Chittenden County Highway Flood Vulnerability Prioritization & Scoping

CCRPC TAC Meeting

March 4, 2026

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Presentation Overview

- Project Purpose and Scope
- Prioritization Method Overview
- Prioritization Method Draft Results
- Comments
- Next Steps

Project Purpose

- Have projects scoped and ready to apply for potential grants (e.g., HMGP Grants)
  - **PHASE I:** Identify and Prioritize Road Segments and Structures Vulnerable to Flood Damage
  - **PHASE II.** Conduct scoping on highest priority locations to develop feasible mitigation options

Phase I Scope of Work

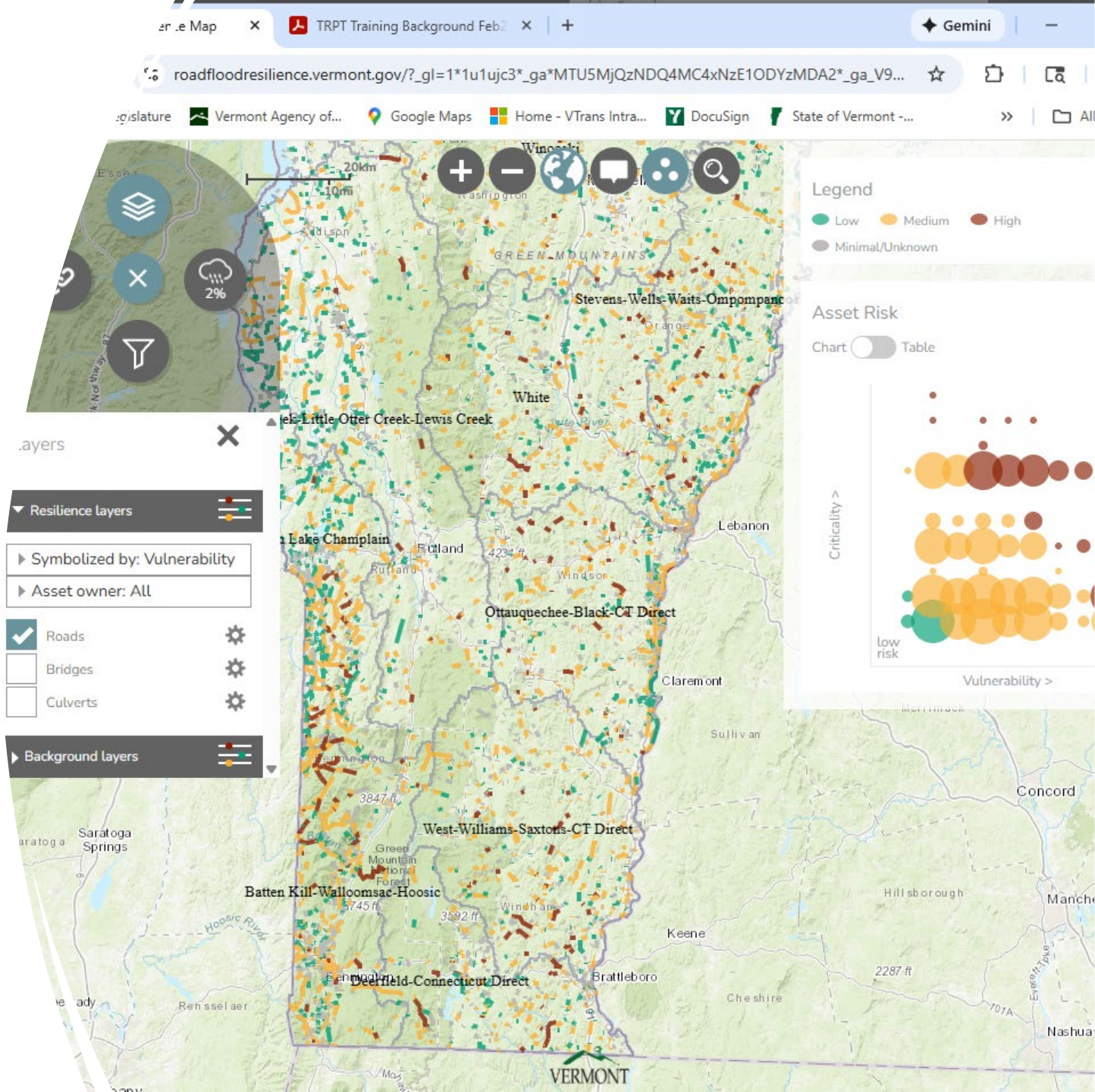
1. Develop the Transportation Flood Vulnerable Prioritization Method.
2. Municipality input
3. Finalize prioritization

Prioritization Criteria

Criterion	MAX Score
TRPT Risk	50
Repeat Damage Location	20
Social Vulnerability Index	10
Located in a Planned Growth Area	5
Hydrologically Connected Roads	15
	100

Transportation Resilience Planning Tool

- Flood Vulnerability Metrics for:
  - Road embankments
  - Bridges
  - culverts
- All state and local roads
- Metrics for:
  - Vulnerability
  - Criticality
  - Risk
- Mitigation Identification



Definitions

Vulnerability: The extent that a transportation asset is exposed to a threat from inundation, erosion, or deposition.

Criticality: How important is the transportation asset that dictates the consequence of the disruption to mobility due to damage.

Risk: The combination of the probability of vulnerability and criticality.

Inundation

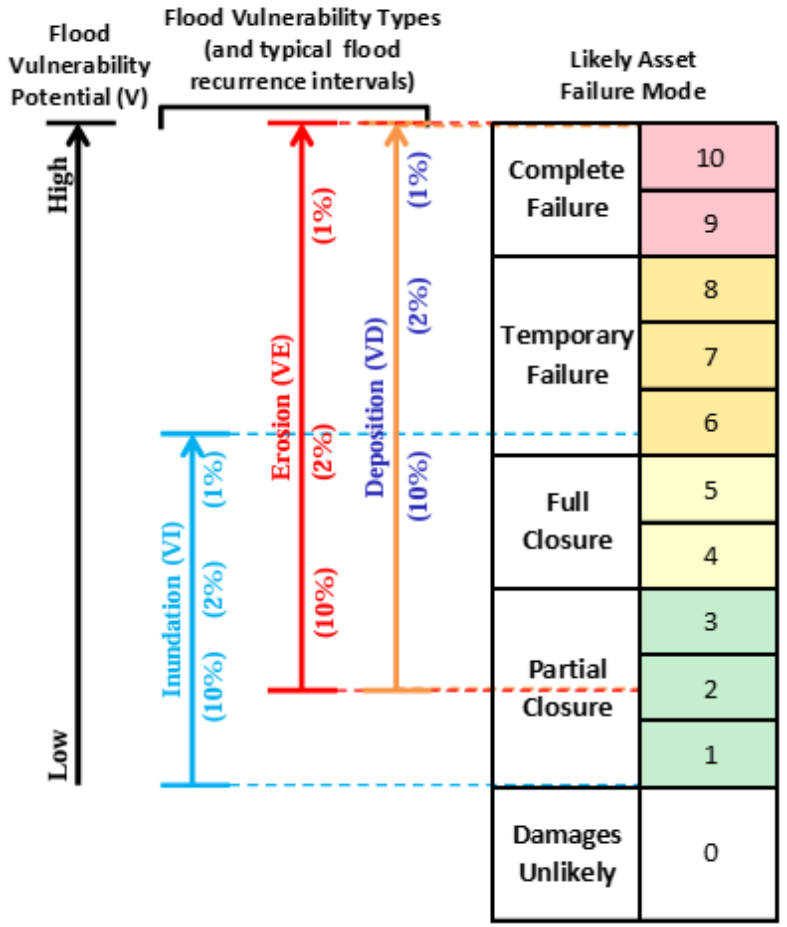
Erosion

Deposition

Vulnerability

$$V_{ROAD\ EMBANKMENT} = MAX(V_{I,ROAD}; V_{E,ROAD}; V_{D,ROAD})$$
$$V_{BRIDGES} = MAX(V_{I,\ BRIDGES}; V_{E,BRIDGES}; V_{D,BRIDGES})$$
$$V_{CULVERTS} = MAX(V_{I,CULVERTS}; V_{E,CULVERTS}; V_{D,CULVERTS})$$

where I = inundation, E = erosion and D = deposition



Complete Destruction
Weeks to Months

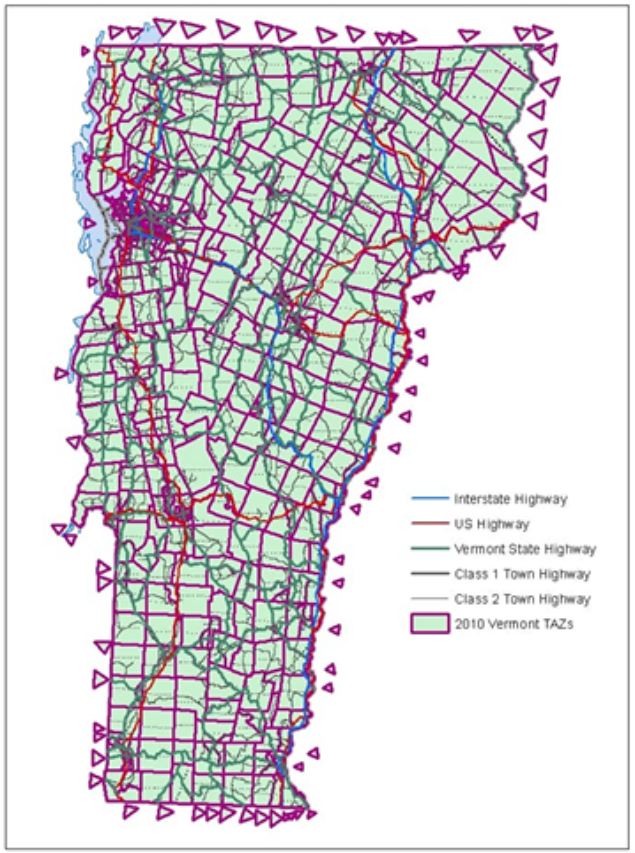
Partial Destruction
Weeks to Months

Temporary Closure
1-3 Days

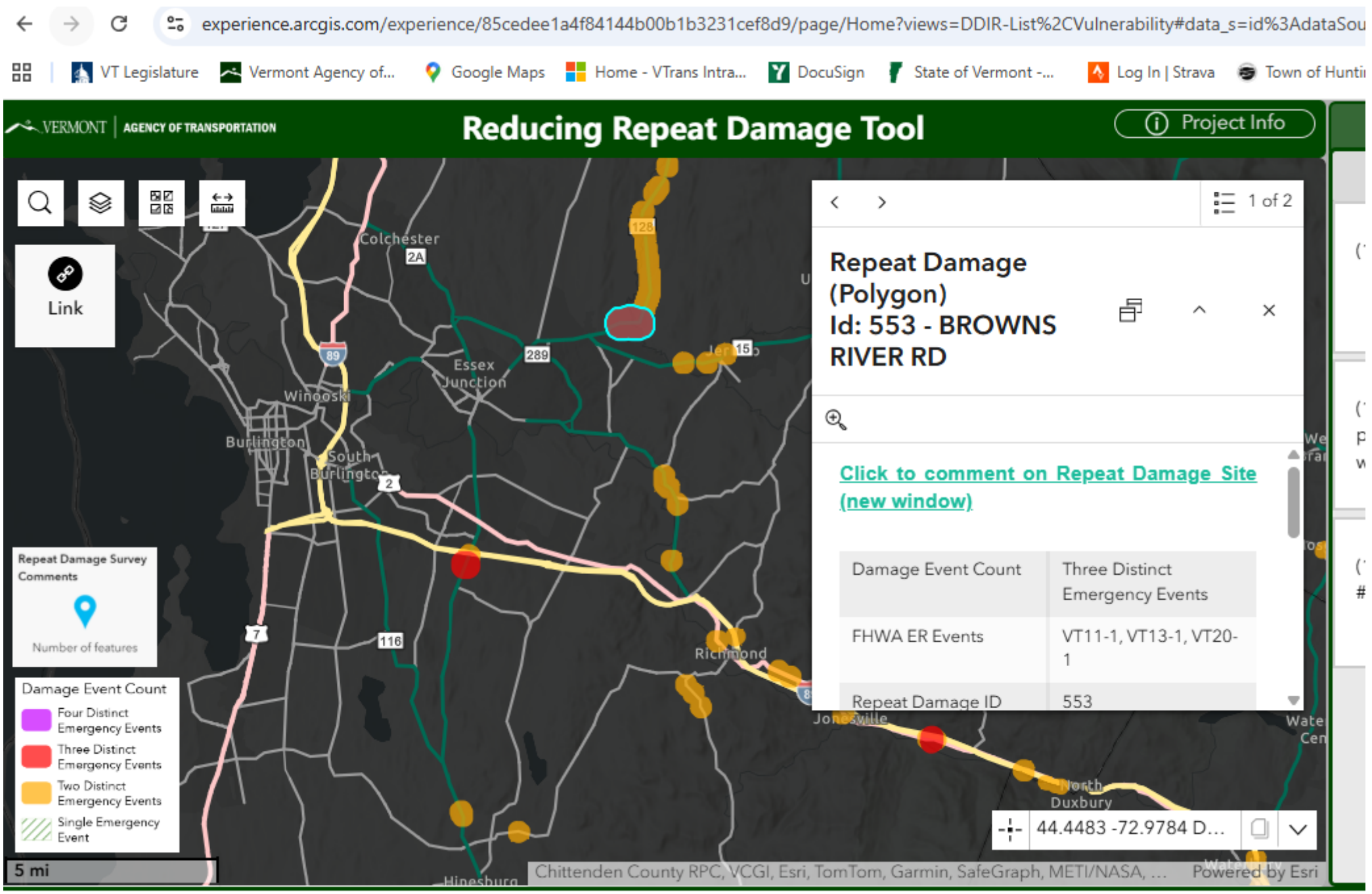
Less than 1 ay

Criticality

1. Travel impacts
   - Failed trips (per day)
   - Excess travel time (hours per day)
   - Isolated areas ('islands') of roads with limited network travel
2. Emergency Services Access
3. Local importance

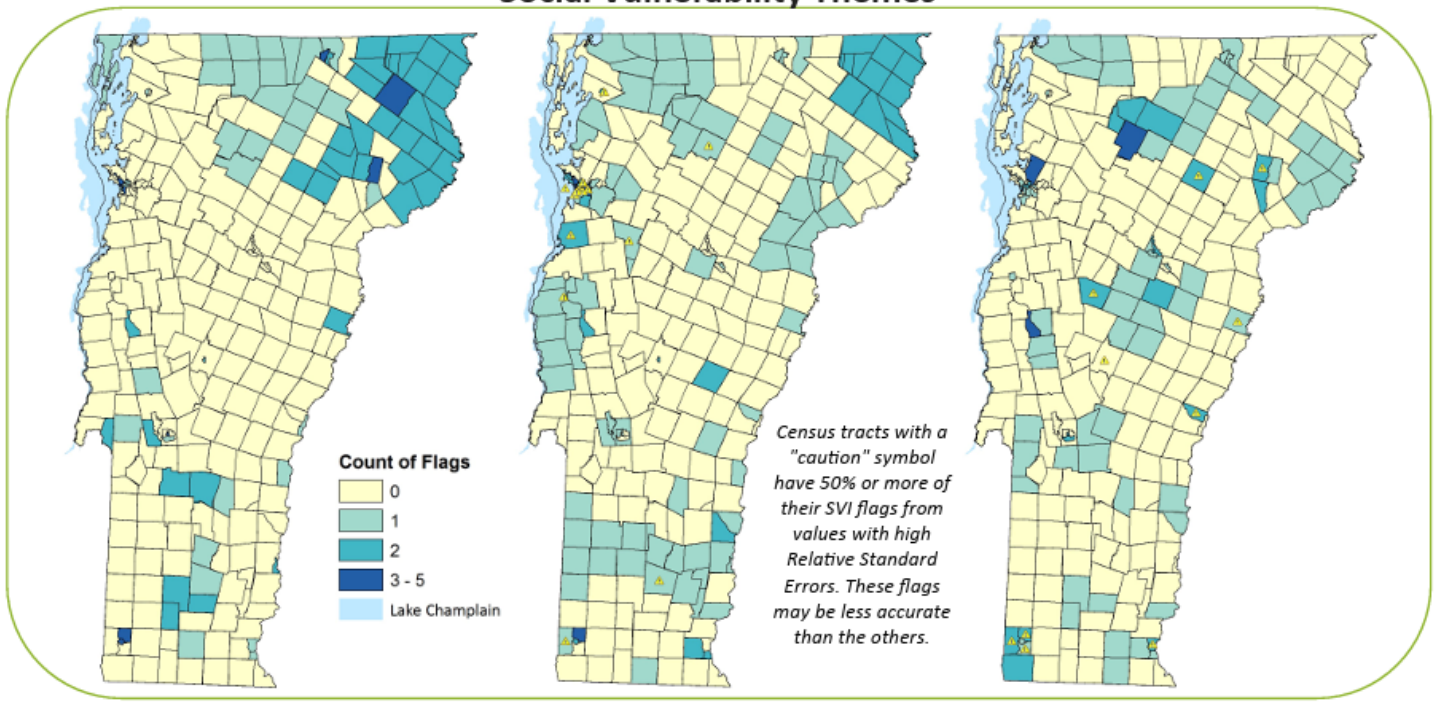


Statewide Travel Demand Model


experience.arcgis.com/experience/85cedee1a4f84144b00b1b3231cef8d9/page/Home?views=DDIR-List%2CVulnerability#data_s=id%3AdataSou
VT Legislature
Vermont Agency of...
Google Maps
Home - VTrans Intra...
DocuSign
State of Vermont -...
Log In | Strava
Town of Hunti
VERMONT | AGENCY OF TRANSPORTATION
Reducing Repeat Damage Tool
Project Info
Link
Colchester
2A
89
289
Essex Junction
Winooski
Burlington
South Burlington
2
7
116
128
15
Richmond
Repeat Damage Survey Comments
Number of features
Damage Event Count
Four Distinct Emergency Events
Three Distinct Emergency Events
Two Distinct Emergency Events
Single Emergency Event
5 mi
1 of 2
Repeat Damage (Polygon)
Id: 553 - BROWNS RIVER RD
Click to comment on Repeat Damage Site (new window)
Damage Event Count
Three Distinct Emergency Events
FHWA ER Events
VT11-1, VT13-1, VT20-1
Repeat Damage ID
553
North Duxbury
44.4483 -72.9784 D...
Chittenden County RPC, VCGI, Esri, TomTom, Garmin, SafeGraph, METI/NASA, ...
Powered by Esri

Social Vulnerability Index

Social Vulnerability Themes



Socioeconomic Vulnerability Measures:

1. **Poverty** - population living below Federal poverty level
2. **Unemployment** - age 16 and over seeking work
3. **Per capita income** - (2013 inflation-adjusted $)
4. **Education** - age 25+ without a high school diploma
5. **Health insurance** - age less than 65 without insurance

Population Vulnerability Measures:

6. **Children** - population age less than 18
7. **Elderly** - population age 65 and over
8. **Disability** - age 5 or more with a disability
9. **Single parent** - percent of households with children
10. **Minority** - Hispanic or non-white race
11. **Limited English** - age 5 and over who speak English less than "Well"

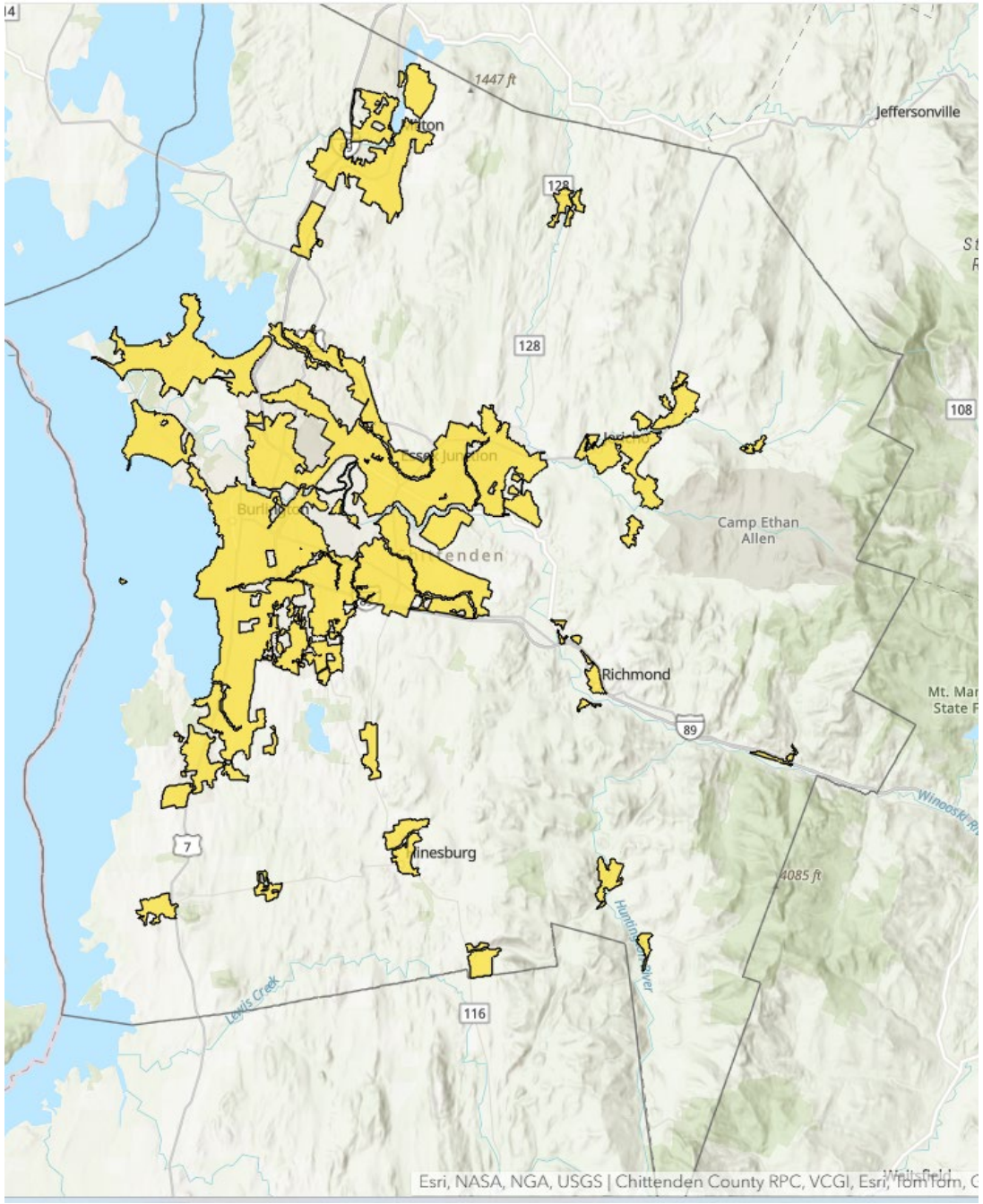
Housing/Transportation Vulnerability Measures:

12. **Large apt. bldgs.** - 10 or more housing units per building
13. **Mobile homes** - percent of housing units
14. **Crowding** - housing units with more than one person per room
15. **No vehicle** - households with no vehicle available
16. **Group quarters** - population living in group quarters

Planned Growth Areas

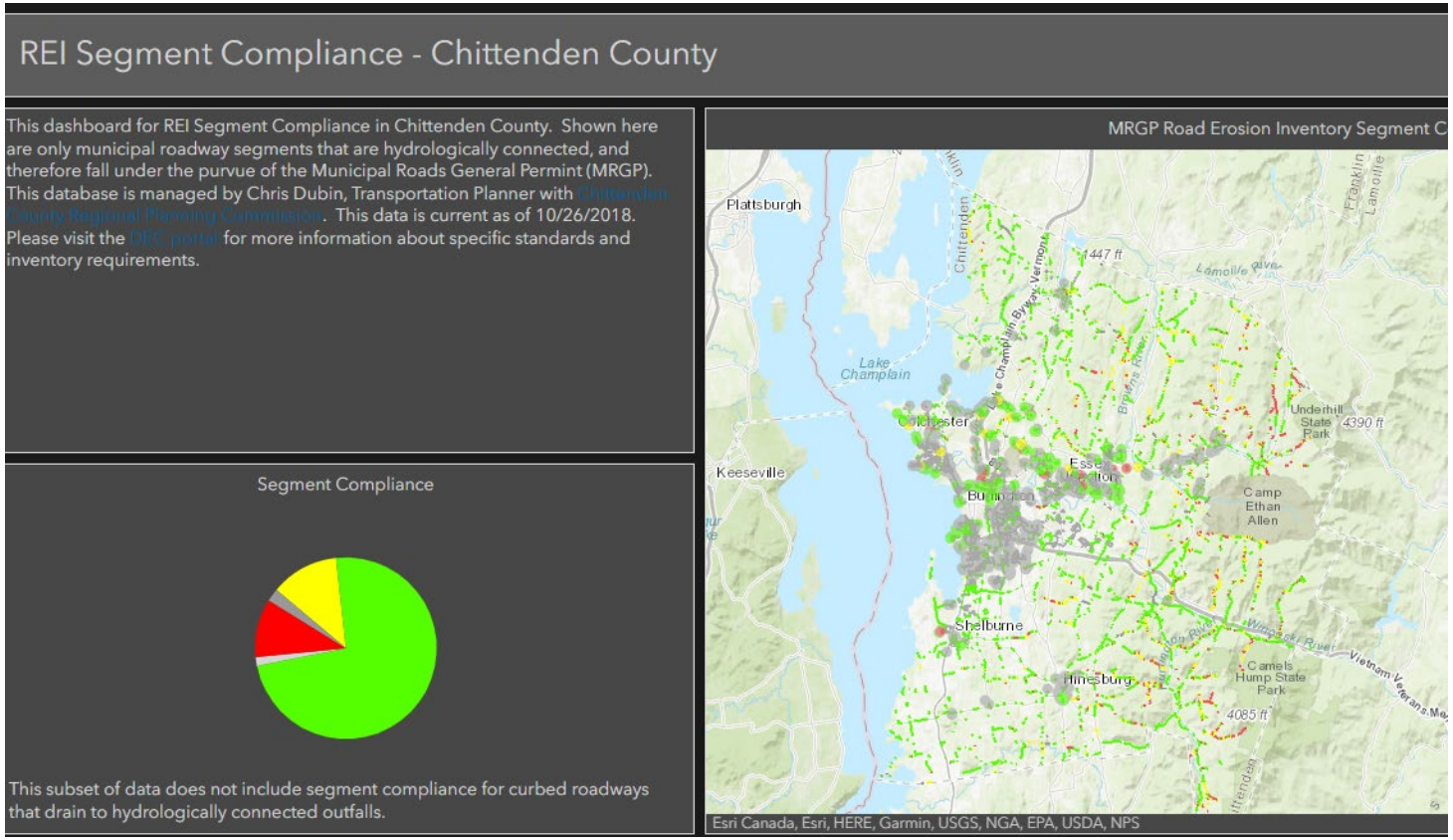
CCRPC Draft Future Land Use Map

- Downtown Center
- Village Center
- Planned Growth Area
- Village Area

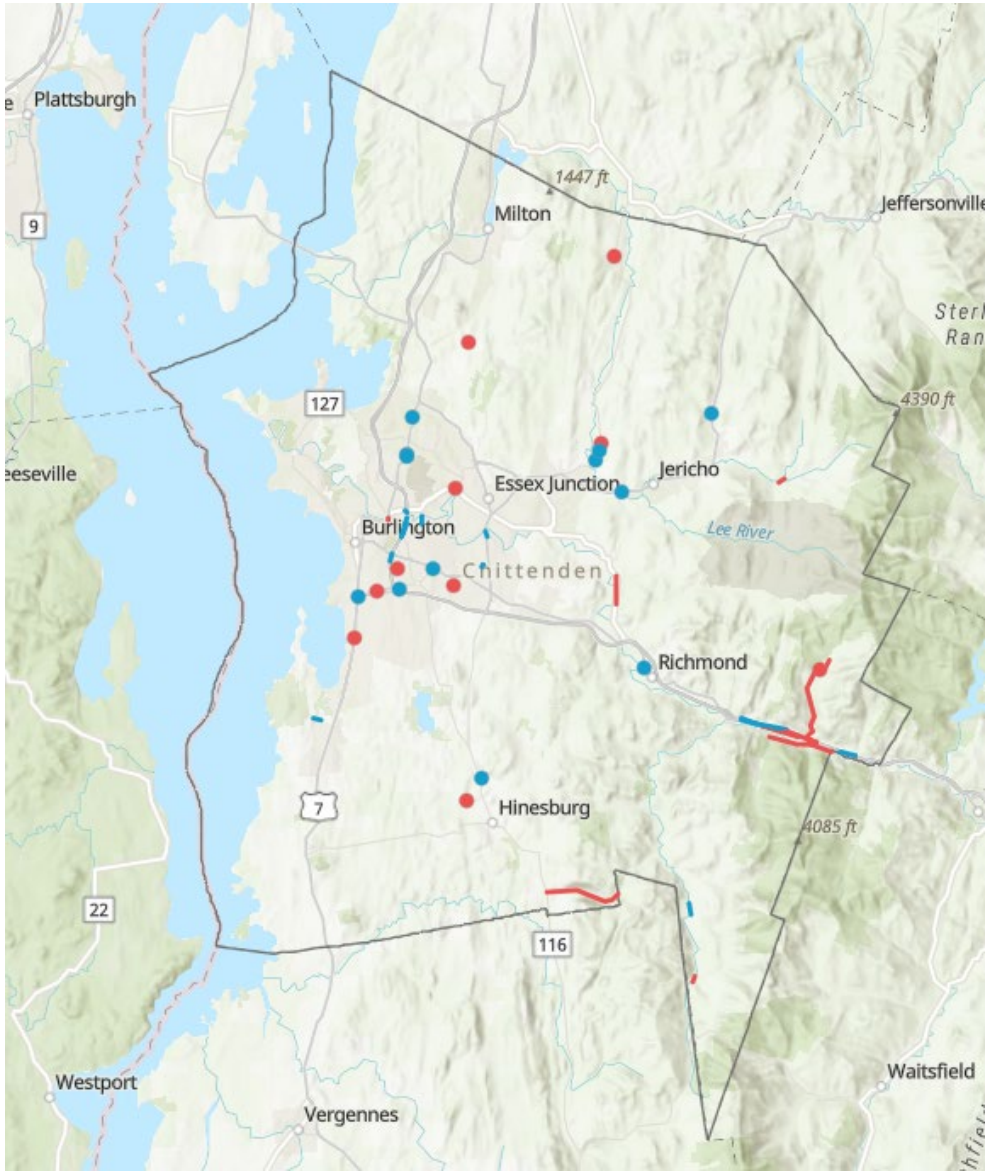


Hydrologically Connected Roads

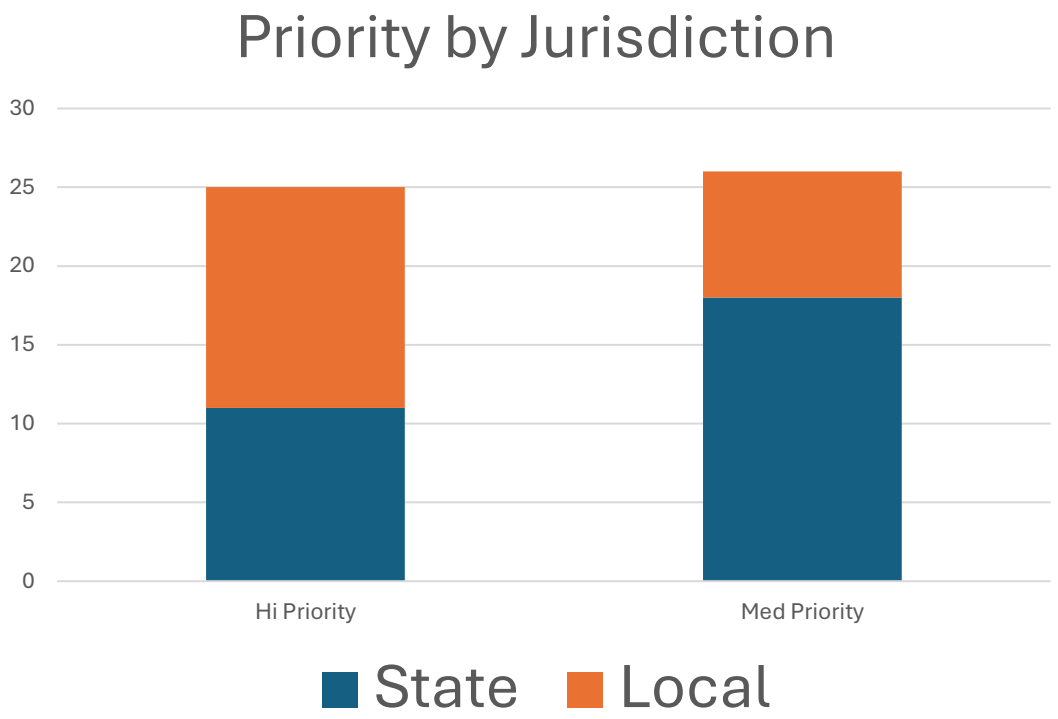
- Local Roads: MRGP
- VTrans Phosphorus Control Implementation Plan Road Segments.

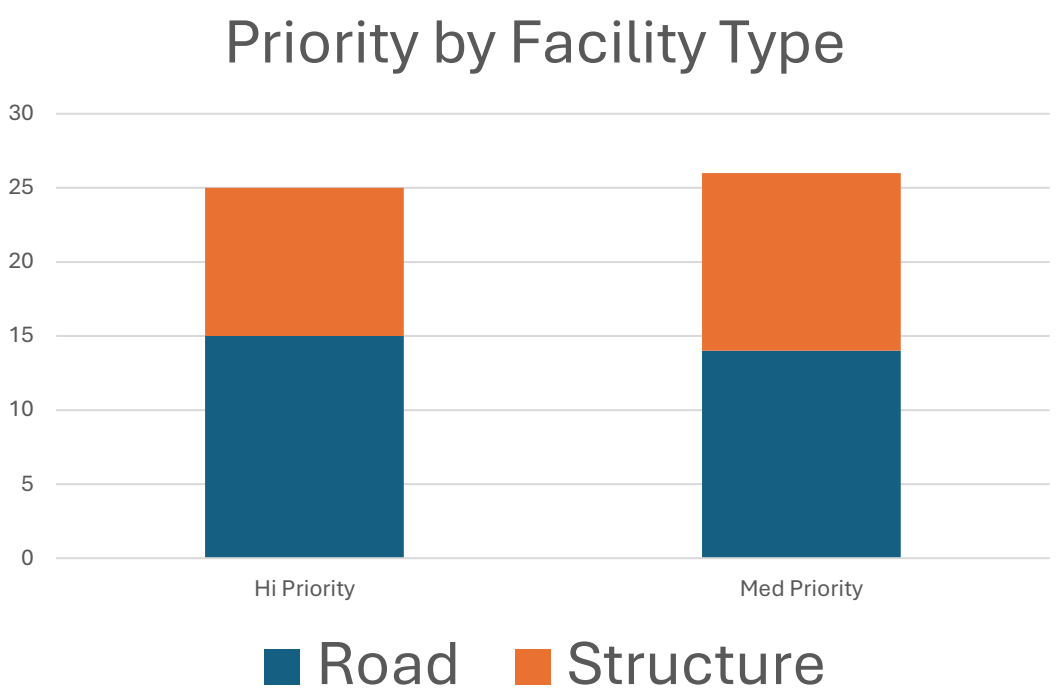


High and Medium Priority Road Segments and Structures



Generalized Results





Next Steps

- Identify repeat damage sites on local roads
  - Road foreman meetings
  - Follow-up with towns not present
- Eliminate high priority locations with projects in development process
- Refine prioritization and select locations for scoping