Geotechnical Asset Management (GAM) – WisDOT Initial Efforts

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Outline

- Wisconsin Highway Research Program (WHRP)
- Project G21-06 Overview
- Next Steps

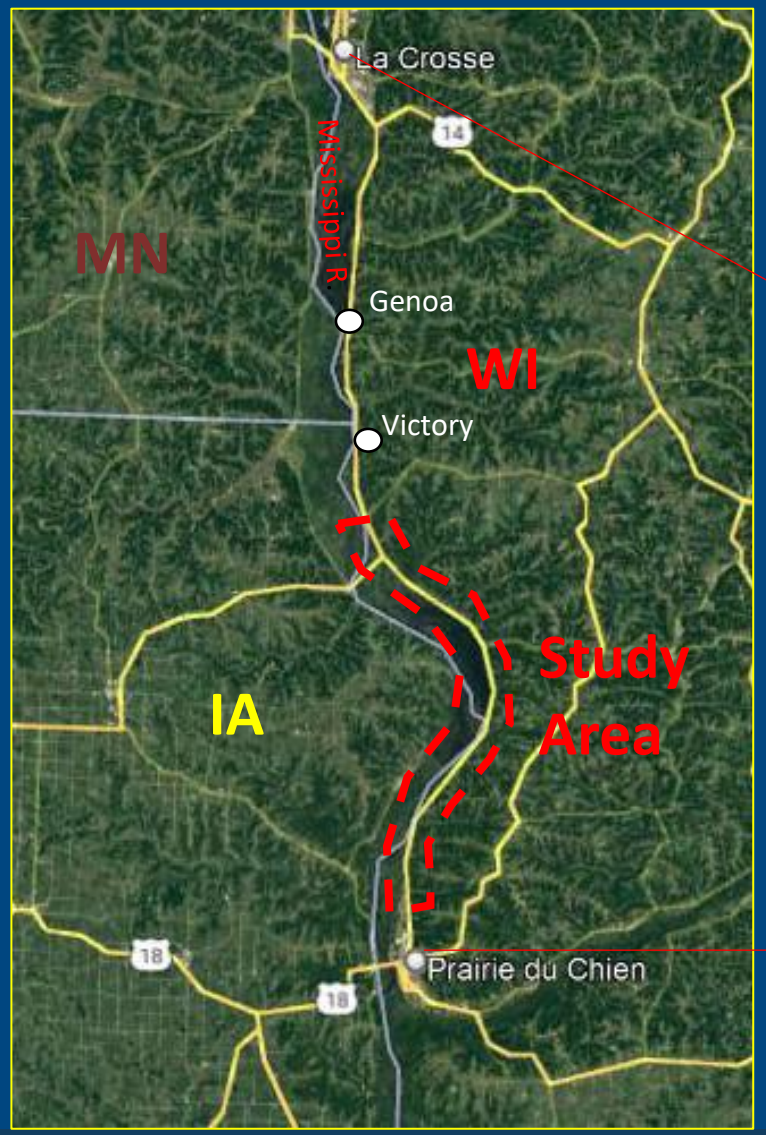
WHRP Project G21-06 – Geotechnical Asset Management (GAM) for Slopes

- Wisconsin Highway Research Program (WHRP)
- Develop GIS-based Geotechnical Asset Management (GAM) for Slopes framework to categorize slope failure risk potential along STH 35 segment (Crawford County)
- GAM-Slopes framework expandable elsewhere (with appropriate local adjustments)
- Potentially use to prioritize and plan future projects and maintenance

WHRP Project G21-06 – Geotechnical Asset Management (GAM) for Slopes

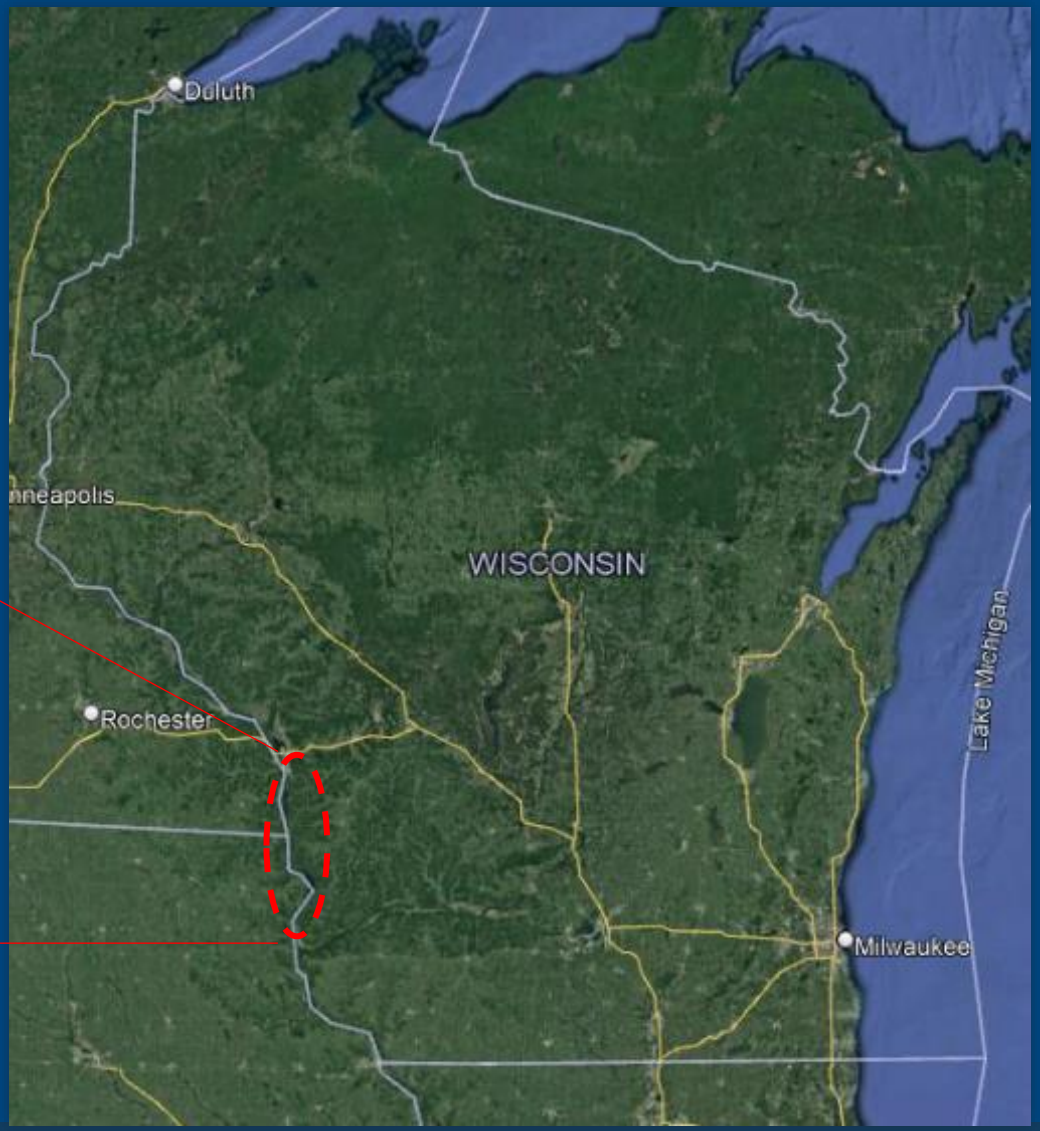
- 11 research team proposals submitted
- BGC Engineering, Inc.
- Schedule: 2 years (Oct. 2020 – Sept. 2022)
- Budget: $150,000

STH 35 – Crawford County



GREAT RIVER ROAD WISCONSIN

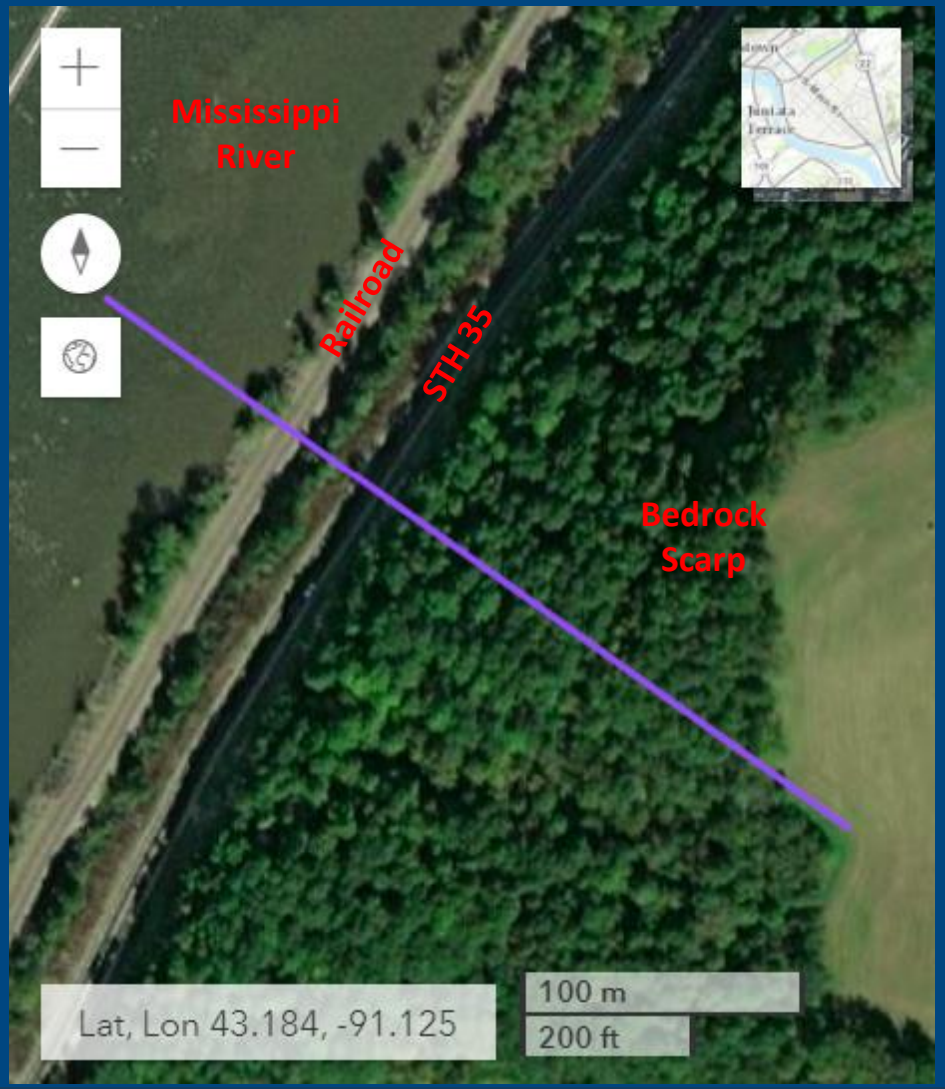
Study area ~30 miles

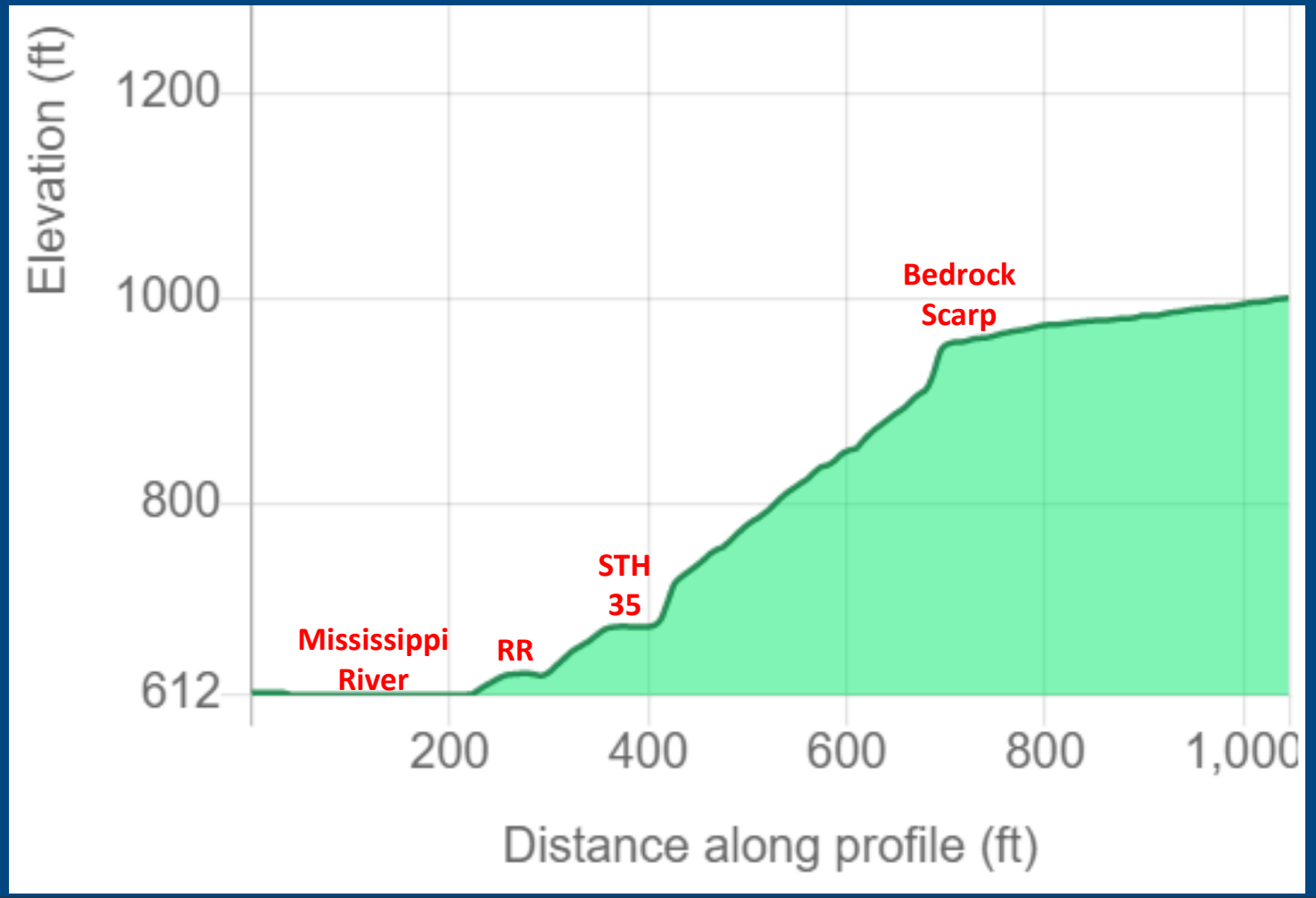


Sources: Google Earth; wigrr.com

WISCONSIN DEPARTMENT OF TRANSPORTATION

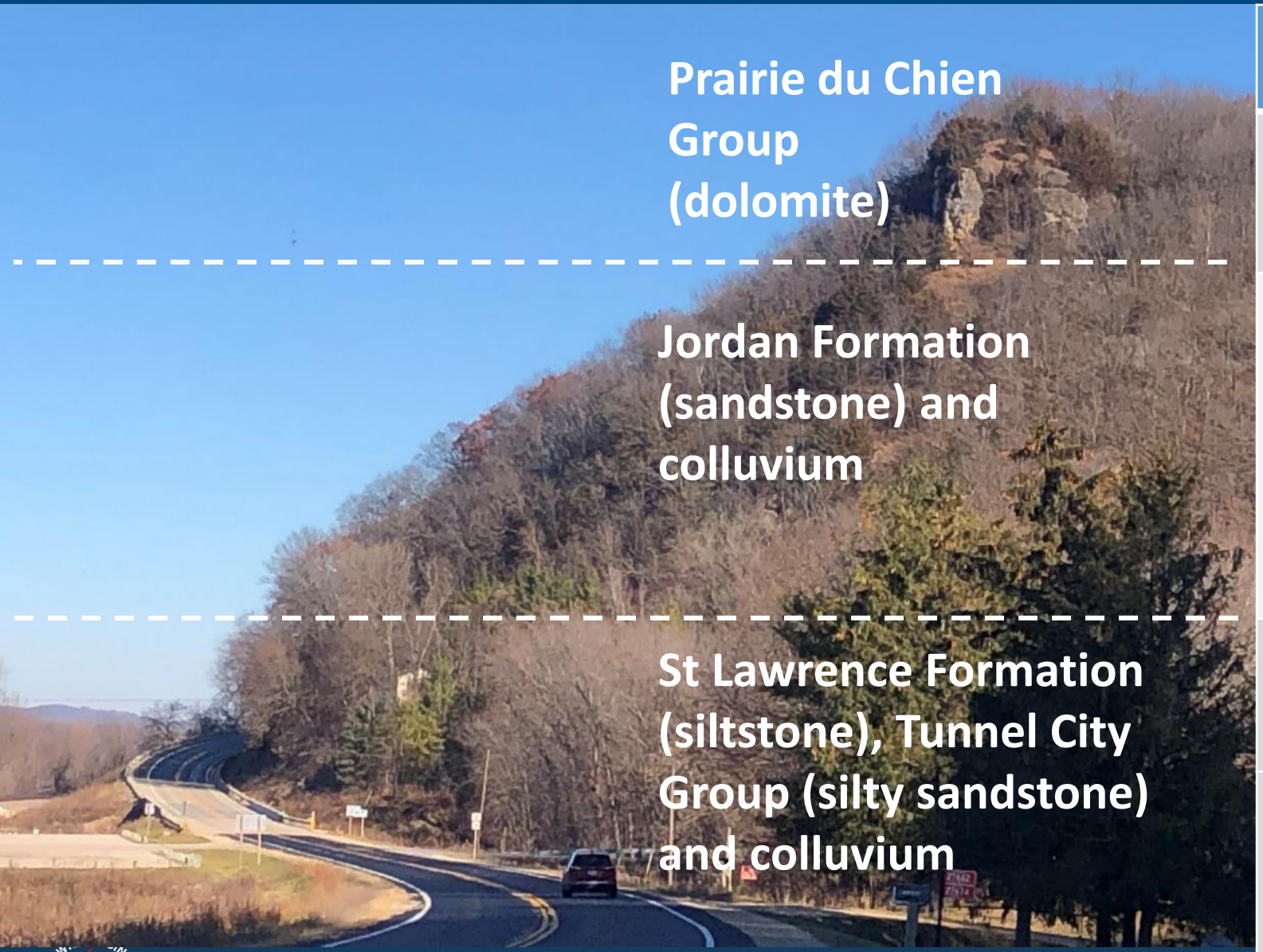
STH 35 – Generalized Cross Section





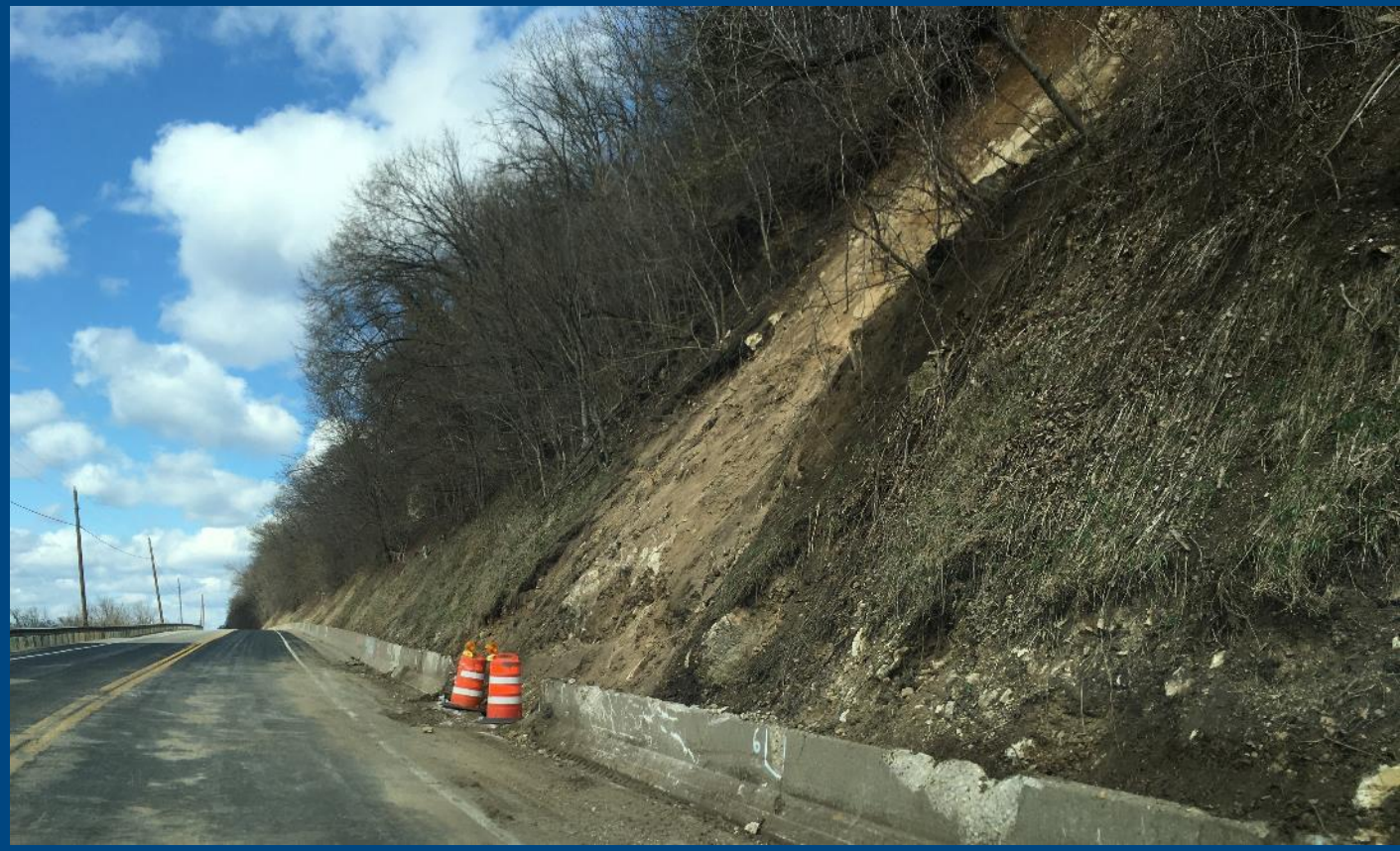
Source: Cambio™

STH 35 - Geology



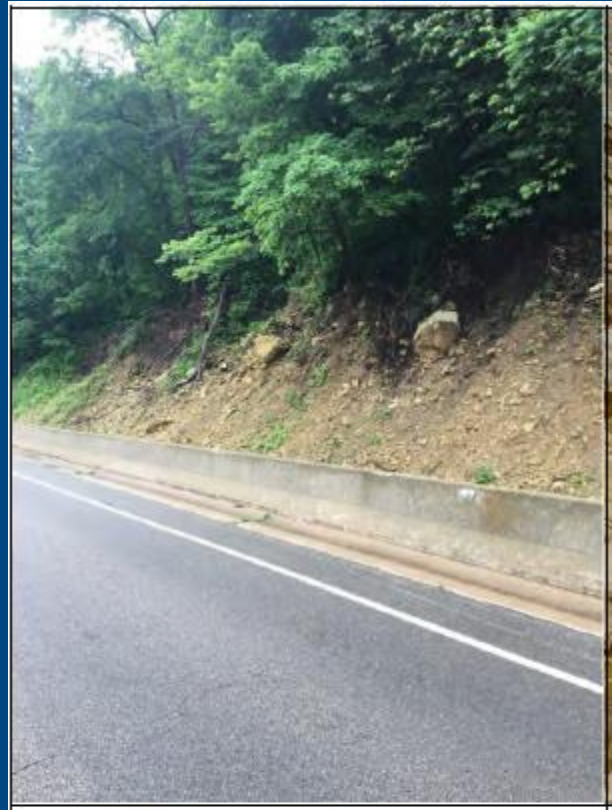
Geologic Description	Observed Failure Mechanisms
Primarily medium- to thick-bedded dolomite	Planar, wedge, or toppling
Fine- to coarse-grained sandstone	Wedge or toppling
Siltstone to silty dolomite	Planar, wedge and raveling
Silty, shaley, glauconitic sandstone	Sliding, raveling and undercutting

STH 35 – Typical Slide Event



STH 35 – Field Reconnaissance

STH 35 – Slope Hazards Identified

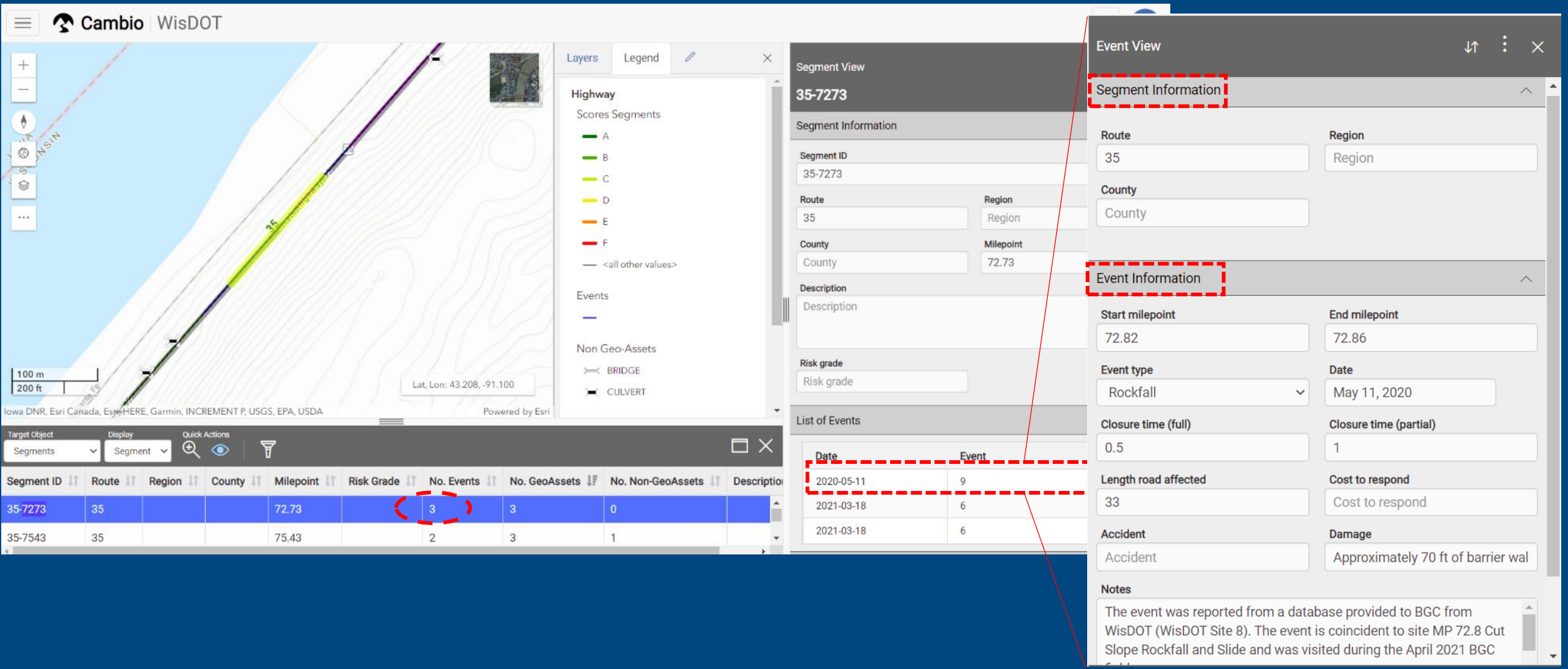
		
Rockfall sourced from the upper colluvium (typically dislodged boulders that are >1yd^3)	Fragmental rockfall and rockslides sourced from the Jordan Sandstone	Shallow colluvial slides in the upper colluvium and lower colluvium/Lone Rock Formation

Note: Slide information prepared by BGC for project presentation.

GIS-Based Model
Cambio™ Geohazard Management System

- Web-based GIS platform – spatial database for documenting geohazards and asset management
- Originally developed for pipeline and railway geohazard management
- Readily adapted to other linear infrastructure (e.g., highways)
- Customizable for different available data (e.g., LiDAR, USGS bedrock geology maps, precipitation data, pavement condition data, culvert proximity, event history, field mapping, etc.)

Cambio™ for WisDOT

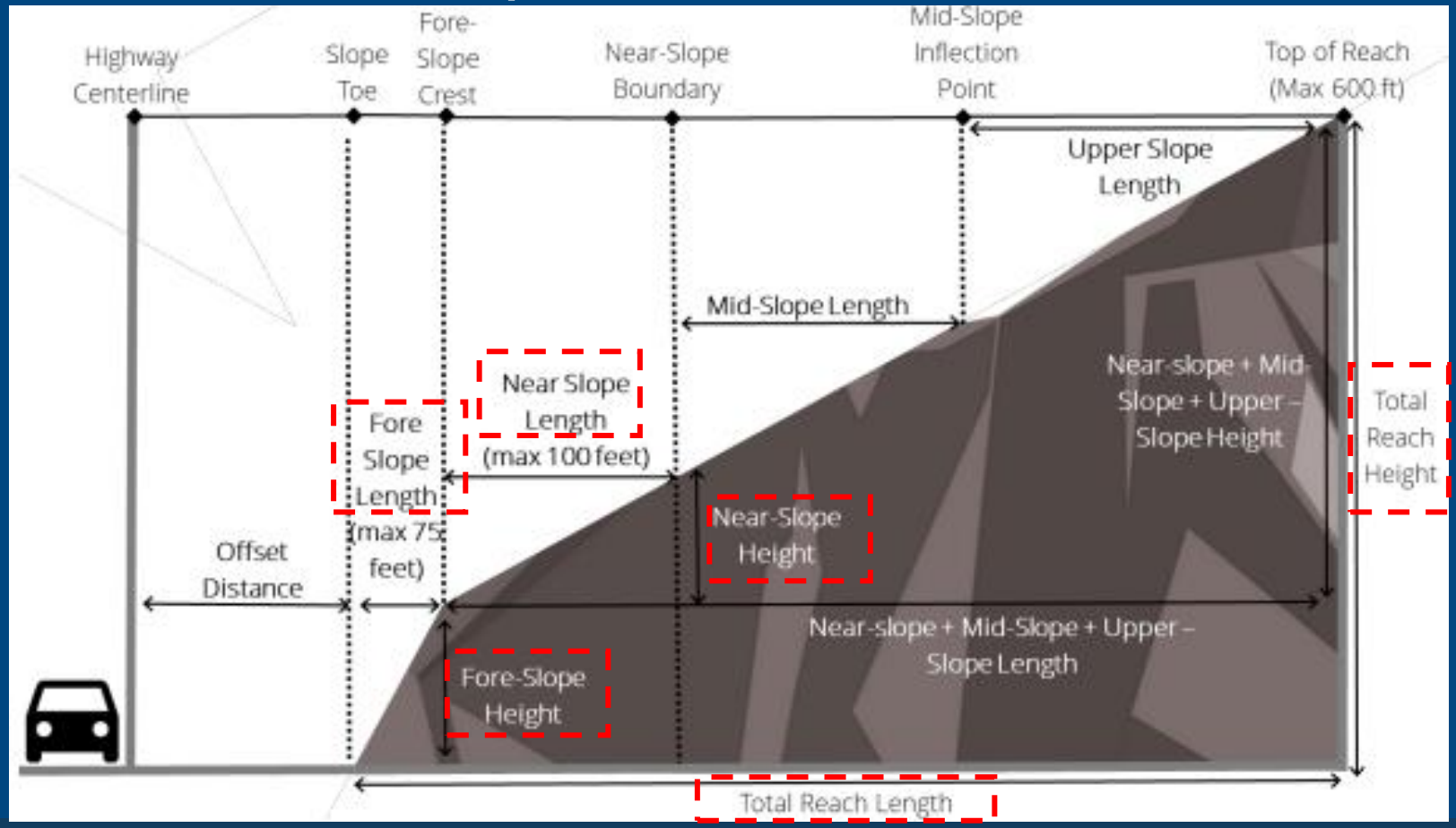


Susceptibility Model

Current Model Inputs (Up-Slope Hazards)

- Fore-slope height & angle
- Near-slope angle
- Total slope angle
- Cut slope geology

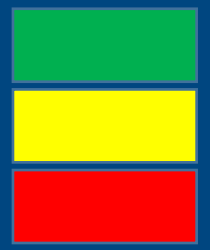
Geometric Data from LiDAR



Note: Figure prepared by BGC for final project report.

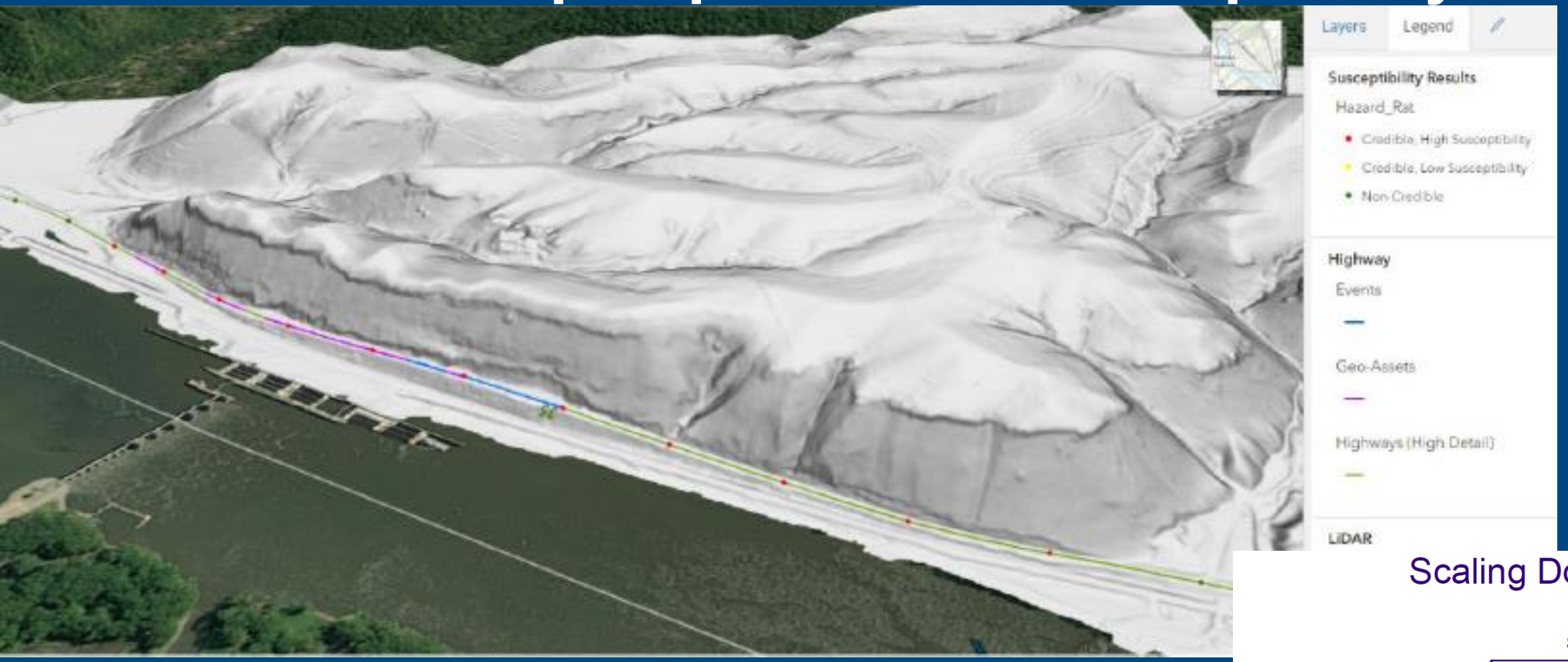
Susceptibility Model Categorization

- Susceptibility model weighs model inputs based on correlation between the presence or absence of observed hazard
- Susceptibility categories:
  - Non-Credible Hazard (low) (56%)
  - Credible Hazard, Low-Susceptibility (medium) (17.5%)
  - Credible Hazard, High-Susceptibility (high) (26.5%)

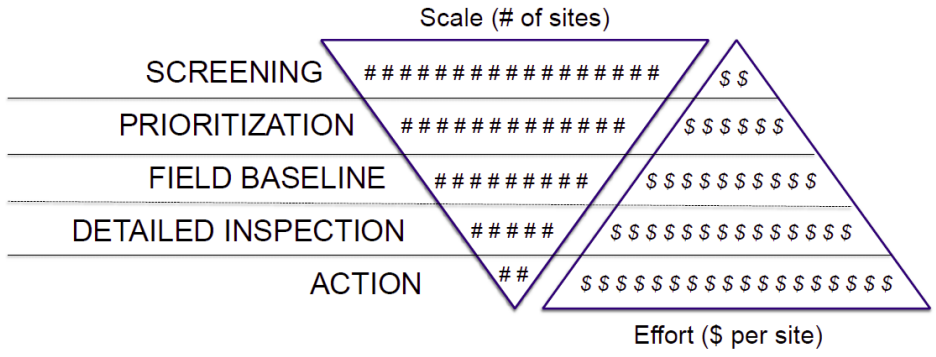


- Initial screening - identify sites for additional investigation to better understand slope failure susceptibility
- Prioritize additional work and/or remedial measures

Upslope Hazard Susceptibility



Scaling Down Approach



Note: Slide information prepared by BGC for project report.

FUTURE STEPS

- Improve Tracking - Engage maintenance staff to track slope instability events (costs) & early indicators? Early discussions underway
- Develop slope failure RISK maps?

  Requires higher-level discussions of consequences (costs/impacts)
- Expand to other parts of the state with historic slope stability issues?

  WGNHS plans to complete more detailed geologic mapping of WI-35 corridor
- Pooled-fund study to continue GAM efforts?

  Evaluating opportunities
- NEED TO FIND WAYS TO DEMONSTRATE BENEFITS OF GAM!

  Justify the cost of a preemptive program; engage decision makers

THANK YOU - QUESTIONS?

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