Flooding Dynamic Modeling for Optimized Planning of CORE MPO Transportation Infrastructure Systems

Matthew V. Bilskie, Felix Santiago-Collazo & Brian Bledsoe, UGA, College of Engineering

Clark Alexander, UGA, Skidaway Institute of Oceanography

Scott Pippin & Shana Jones, UGA, Carl Vinson Institute of Government

Ed DiTommaso, Goodwyn Mills Cawood

Goodwyn Mills Cawood

UNIVERSITY OF GEORGIA
Institute for Resilient Infrastructure Systems

UNIVERSITY OF GEORGIA
Coastal Ocean Analysis and Simulation Team

UNIVERSITY OF GEORGIA
Skidaway Institute of Oceanography

Carl Vinson Institute of Government
UNIVERSITY OF GEORGIA

Presentation Outline

1. Project Team
2. Project Goal & Overview
3. Project Update
   - Committees and Engagement
   - Stormwater Modeling

Team

- College of Engineering
  - Matt Bilskie
  - Brian Bledsoe
  - Felix Santiago-Collazo
- Skidaway Institute of Oceanography
  - Clark Alexander
- Carl Vinson Institute of Government
  - Scott Pippin
  - Shana Jones
- Goodwyn Mills Cawood
  - Ed DiTommaso







Project Goal

To develop a Project Prioritization Tool that assists with optimizing the planning of new and existing infrastructure to improve reliability and resiliency with additional consideration to economic constraints and social inequities.

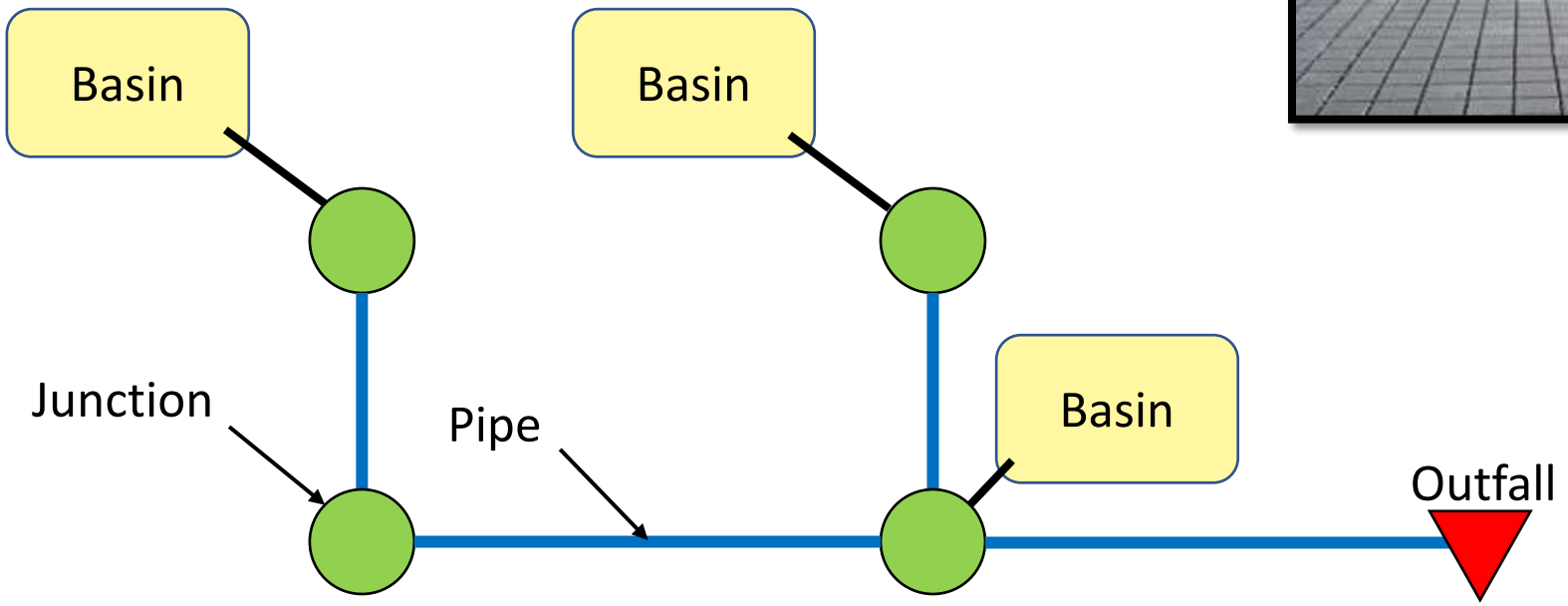
The Project Prioritization Tool will be synergized with an updated Road Vulnerability Assessment.

Road Vulnerability Assessment & Project Prioritization

1. Equity & Livability Objectives
   - Include social vulnerability data
   - Critical Infrastructure
   - Major transportation routes (emergency services)
2. Evaluation
   - Develop metrics to inform the Project Prioritization Tool
   - Compound flooding (coastal and rainfall)
   - Sea Level Rise
   - Road classifications & critical facility access
3. Financial Stewardship & Project Prioritization
   - Prioritize projects to increase resiliency of transportation infrastructure
   - Include cost, land use, access, and environmental justice

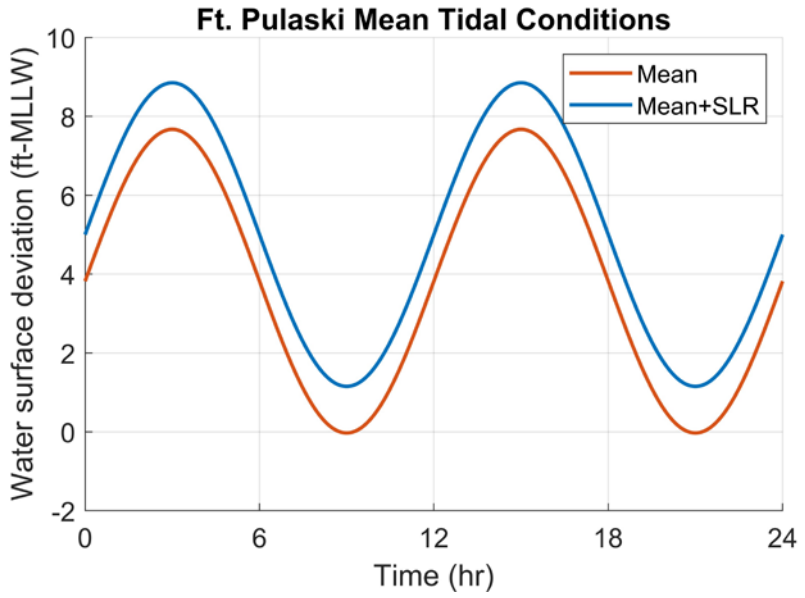
SWMM (Stormwater Management Model

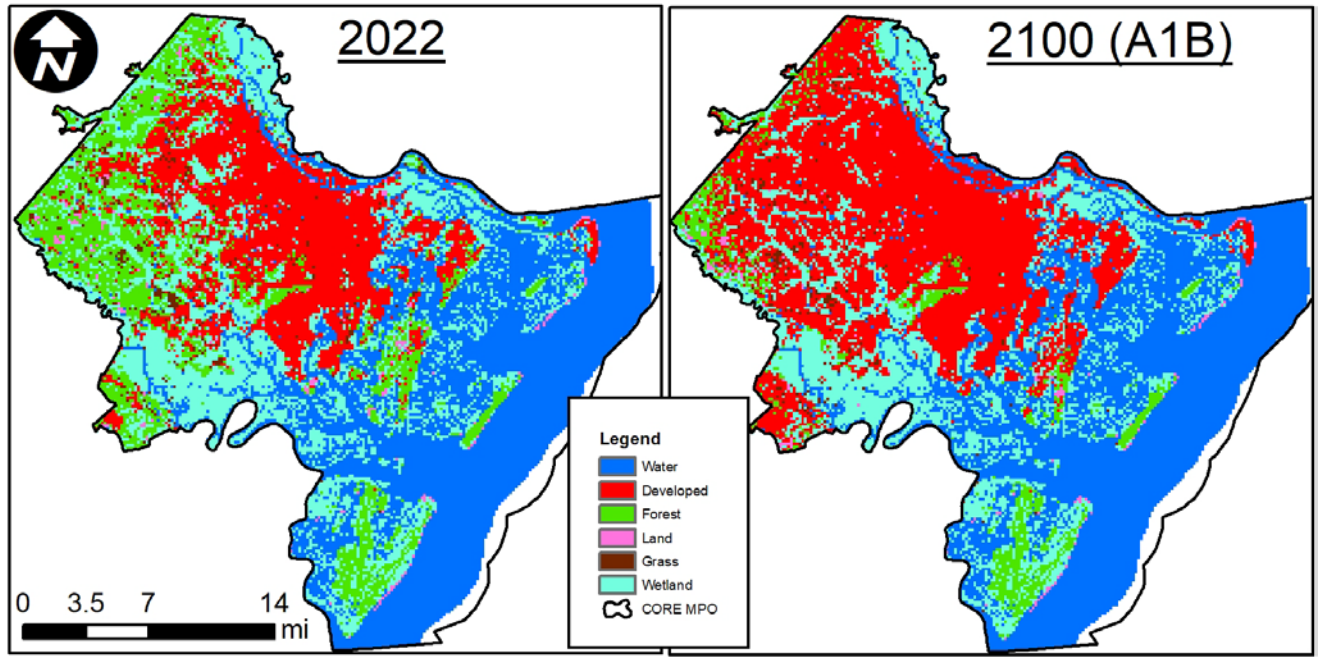
- Simulate runoff quantity & quality
- Good for small homogeneous sub-basins
- Rainfall on a basin → Runoff → Pipe network → Routed to the outfall



SWMM Application

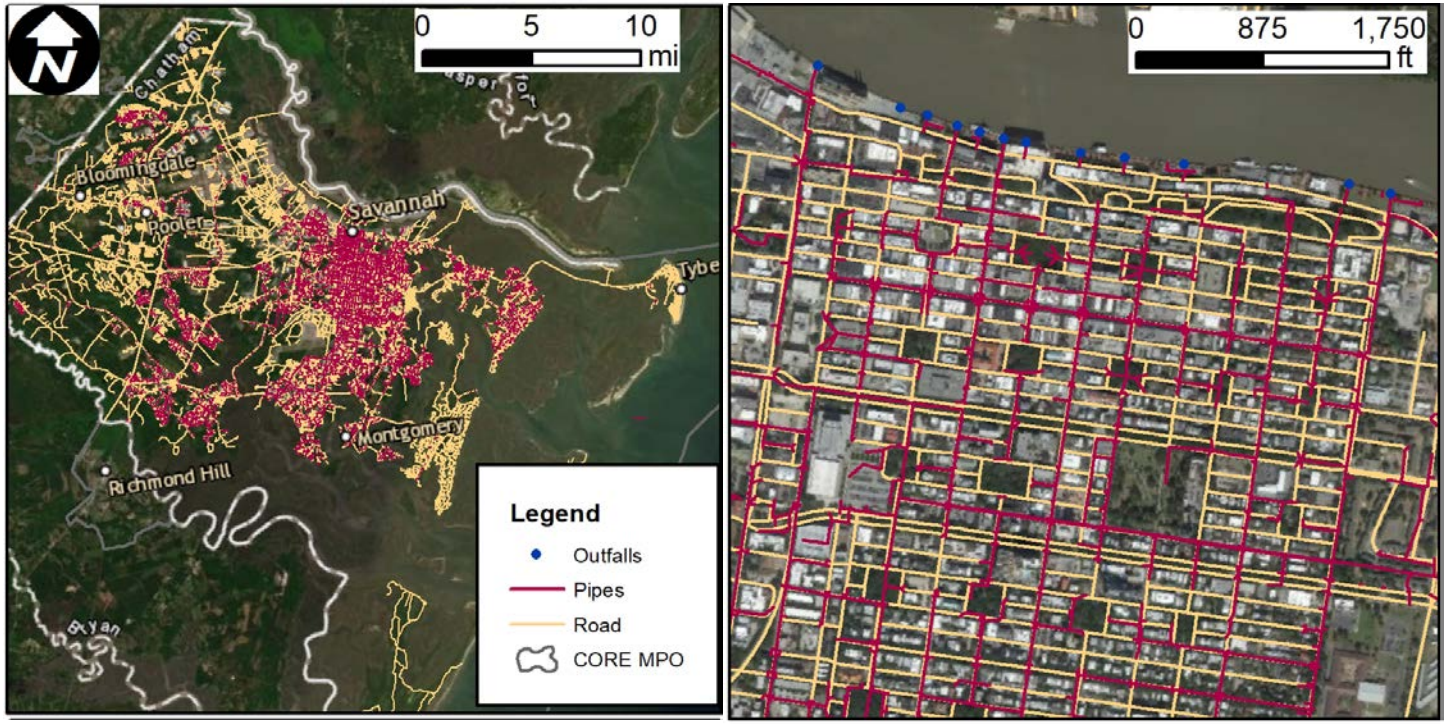
- Assess current vs future conditions
  - How might SLR creep upstream into the stormwater system?
  - How future land use can alter runoff and discharges?
- Develop a toolset to examine stormwater impacts to transportation infrastructure





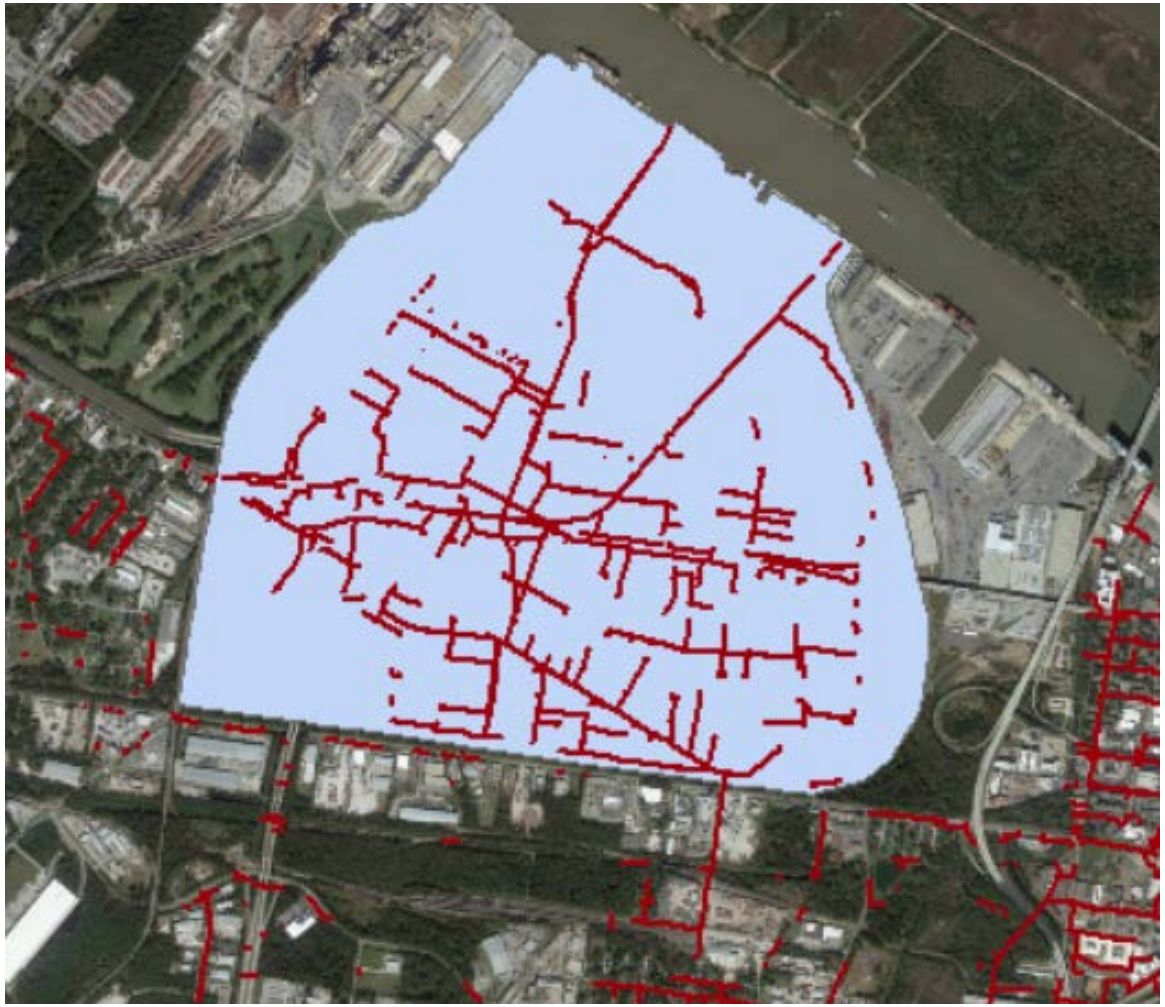
Data Collection

- Stormwater Infrastructure
  - Outfalls, canals, ditches, pipes, reservoirs, pump stations, tide gates, headwalls, manholes, green infrastructure, etc.
  - Stormwater drainage basins
- Road centerlines
- Land Use Land Cover
- Soil Types

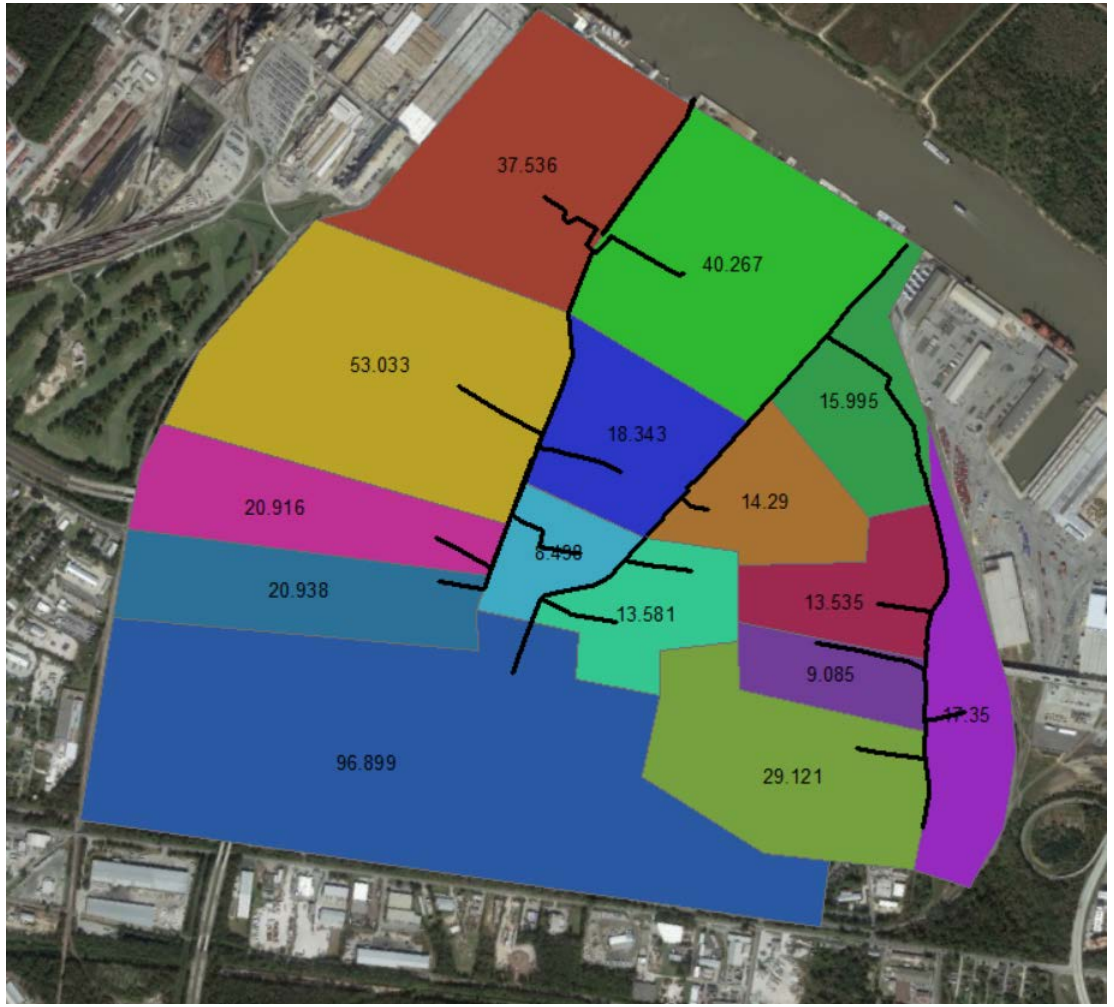


Fell Street Basin

Stormwater Network

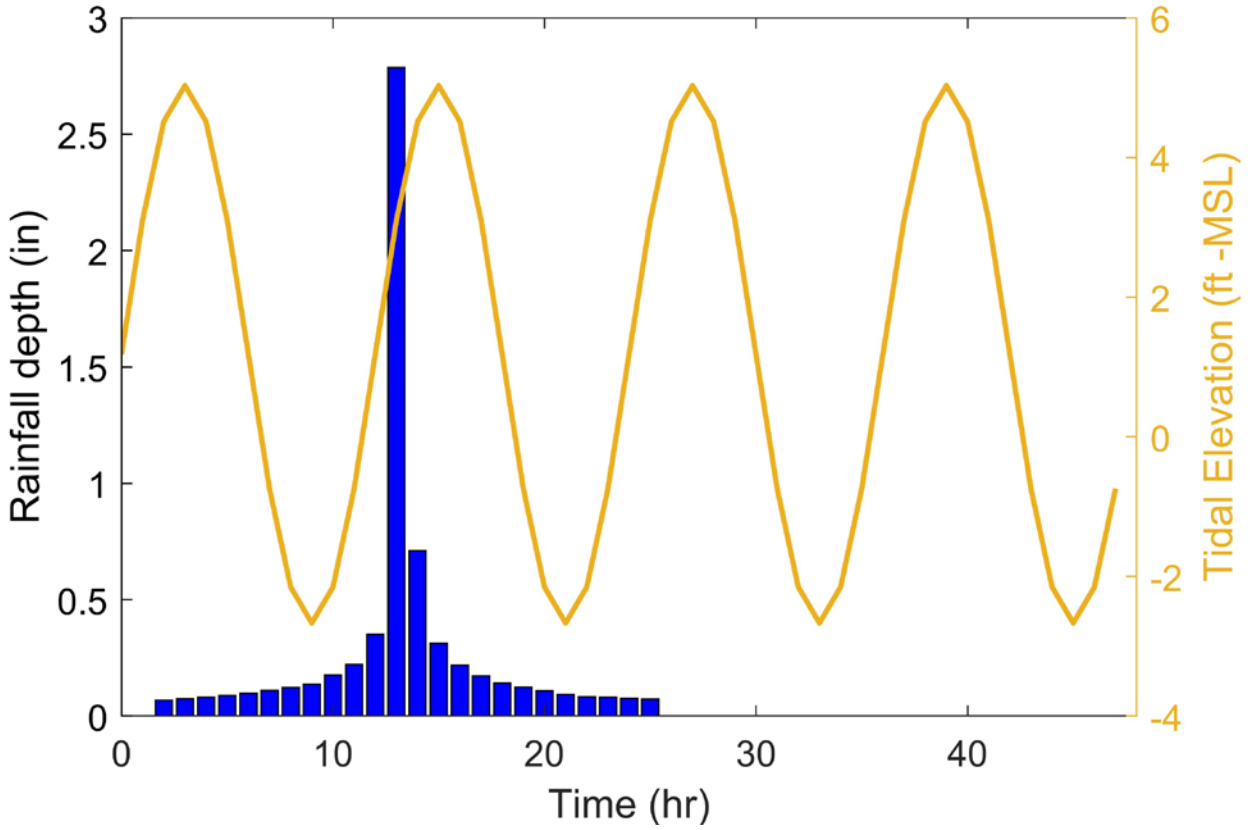


Simplification



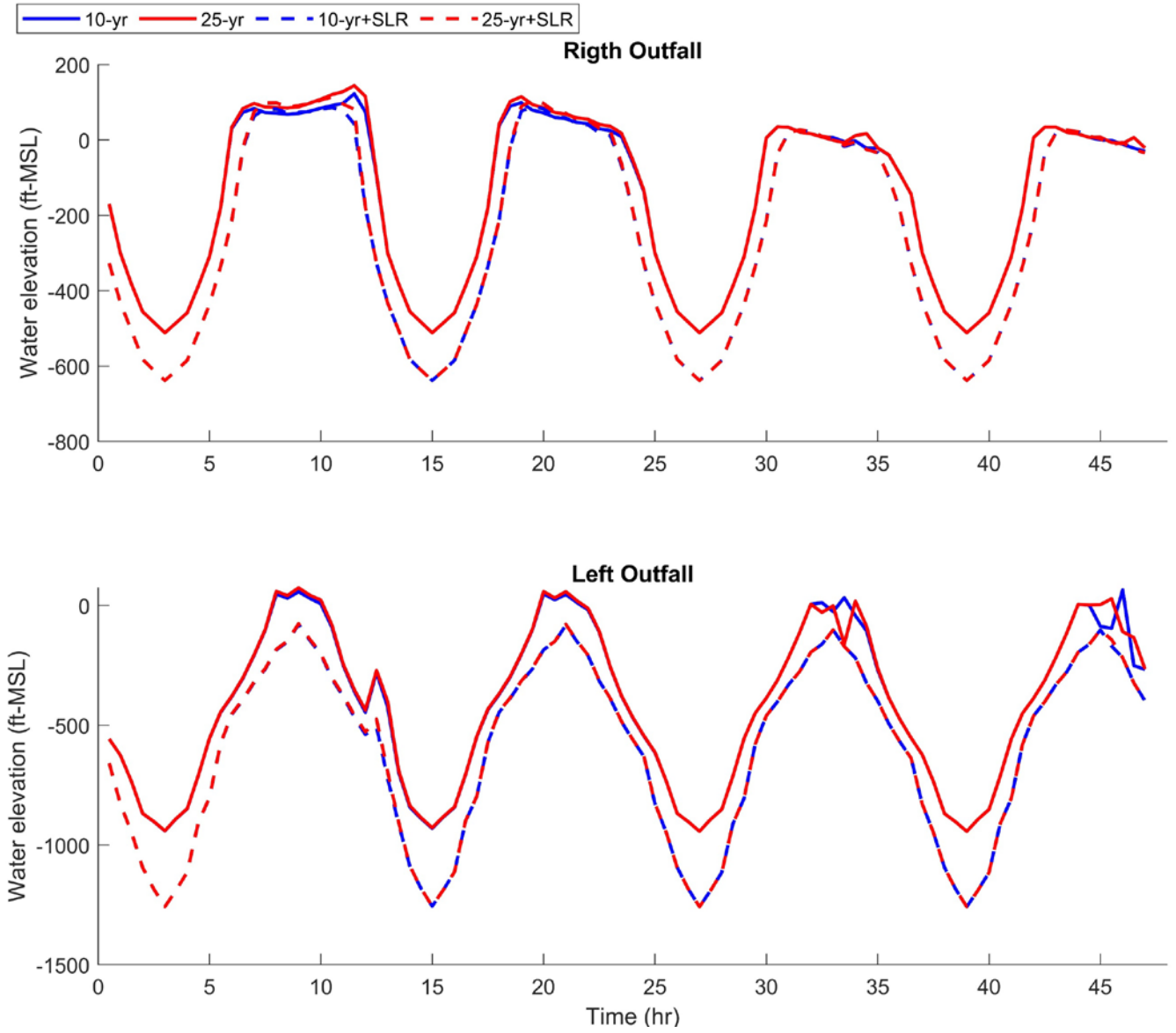
Fell Street Basin

- Basin Information
  - 15 sub-catchments
  - 64 junction nodes
  - 2 outfalls
  - Curve numbers: 88-94
- Model Forcing
  - Type 2 cumulative rainfall 24-hr
    - 6.51 in depth, T_R = 10-yr
    - 8.1 in depth, T_R = 25-yr
  - Tide conditions
    - Average amplitude
    - Average amplitude + Intermediate SLR

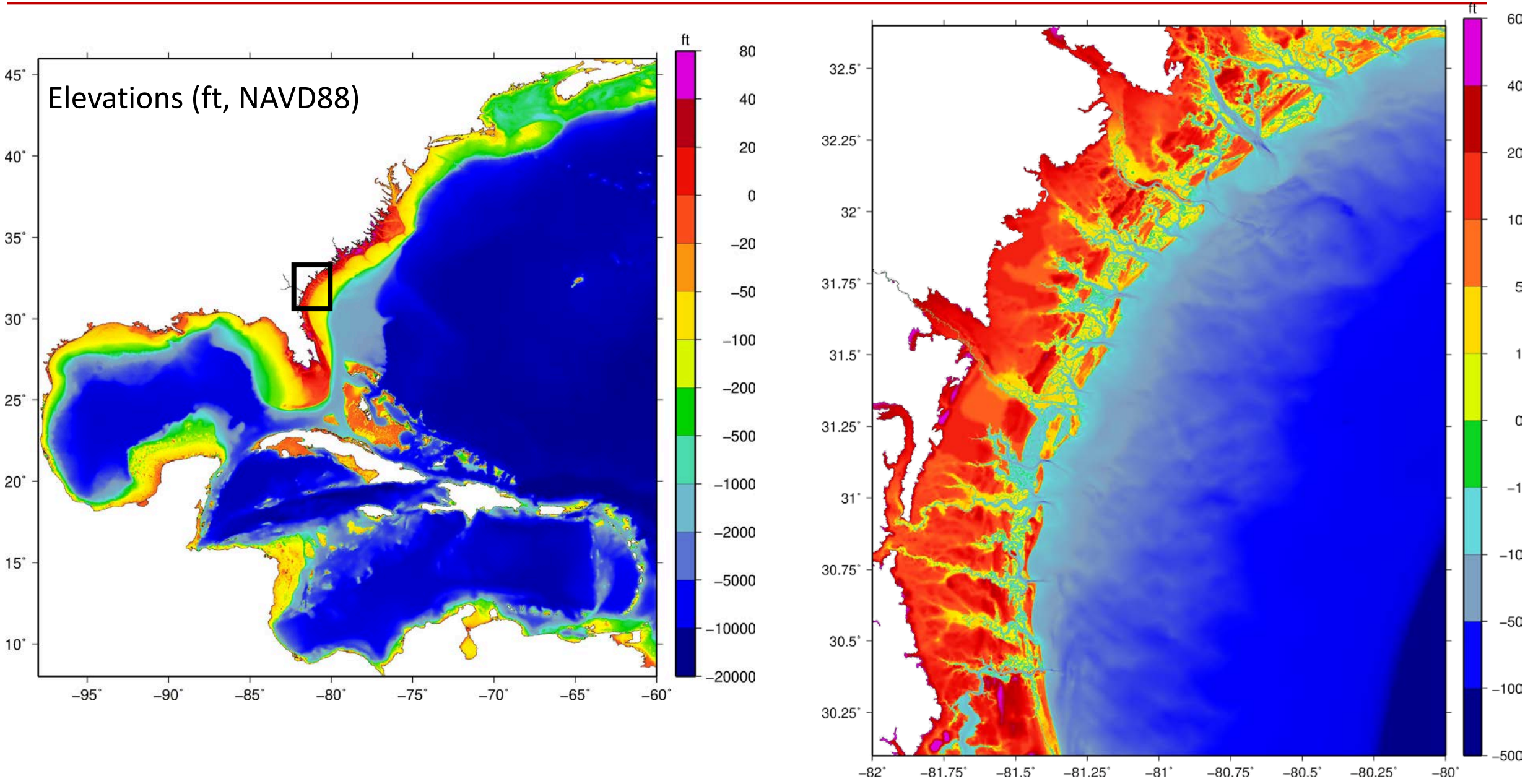


Average tidal conditions and a 10-yr rainfall event

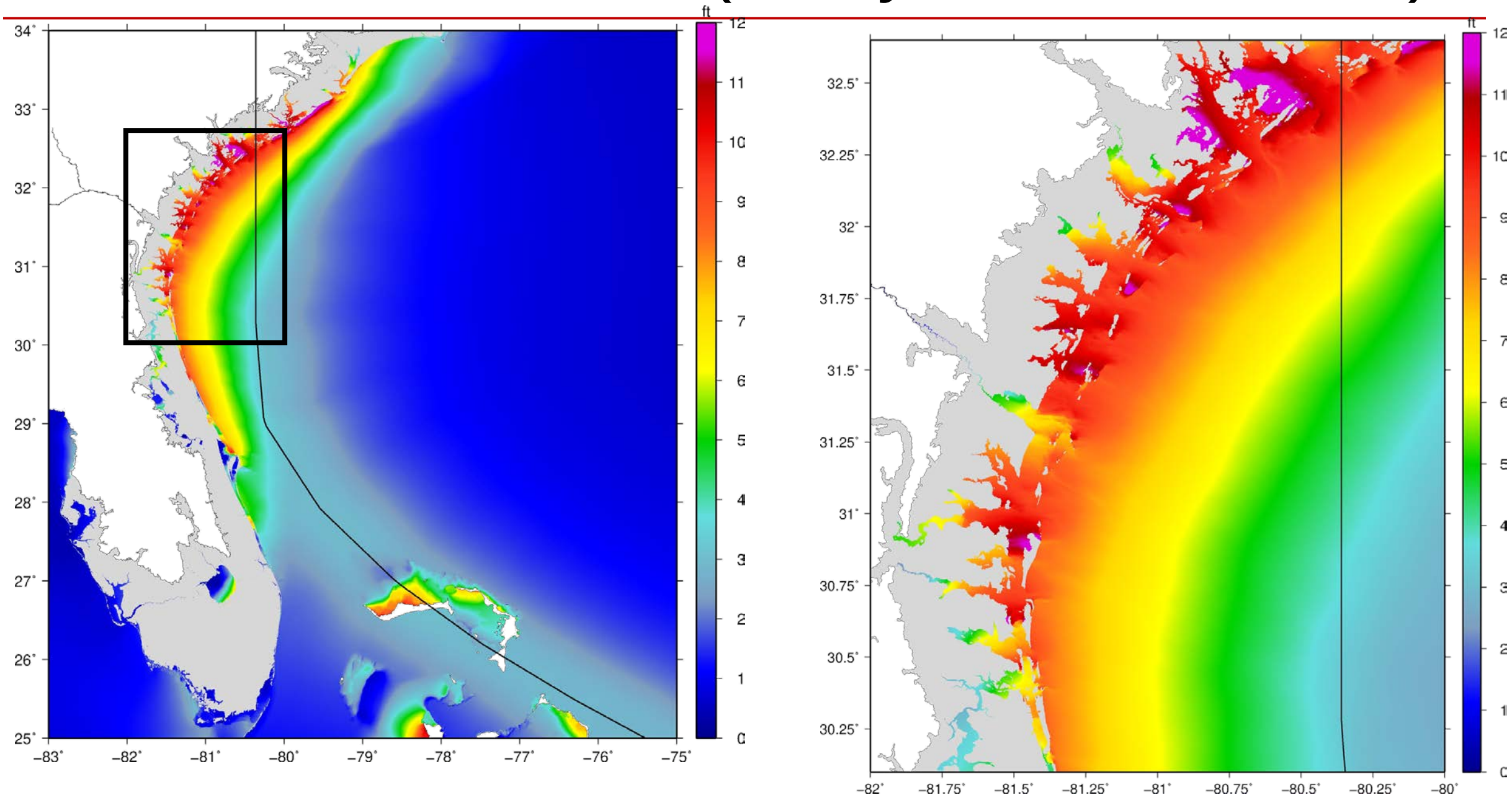
Fell Street Basin – Example Outfall Hydrograph



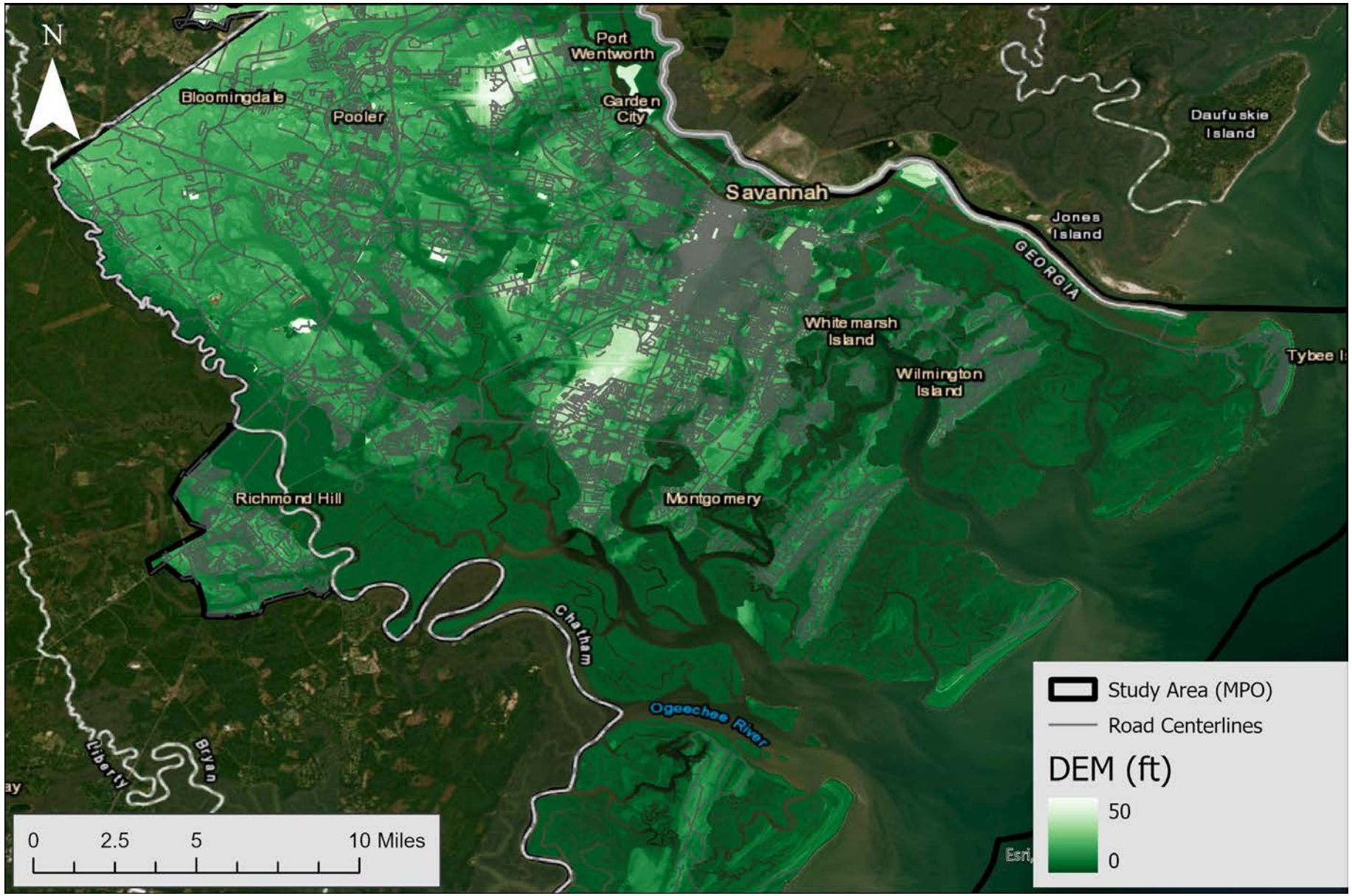
Storm Surge Model Domain



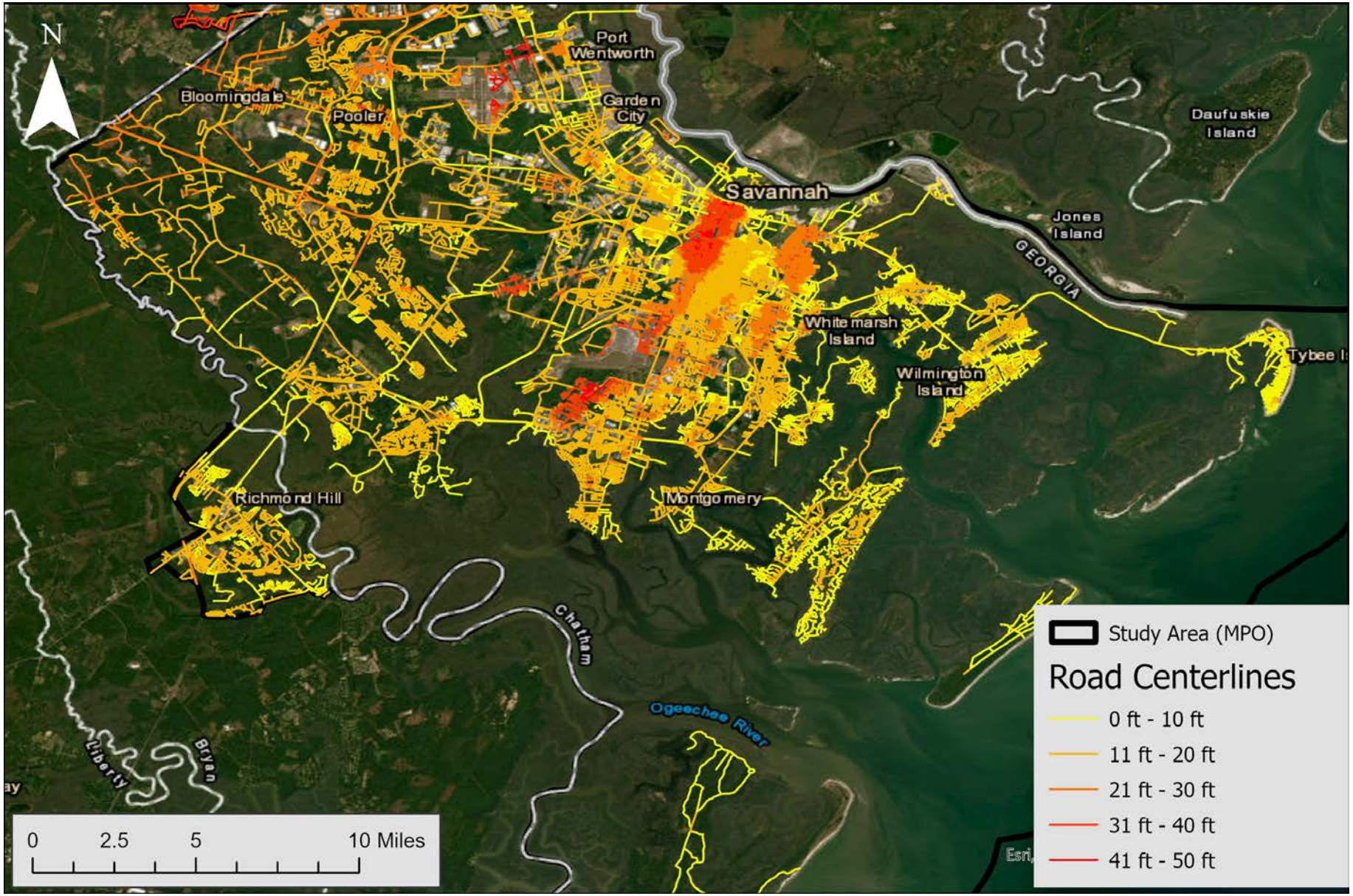
1% AEP Water Level (100-yr Return Period)



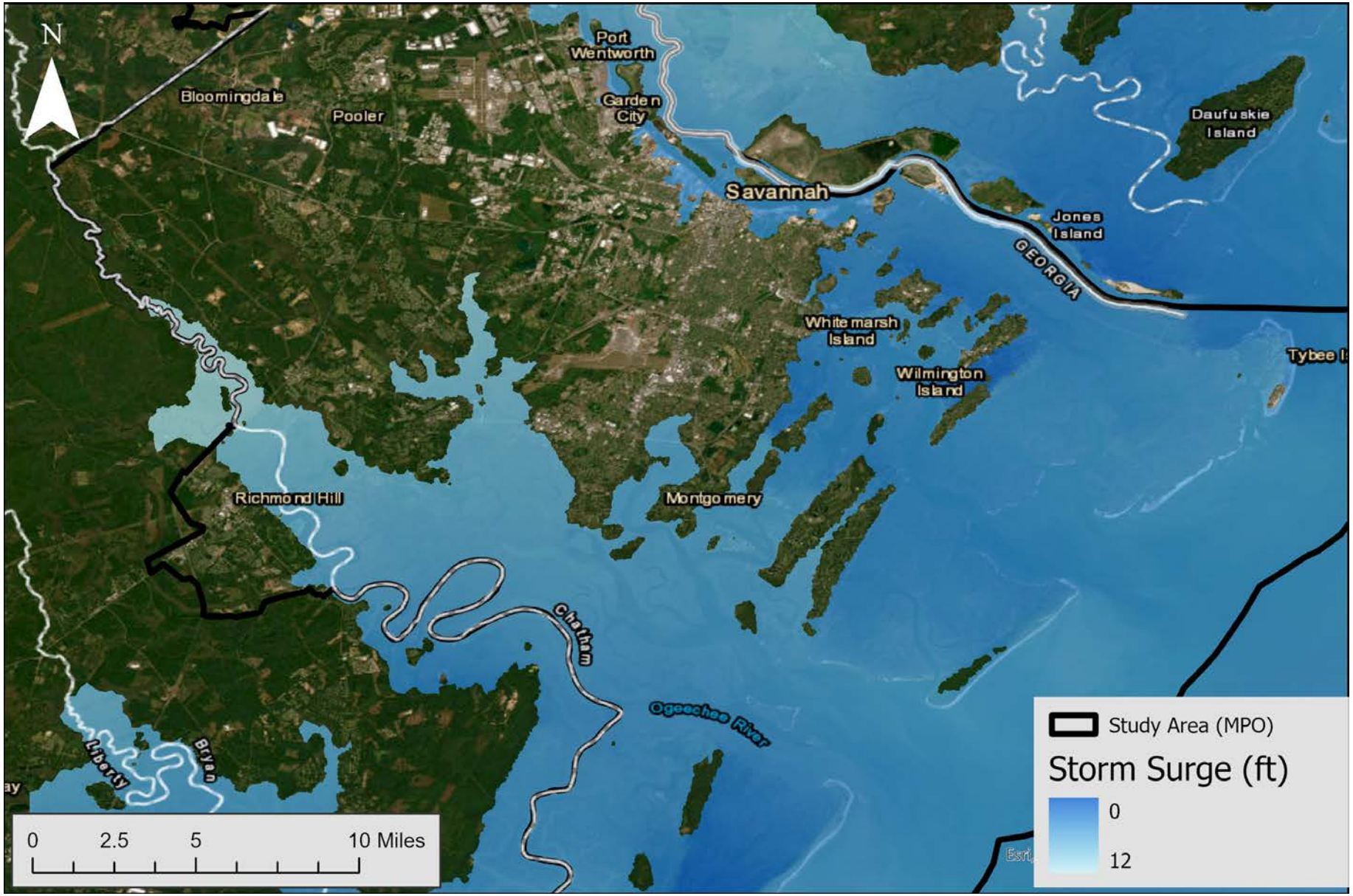
DEM & Road Network (Elevation, ft)



Road Network (Elevation, ft)



1% AEP Simulated Storm Surge



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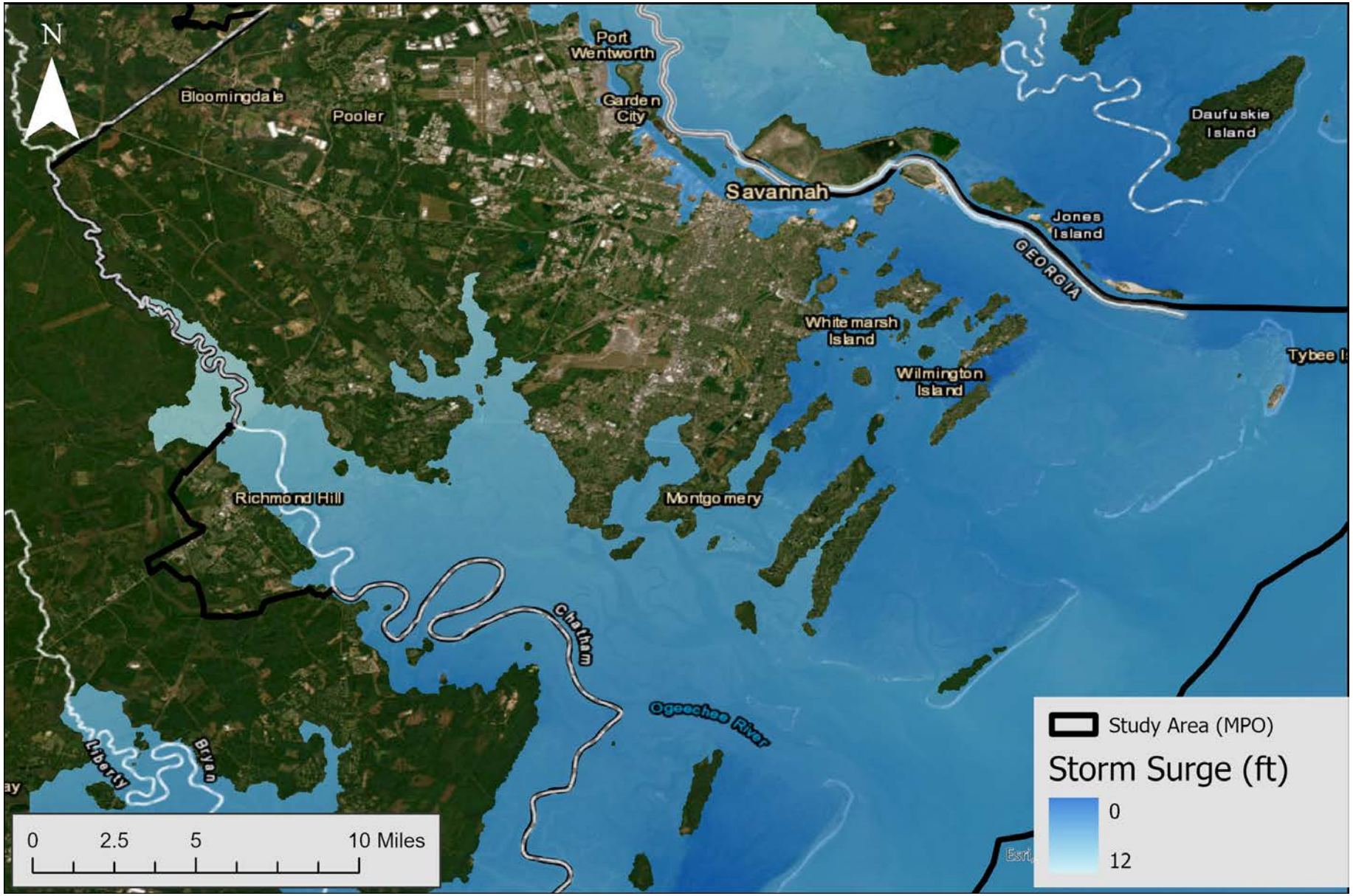
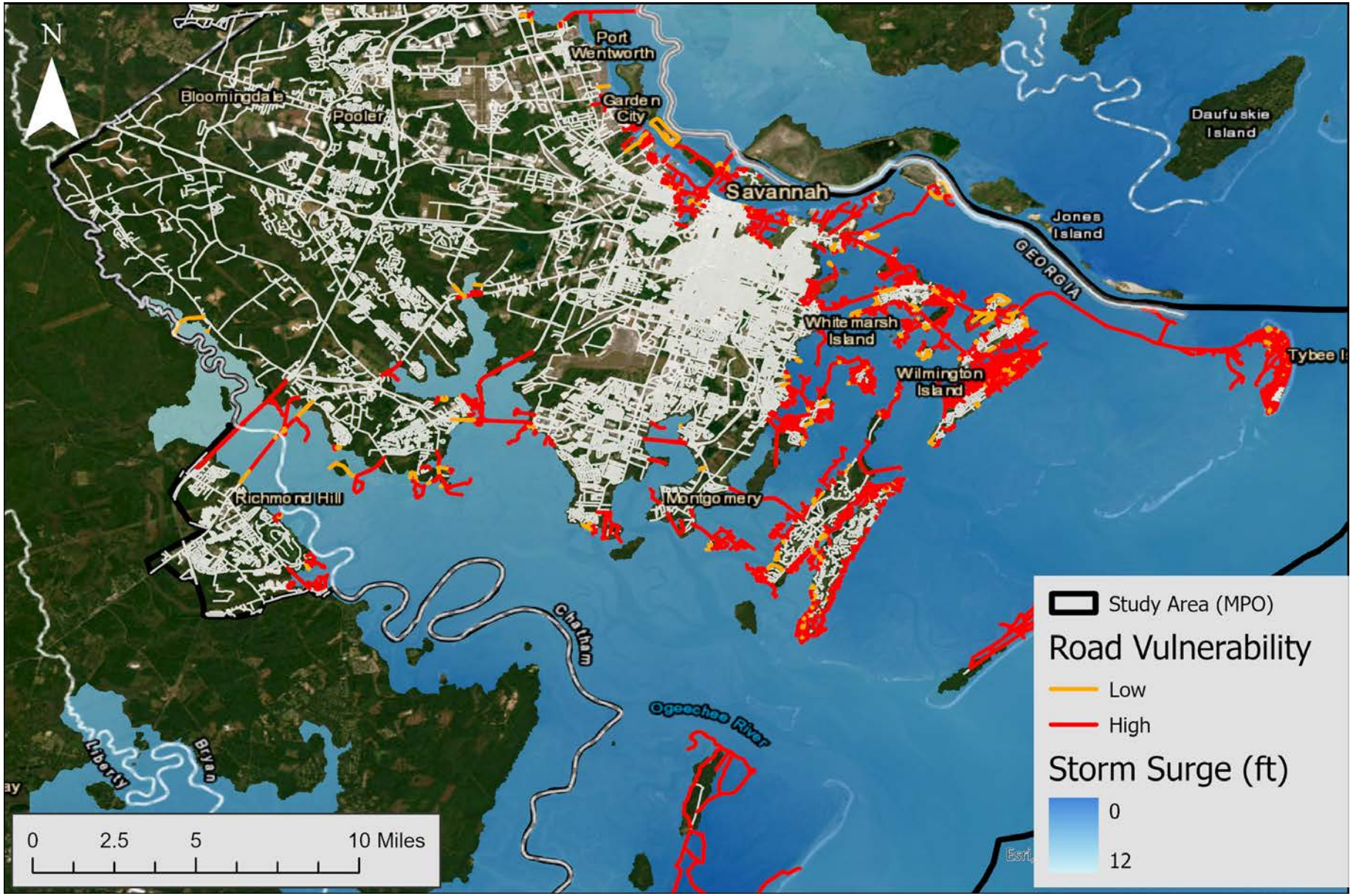
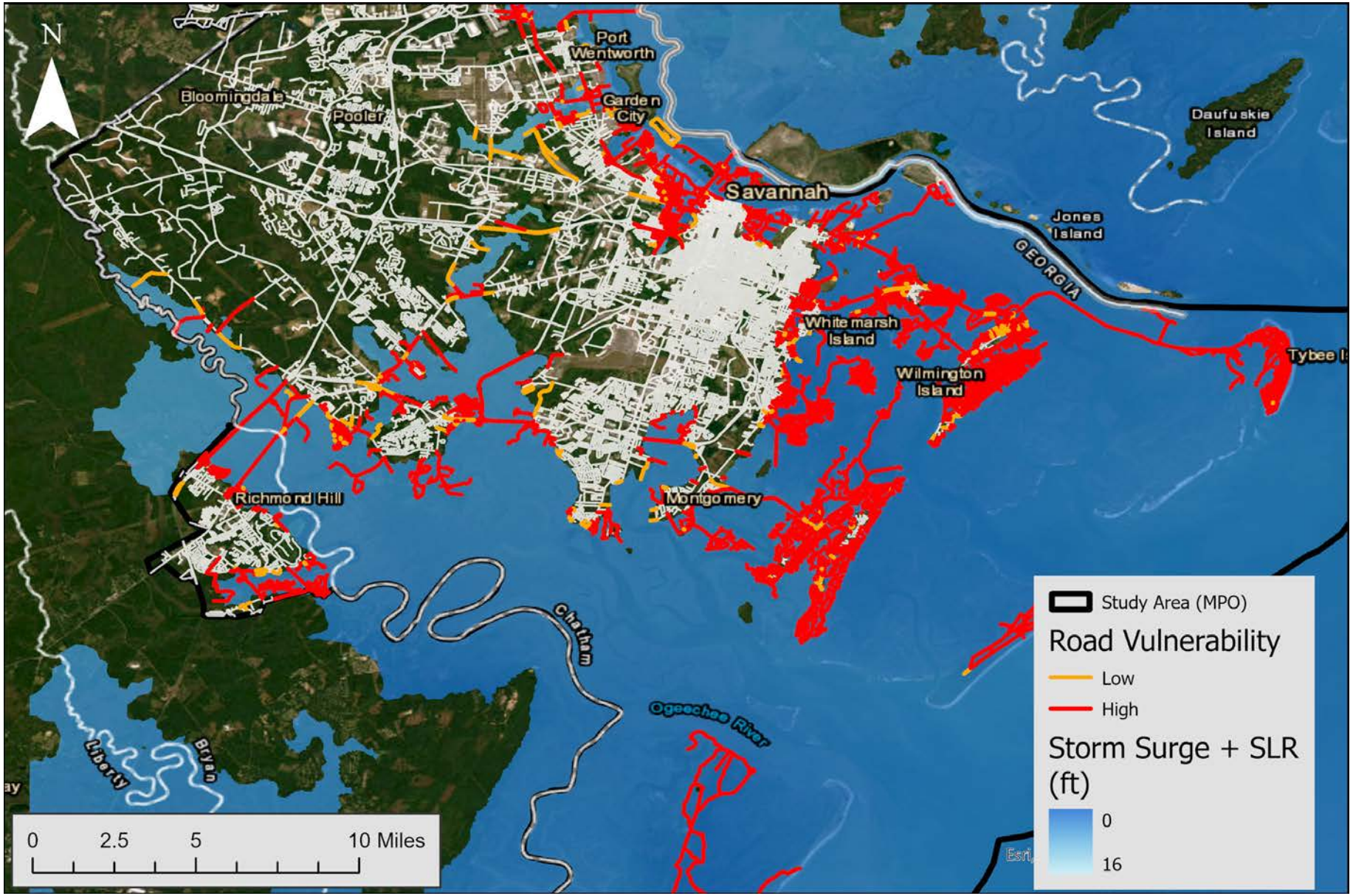


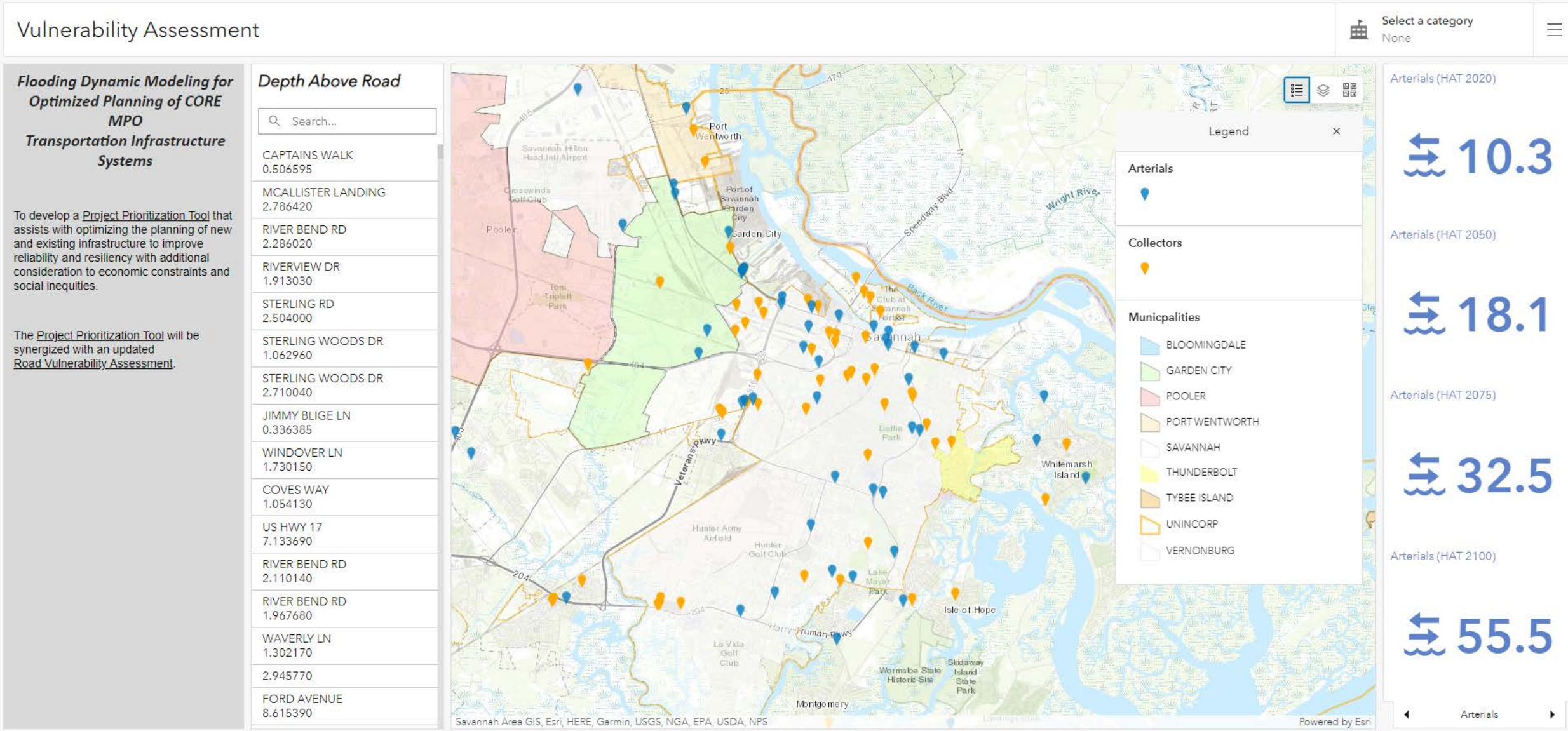
Roadway Vulnerability Assessment (348 miles)



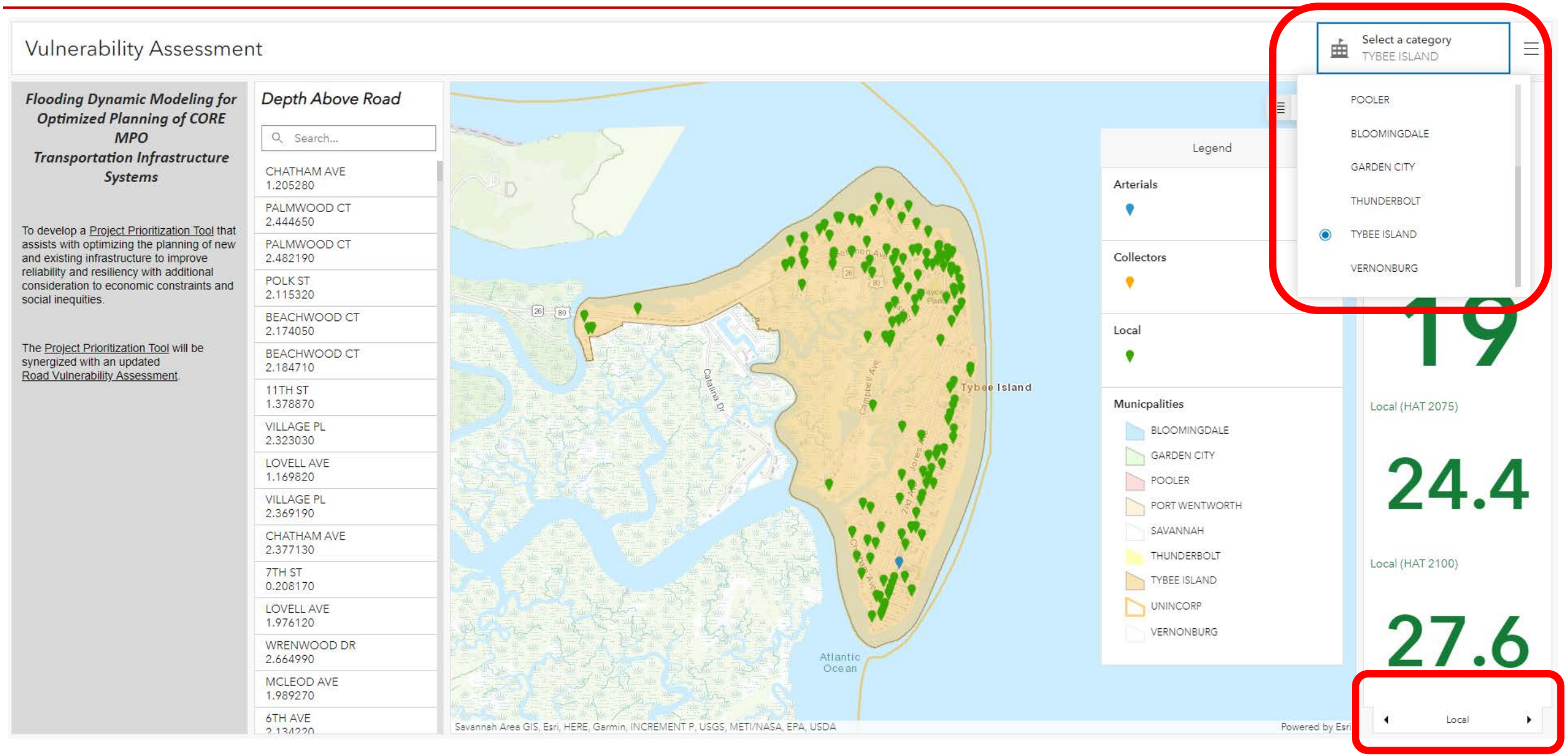
Roadway Vulnerability Assessment + 4 ft SLR (627 miles)



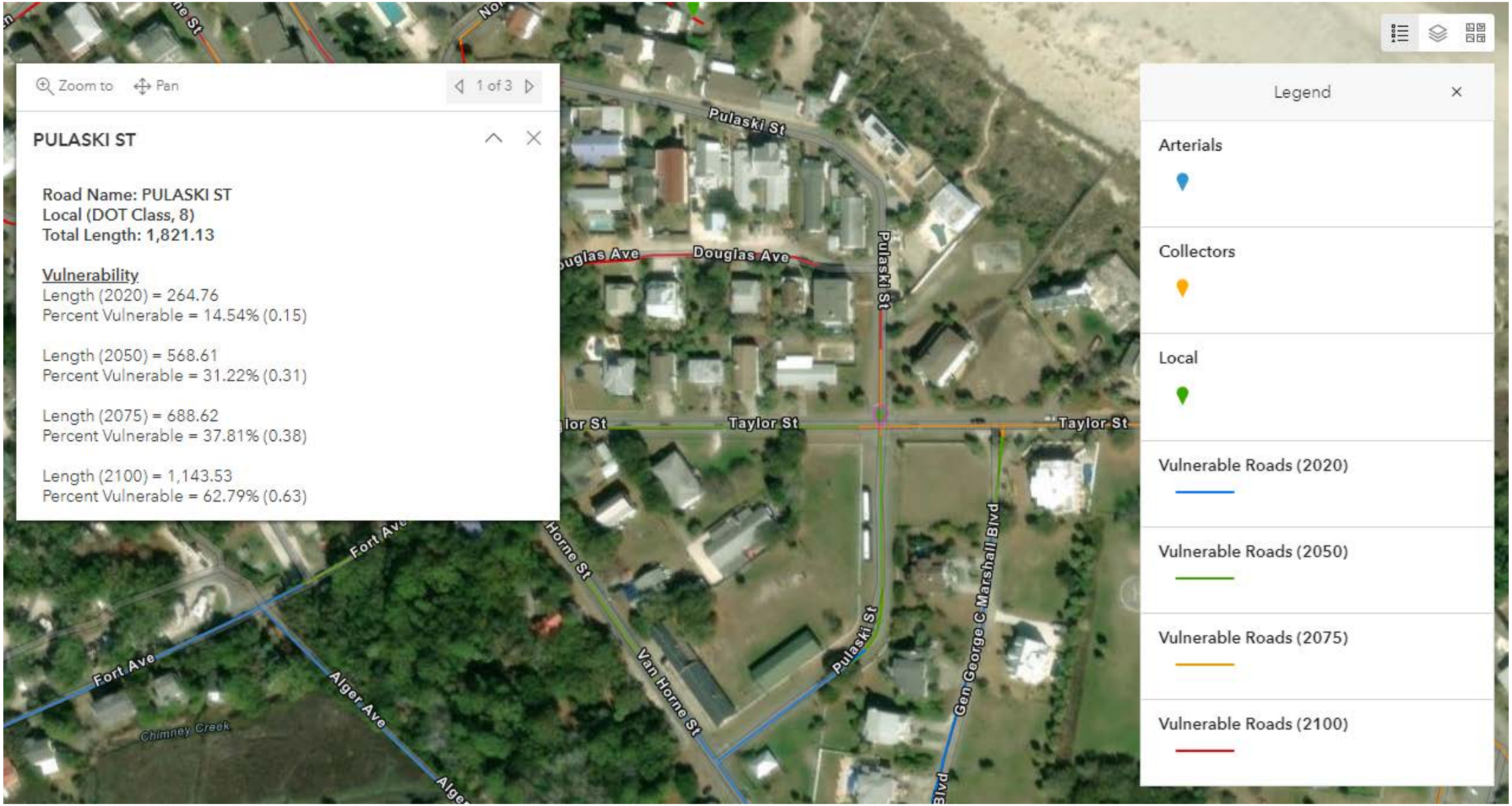
Roadway Vulnerability



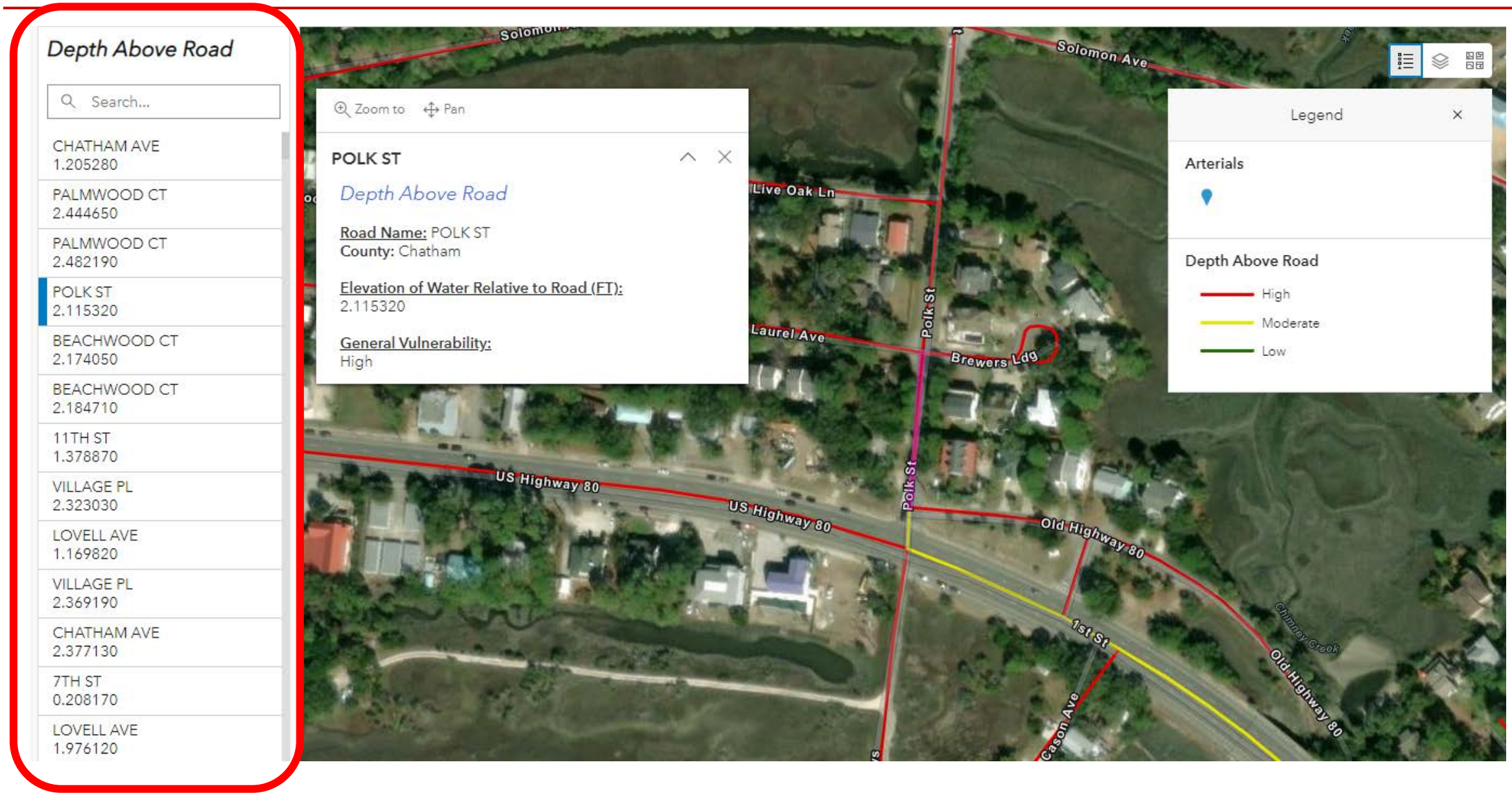
Roadway Vulnerability



Roadway Vulnerability



Roadway Vulnerability



Steering Committee, Stakeholder, and Community Engagement

- MPO Technical Coordinating Committee will serve as the Steering Committee ultimately directing and accepting the project deliverables.

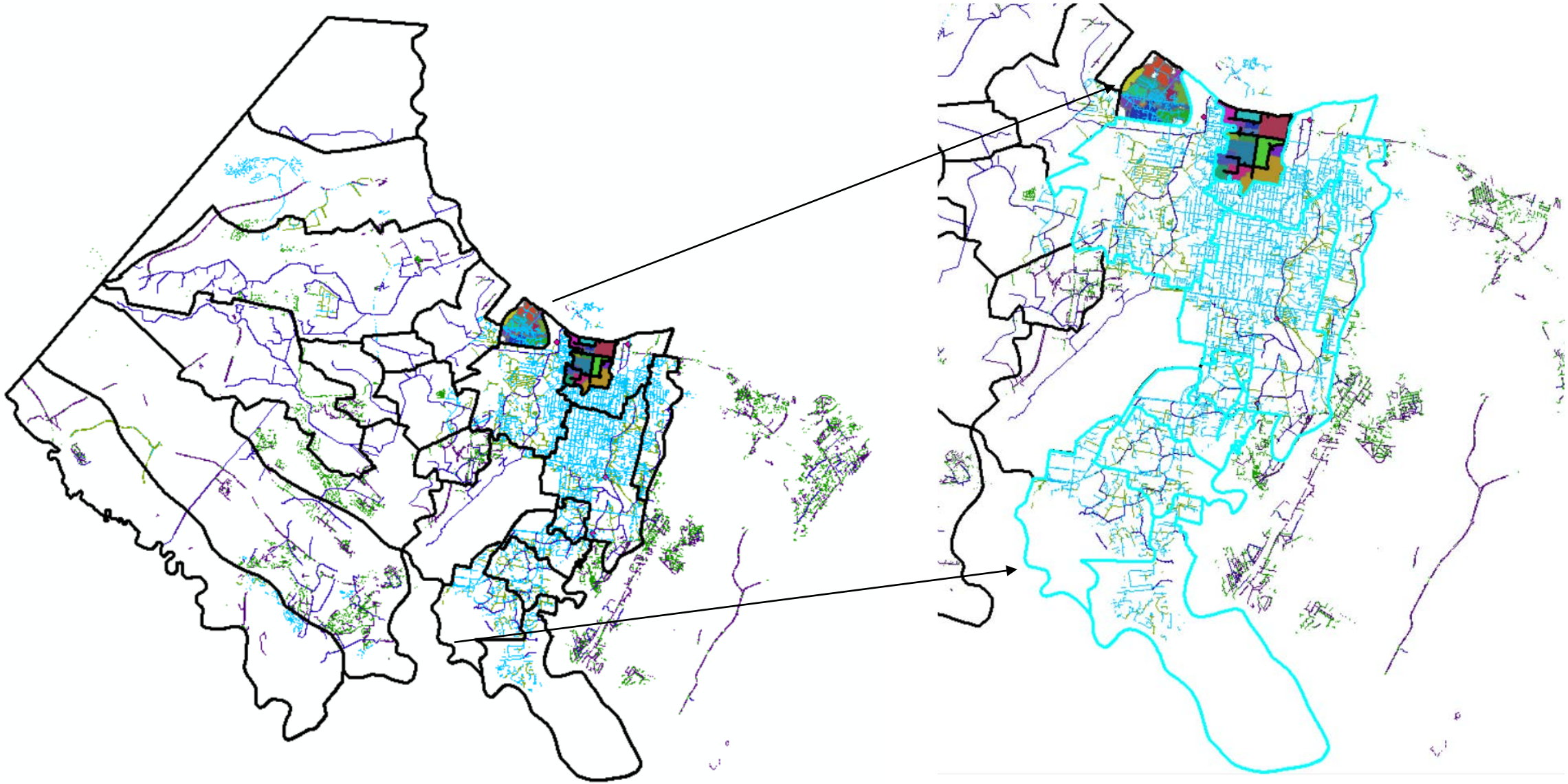
- Other interested organizations have been invited into a Stakeholder Group to provide data and technical support as well as direction and input.

- Will also engage the general public through at least one public input session.

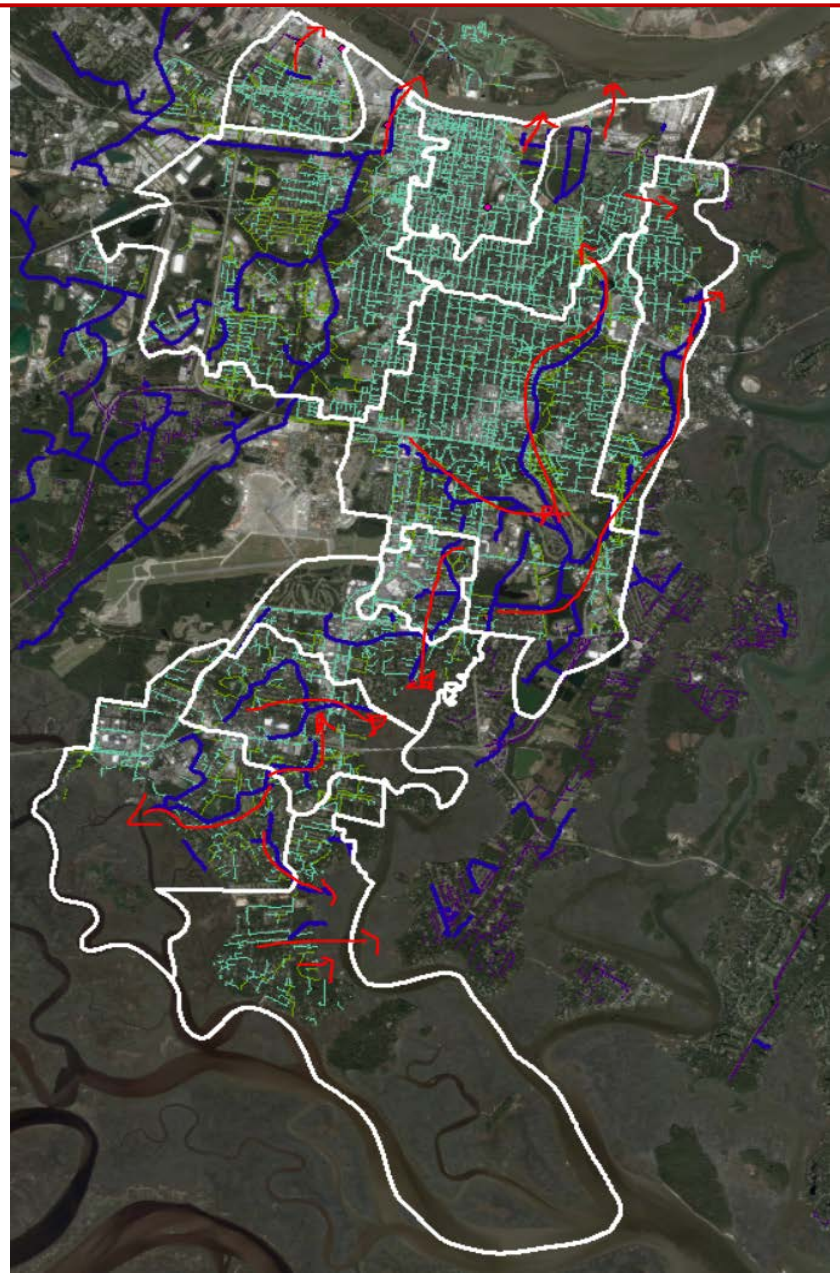
Thank You

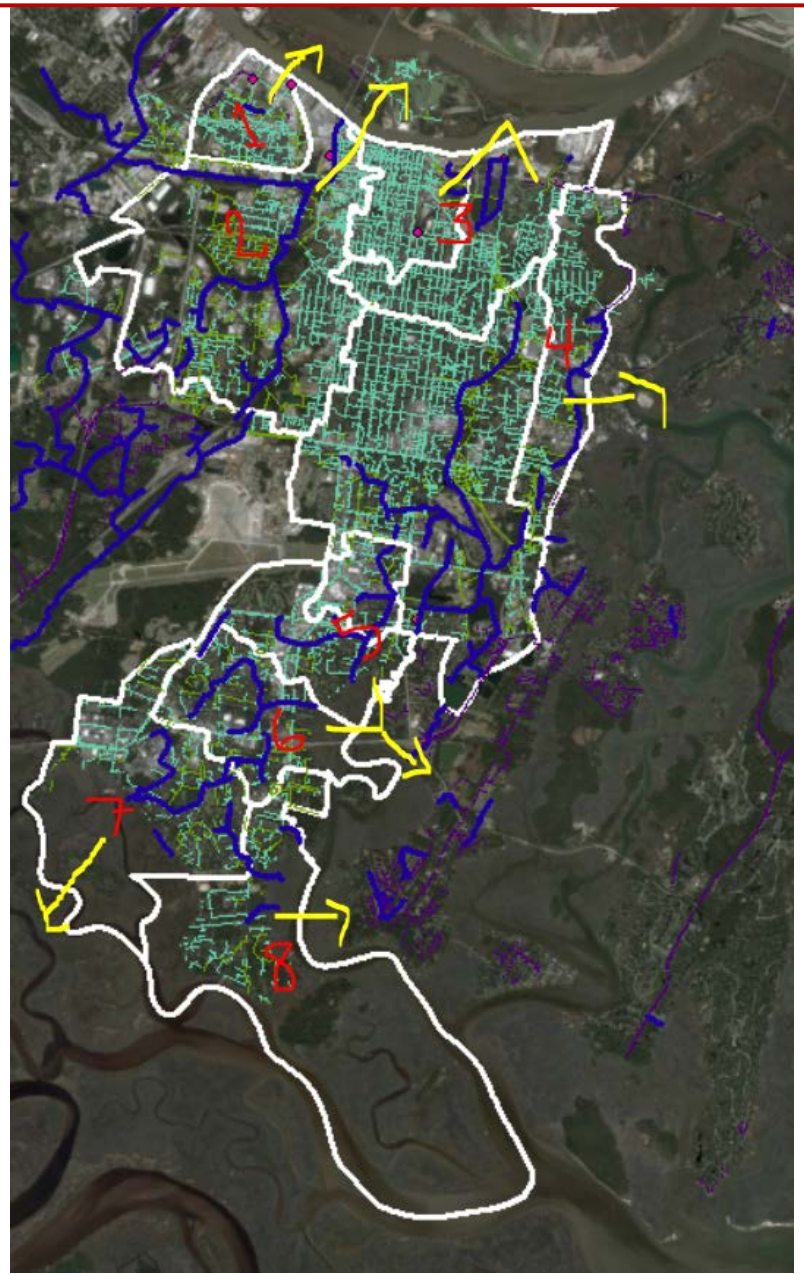
Matt Bilskie
mbilskie@uga.edu

Sub-basins of interest



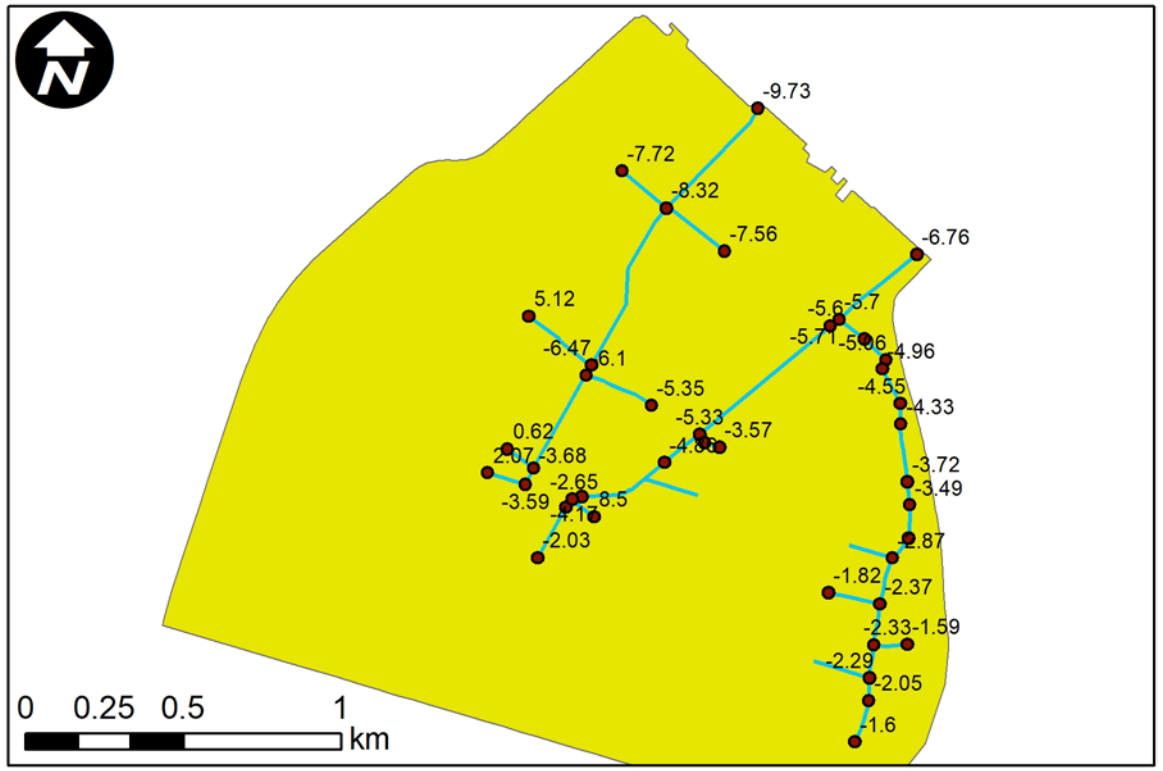
General Flowpath





Filling the Gap

Correct invert elevation at pipe junctions using an automated approach to fill gaps in data using the minimum pipe slope and surrounding manholes



Missing elevation values in zero and adverse pipe slopes