Seacoast Transportation Corridor Vulnerability Assessment

David Walker
Assistant Director/
Transportation Program Manager

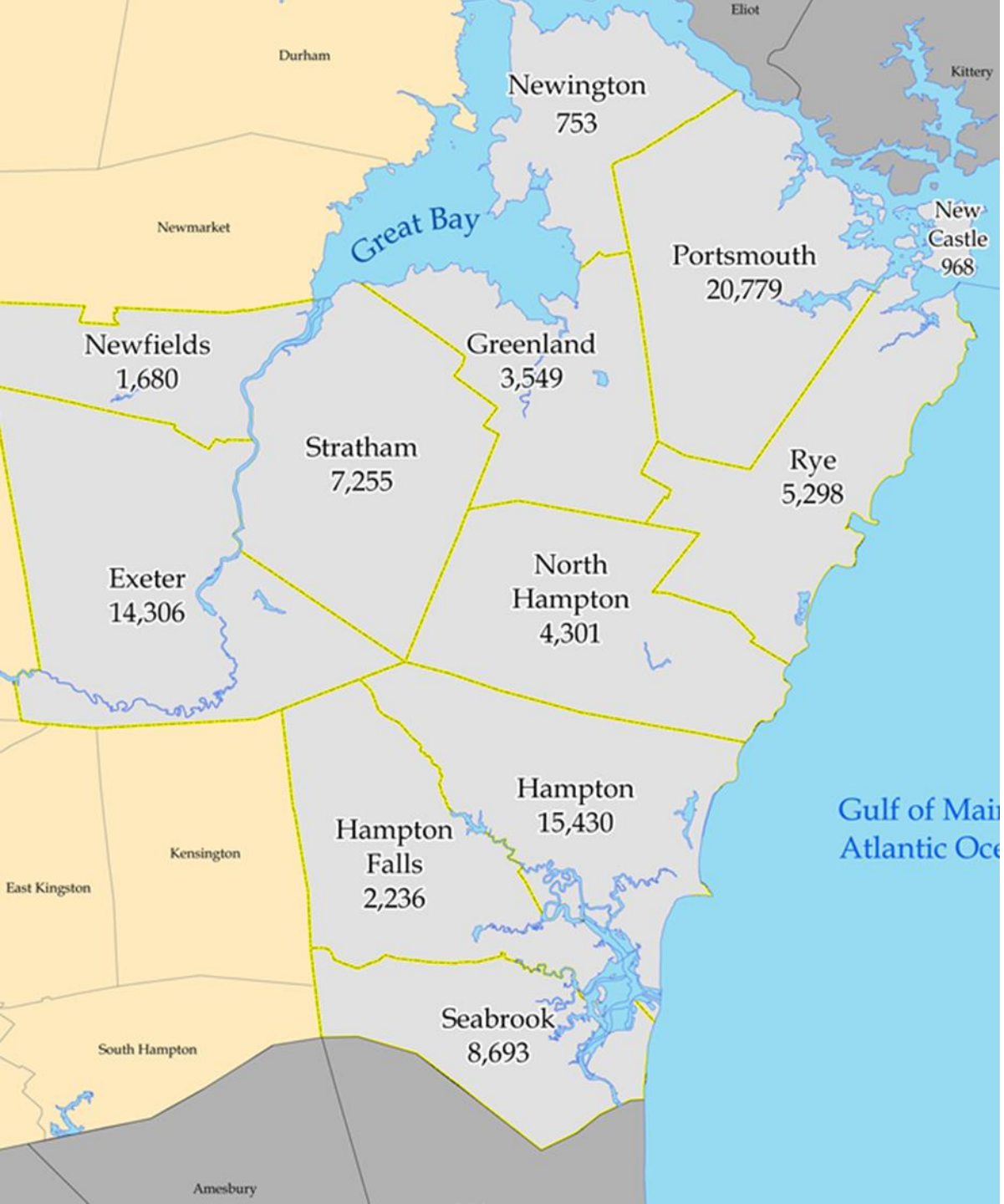
Community Updates & Engagement

Fall, 2021

Image Courtesy of EcoPhotography

Agenda

Introductions	5 Minutes
Project Summary	15 Minutes
Transportation Network Impacts	15 Minutes
Conceptual Adaptation Options	15 Minutes
Community Feedback	45 Minutes



Seacoast Transportation Corridor Vulnerability Assessment (STCVA)

- Funded as a 2019 NOAA Project of Special Merit
- A partnership between:
  - Rockingham Planning Commission
  - NH DES Coastal Program
  - NH Department of Transportation
  - University of New Hampshire
  - 10 NH coastal municipalities

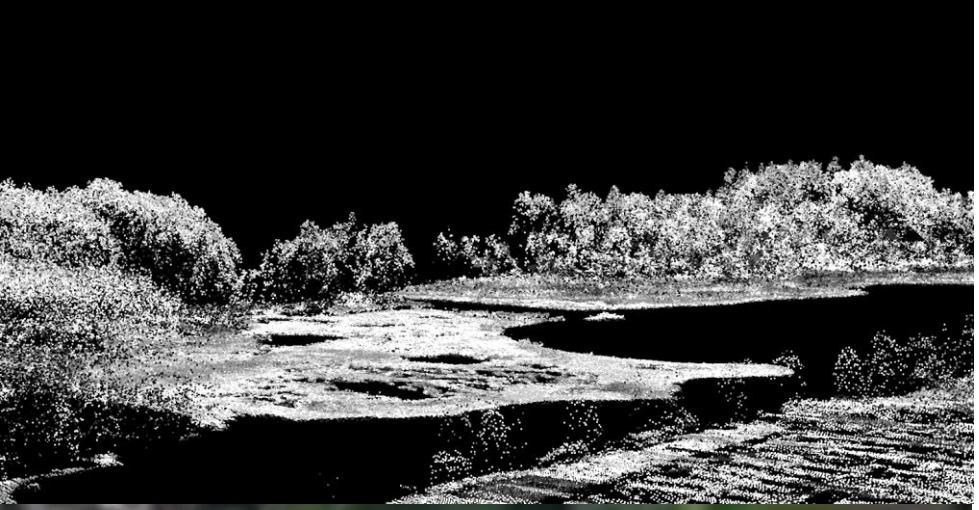
This project was funded,in part, by NOAA's Office for Coastal Management under the Coastal Zone Management Act in conjunction with the New Hampshire Department of Environmental Services Coastal Program.

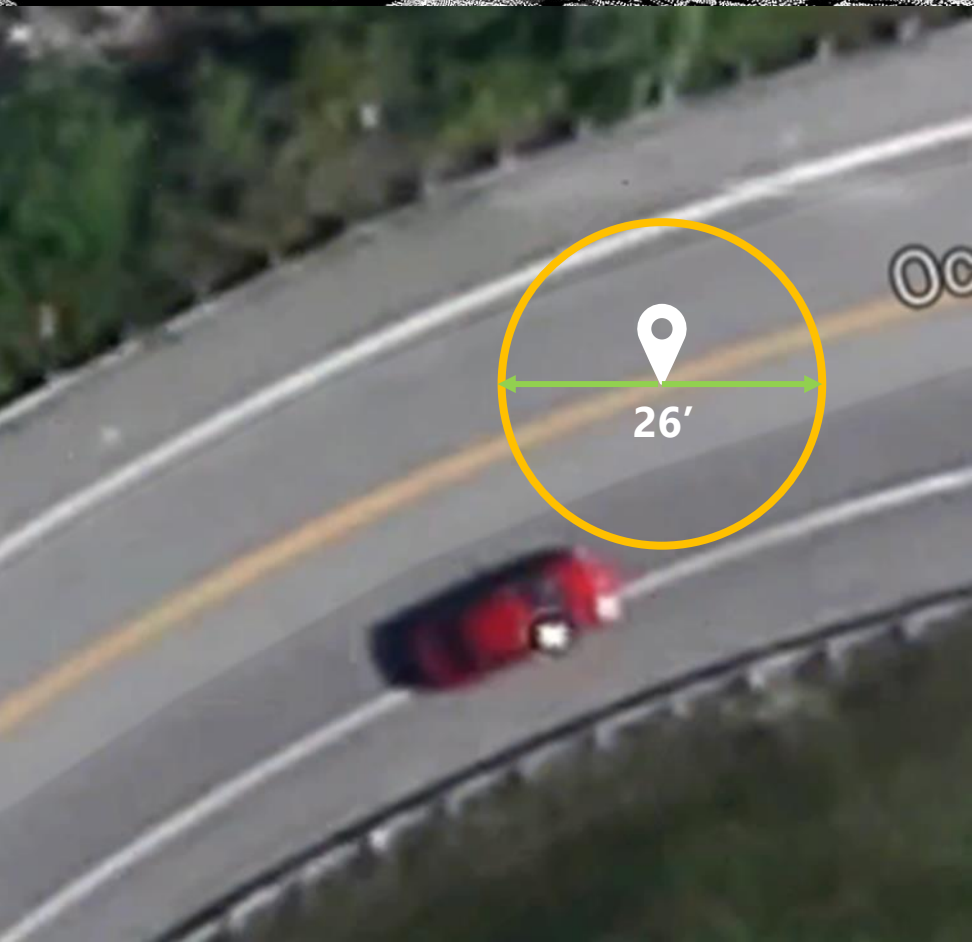
STCVA Goals

- Assess the impacts of projected sea-level rise on the seacoast transportation network (1', 1.7', 4', and 6.3' sea-level rise scenarios.
- Evaluate changes in traffic volume, travel patterns, road capacity, road conditions due to SLR
- Identify & prioritize sites impacted by flooding for further evaluation
- Identify adaptation and resilience strategies for priority sites
- Improve RPC/MPO decision making processes

STCVA Transportation Planning Outcomes

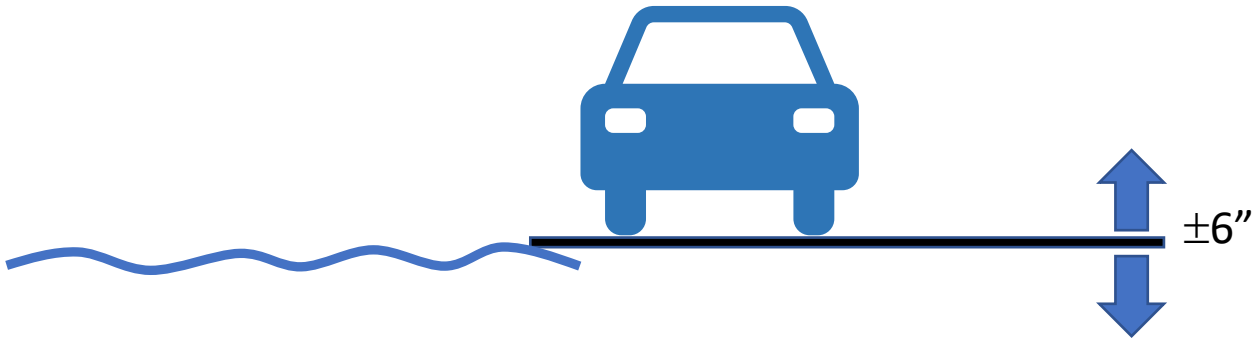
- Enhanced understanding of risks to transportation network from climate change
- Critical links identified and impacts of closures on the transportation network assessed
- Improvement concepts and costs developed for priority locations to better understand scope and scale of building a more resilient system
- Improved resiliency factors for the general project selection process
- Data and analysis available for other planning and project development efforts.
- Policies defined that can facilitate a more resilient transportation system





Data Accuracy

- Based on Light Detection and Ranging (LIDAR) data from 2011
- LIDAR data has roughly ±6” vertical accuracy
- Horizontal accuracy is roughly 13’ – We know the point is somewhere within a 26’ diameter circle



Identifying & Prioritizing Impacted Roadways

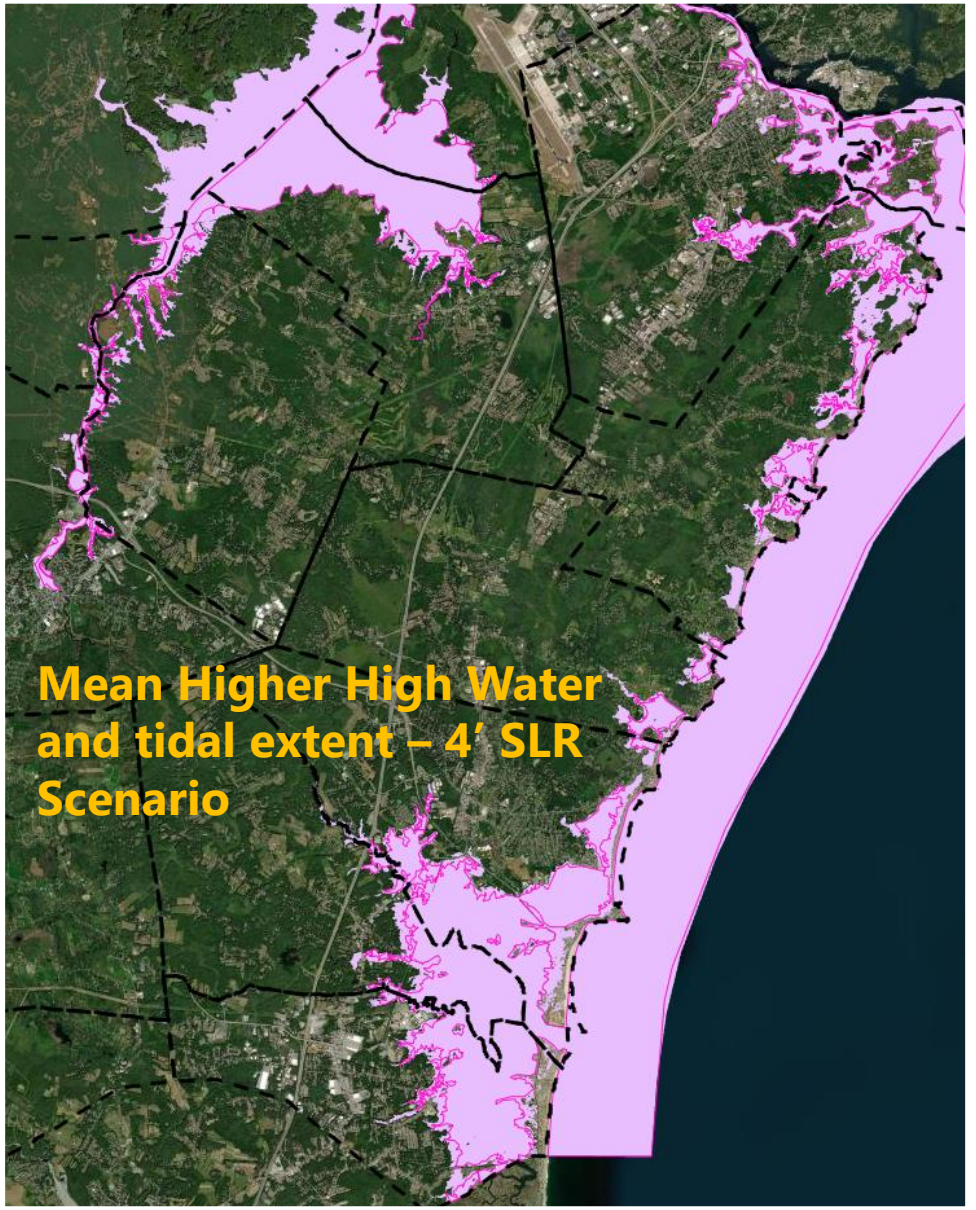
Previous Work on Sea Level Rise Impacts

- Tides to Storms
- Coastal Risks and Hazards Commission
- 2020 NH Science Summary

Regional Travel Demand Model

- Travel Patterns based on residential and employment distribution
- All State Roadways and many local Roads

Transportation System Impacts of Sea Level Rise



Identifying & Prioritizing Impacted Roadways

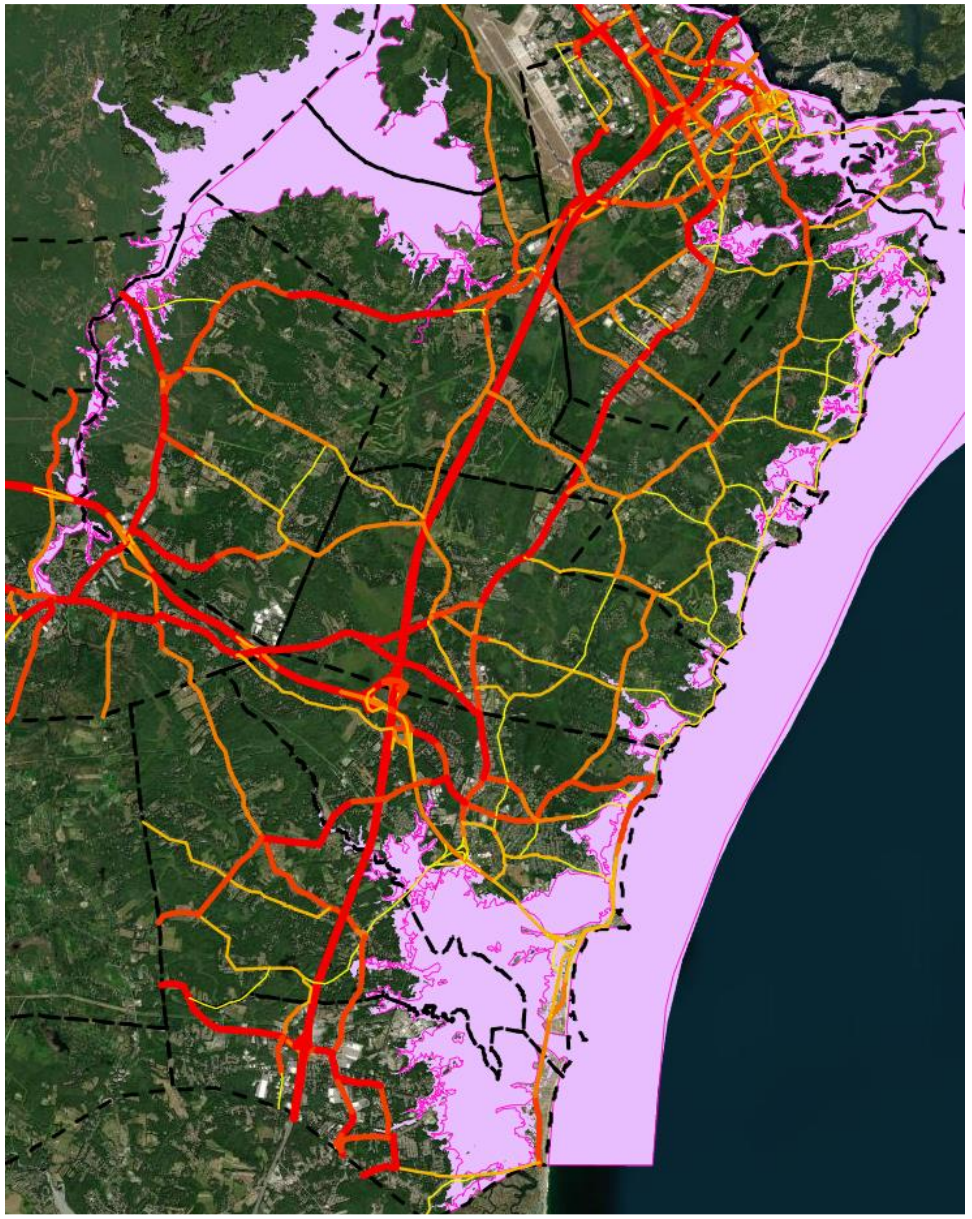
Previous Work on Sea Level Rise Impacts

- Tides to Storms
- Coastal Risks and Hazards Commission
- 2020 NH Science Summary

Regional Travel Demand Model

- Travel Patterns from residential and employment distribution
- All State Roadways and many local Roads

Transportation System Impacts of Sea Level Rise



Travel Demand Model links – 4’ SLR Scenario

Identifying & Prioritizing Impacted Roadways

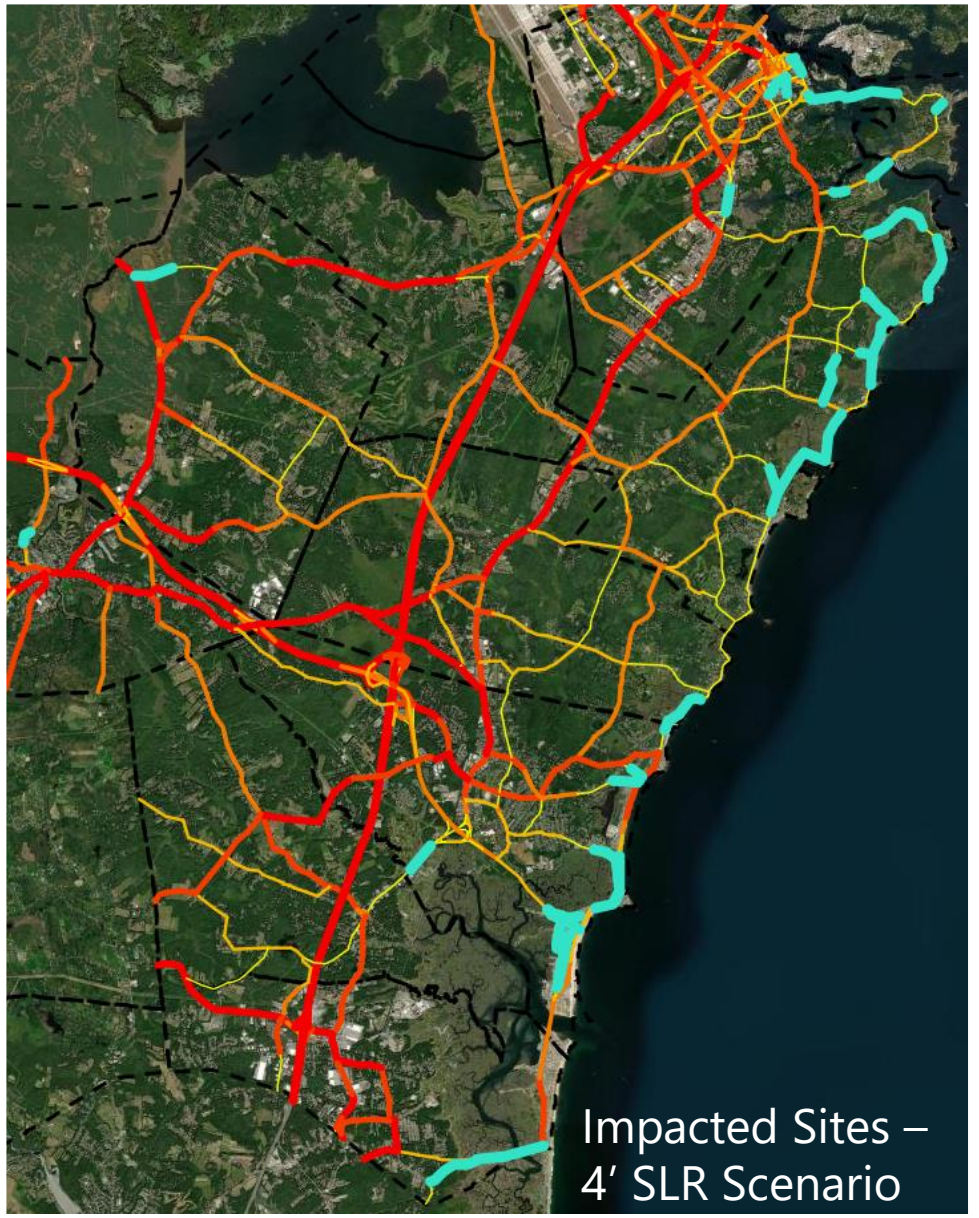
Previous Work on Sea Level Rise Impacts

- Tides to Storms
- Coastal Risks and Hazards Commission
- 2020 NH Science Summary

Regional Travel Demand Model

- Travel Patterns from residential and employment distribution
- All State Roadways and many local Roads

Transportation System Impacts of Sea Level Rise



Impacted Sites – 4' SLR Scenario


Inundated model links at 4′ SLR

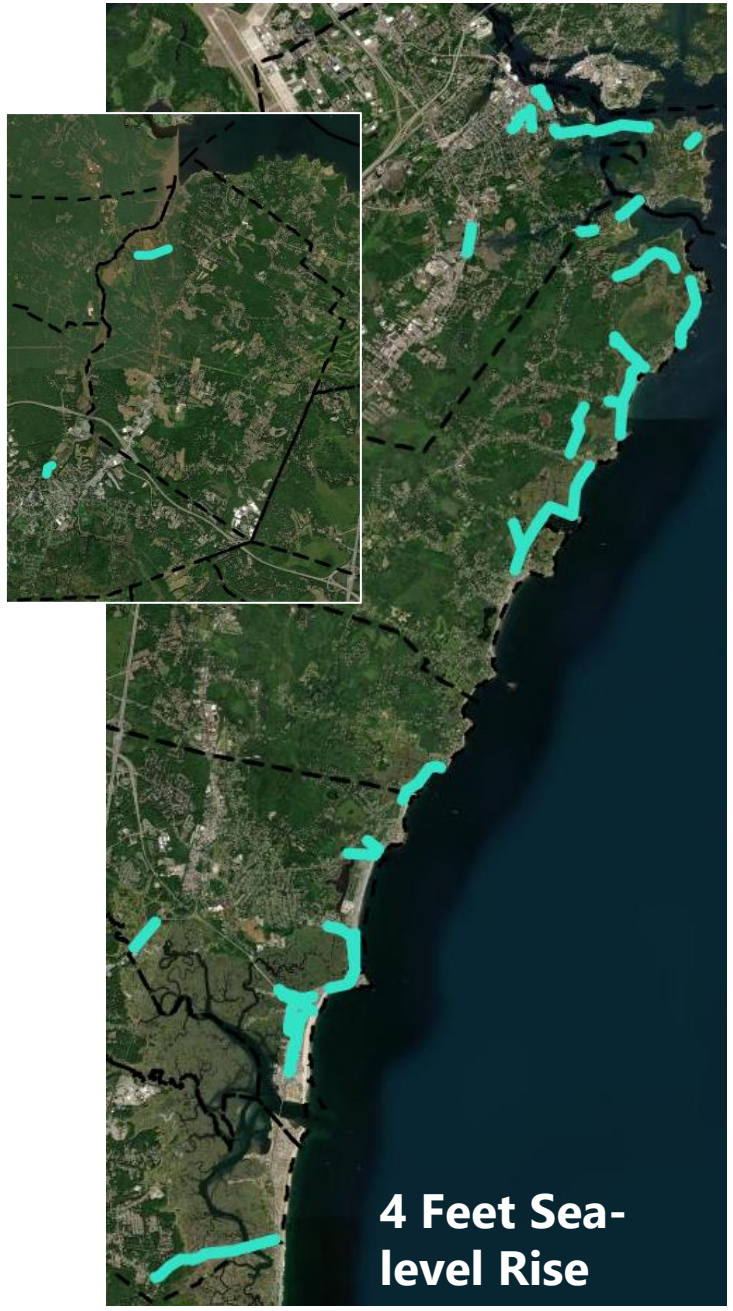
Identify Segments Where Water and Roads intersect

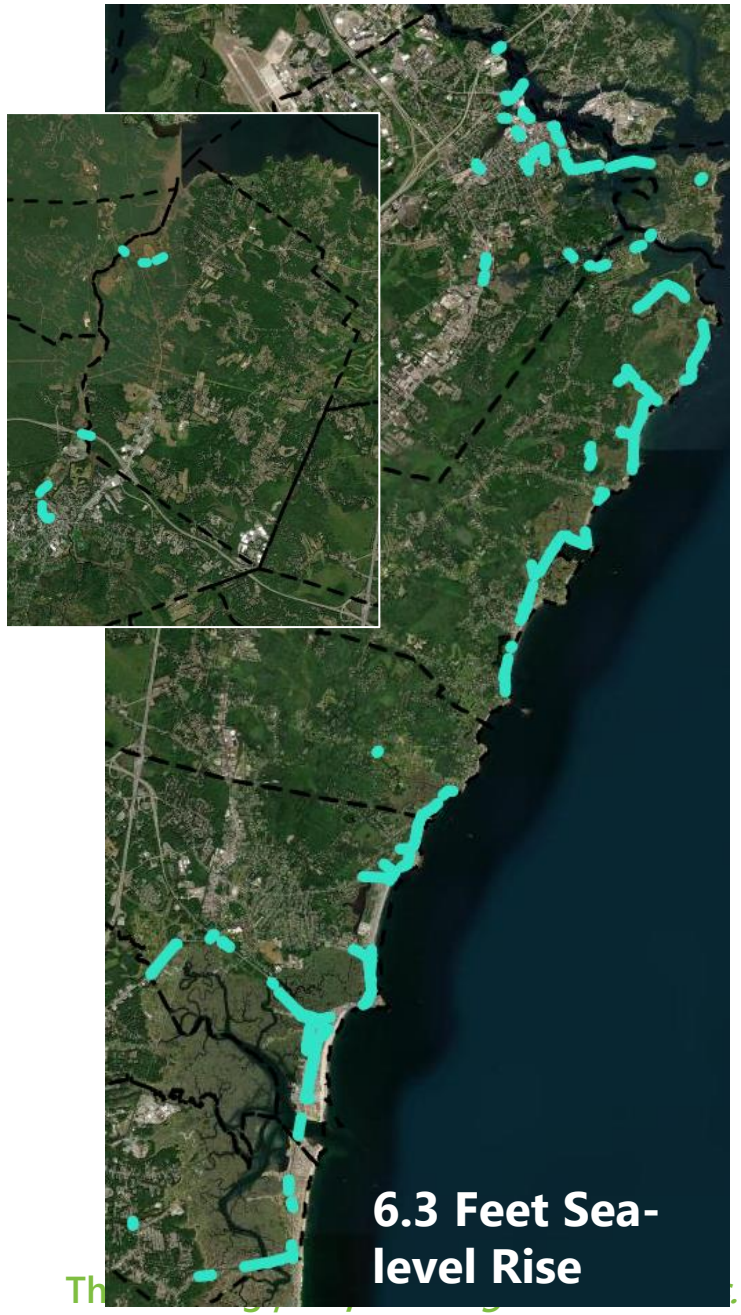
Scenario	Impacted Locations	Approx. Miles Impacted
1′	4 model links	0.5
1.7′	13 model links	1.0
4′	126 model links	16.8
6.3′	259 model links	28.0

Group Adjacent Impacted Links into Sites

Scenario	Impacted Locations	Sites
1 Foot	4 model links	3
1.7 Feet	13 model links	5
4 Feet	126 model links	25

Areas of Anticipated Inundation





Identifying & Prioritizing Impacted Roadways

Previous Work on Sea Level Rise Impacts

- Tides to Storms
- Coastal Risks and Hazards Commission
- 2020 NH Science Summary

Regional Travel Demand Model

- Travel Patterns based on residential and employment distribution
- All State Roadways and many local Roads

Transportation System Impacts of Sea Level Rise

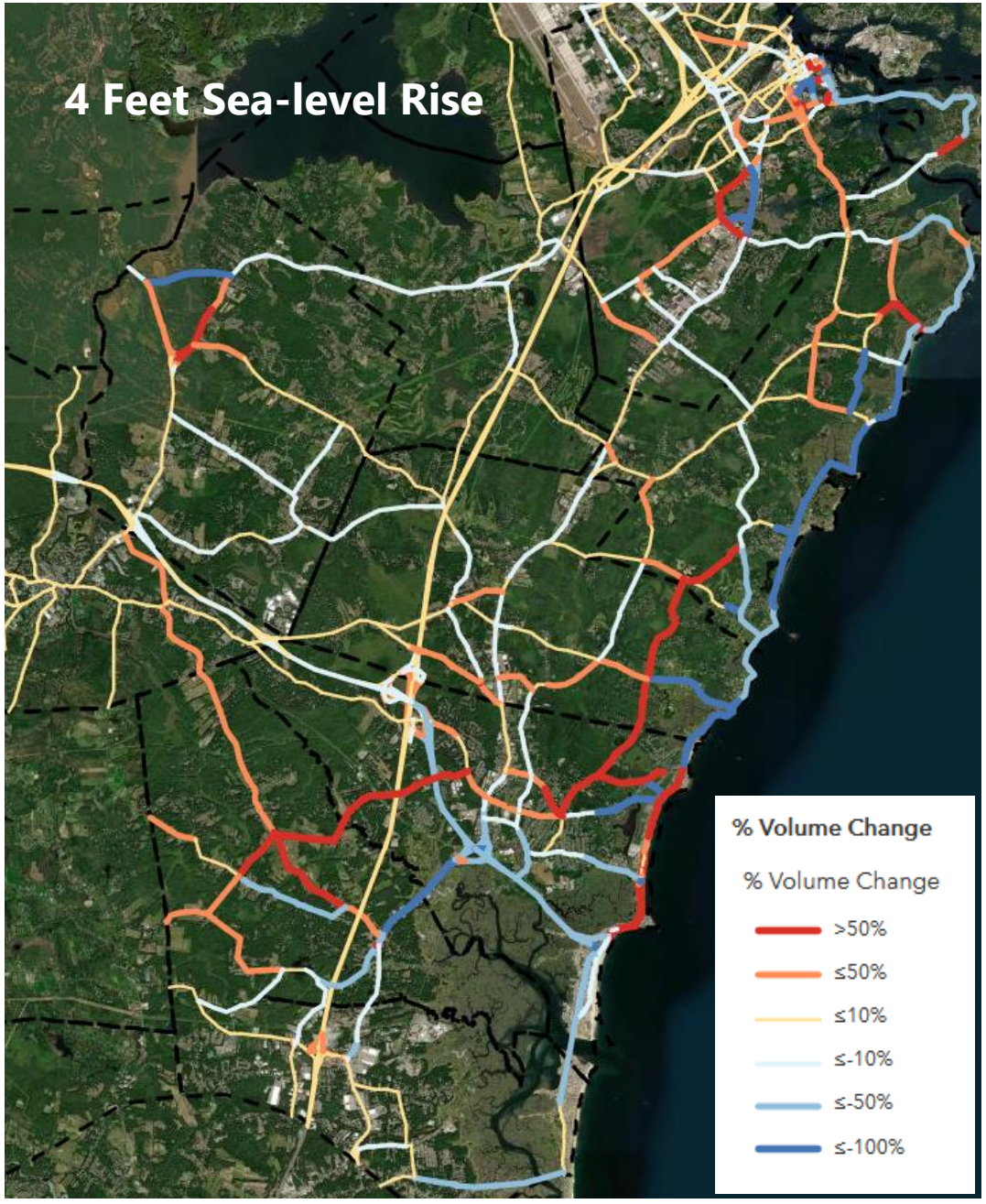
Direct Transportation Network Impacts

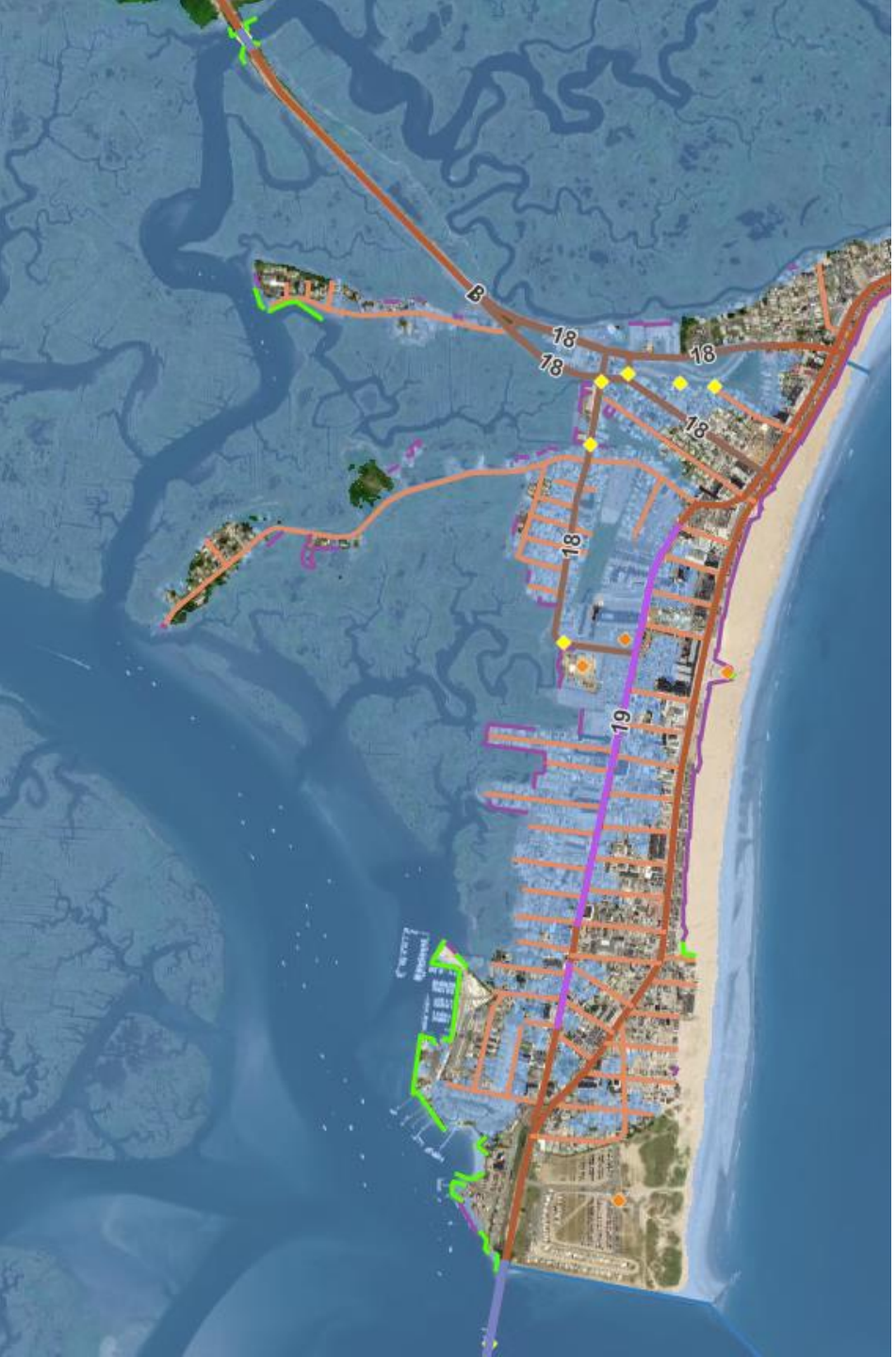
- Inundated Links
- Isolated Areas
- Impacts of flooding on infrastructure

Indirect Transportation Network Impacts

- Travel Pattern Changes
- Traffic Volume Changes
- Impacts on Roadway capacity and condition

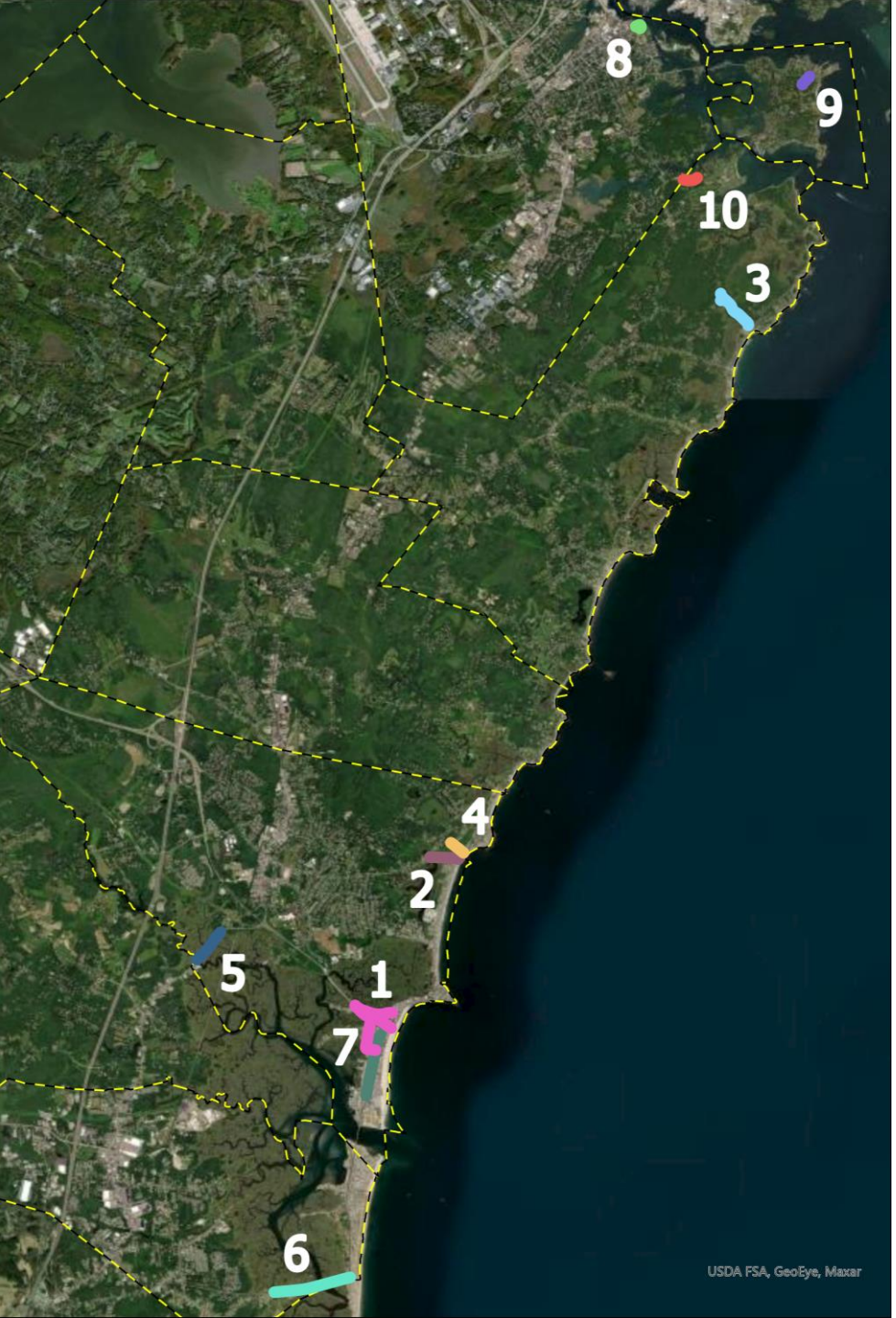
Estimate Traffic Impacts of Road Closures





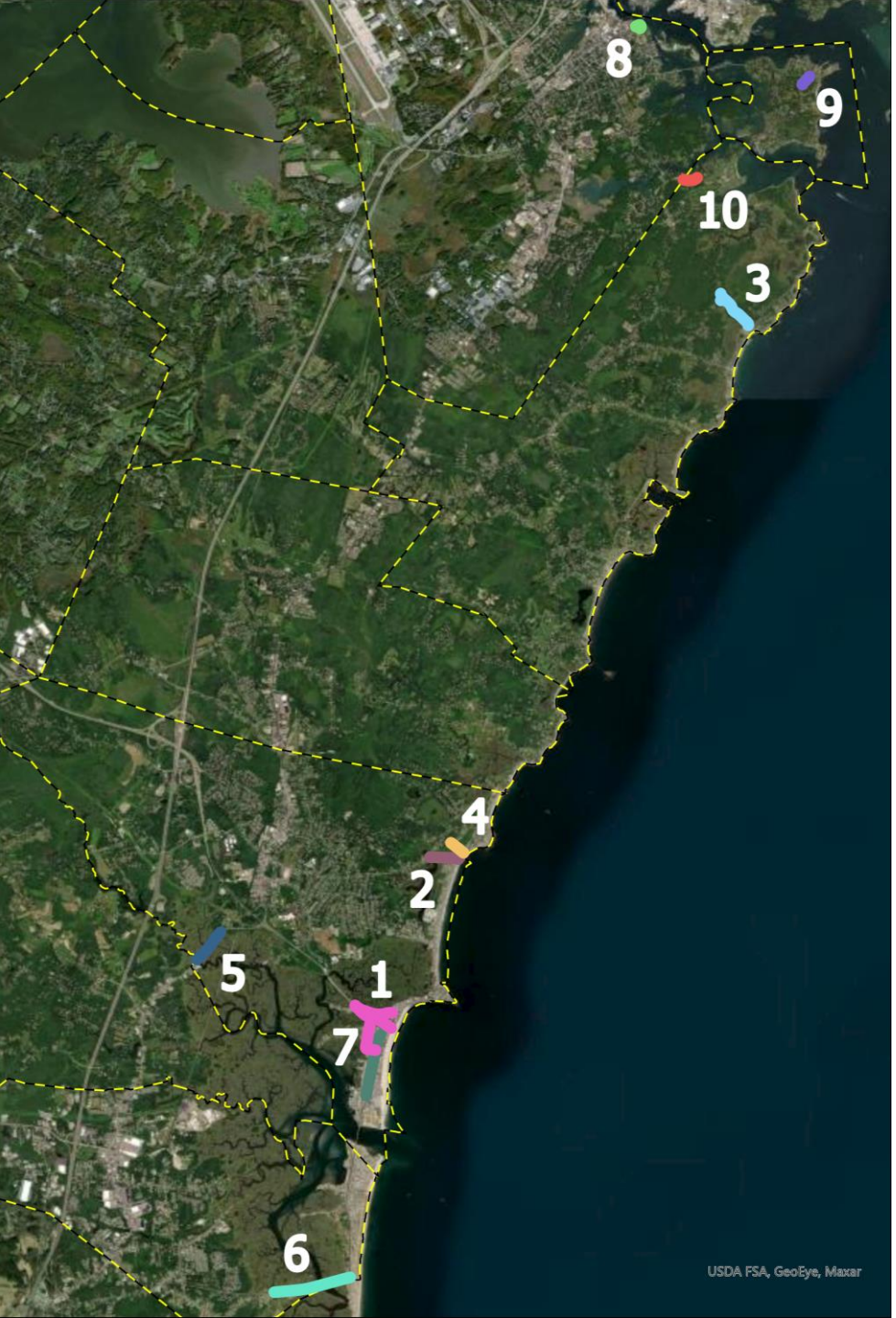
Score Sites Against Criteria to Determine Criticality

Criterion	Weight	
Functional Classification	20%	Operations
Average Daily Volume (AADT)	20%	
Distance to Emergency Services	15%	Health & Safety
Alternate Route Availability	15%	
Social Vulnerability Index (SVI)	10%	Socioeconomics
Distance to Community Facilities	10%	
Average Land Value per Acre	10%	



Identify Priority Sites for Evaluation

- Preliminary List of Priority Sites for further evaluation developed based on criteria
- List Sent to NHDOT and other partners for feedback
- 10 candidate sites Selected
  - Assemble site profiles
  - Assess types of impacts and potential adaptation measures
  - Develop conceptual design alternatives
  - Apply New Hampshire Coastal Flood Risk Guidance
- 2 sites selected for more detailed examination



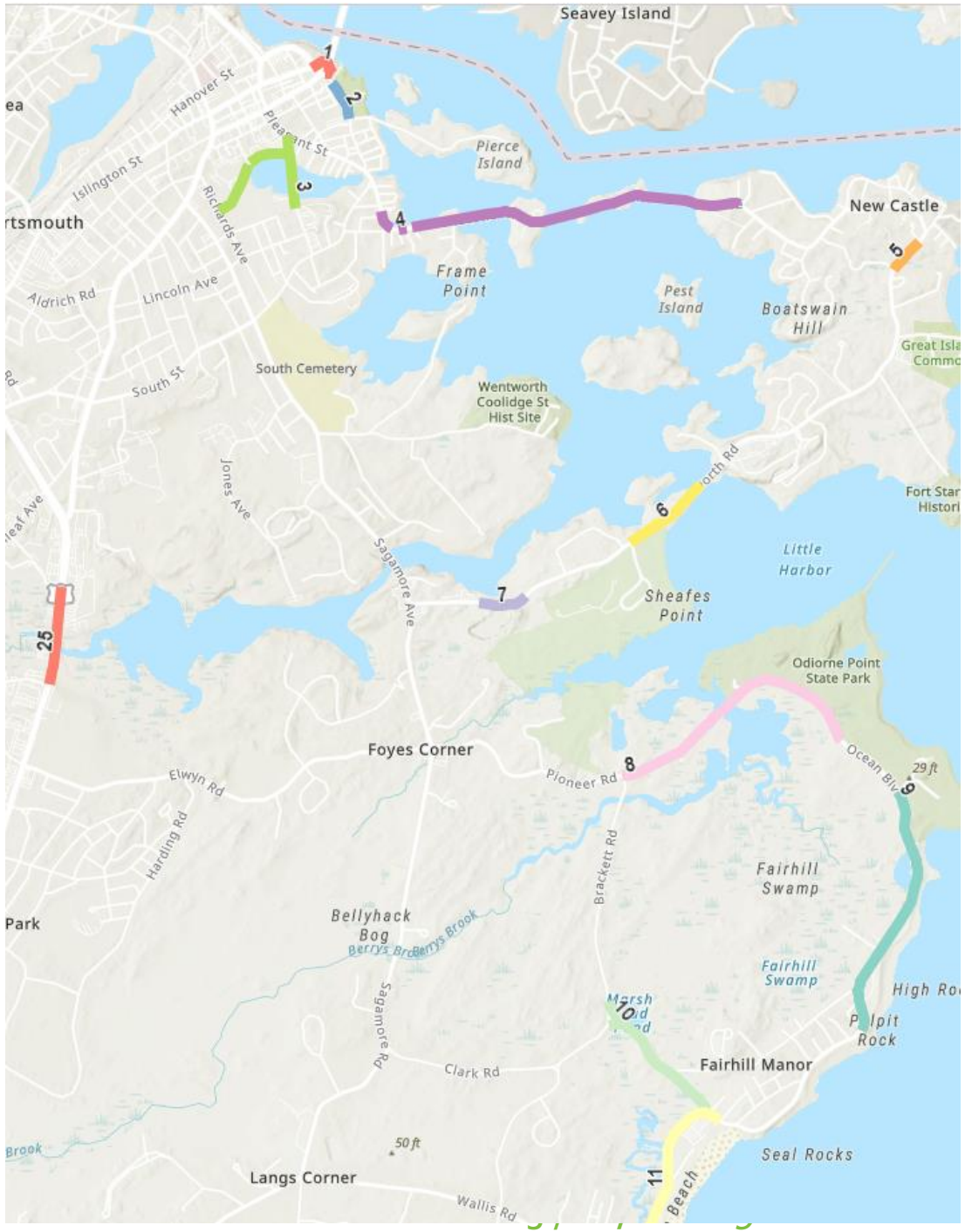
Priority Sites for Evaluation

Town	Site	SLR Impact level
New Castle/ Rye	Wentworth Rd/NH 1B	4'
Rye	Marsh Rd, Parsons Rd	1'
Rye	Ocean Blvd, Wallis Rd	4'
Rye	Locke Rd, Ocean Blvd	4'
Hampton	Cusack Rd	1.7'
Hampton	High St	1'
Hampton	NH 1A SB On ramp, Ocean Blvd, Winnacunnet Rd	4'
Hampton	Brown Ave, Church St, Glade Path, Highland Ave, NH Rt 101	1'
Hampton	Lafayette Rd	4'
Seabrook	South Main St/ NH 286	4'

Portsmouth Sites

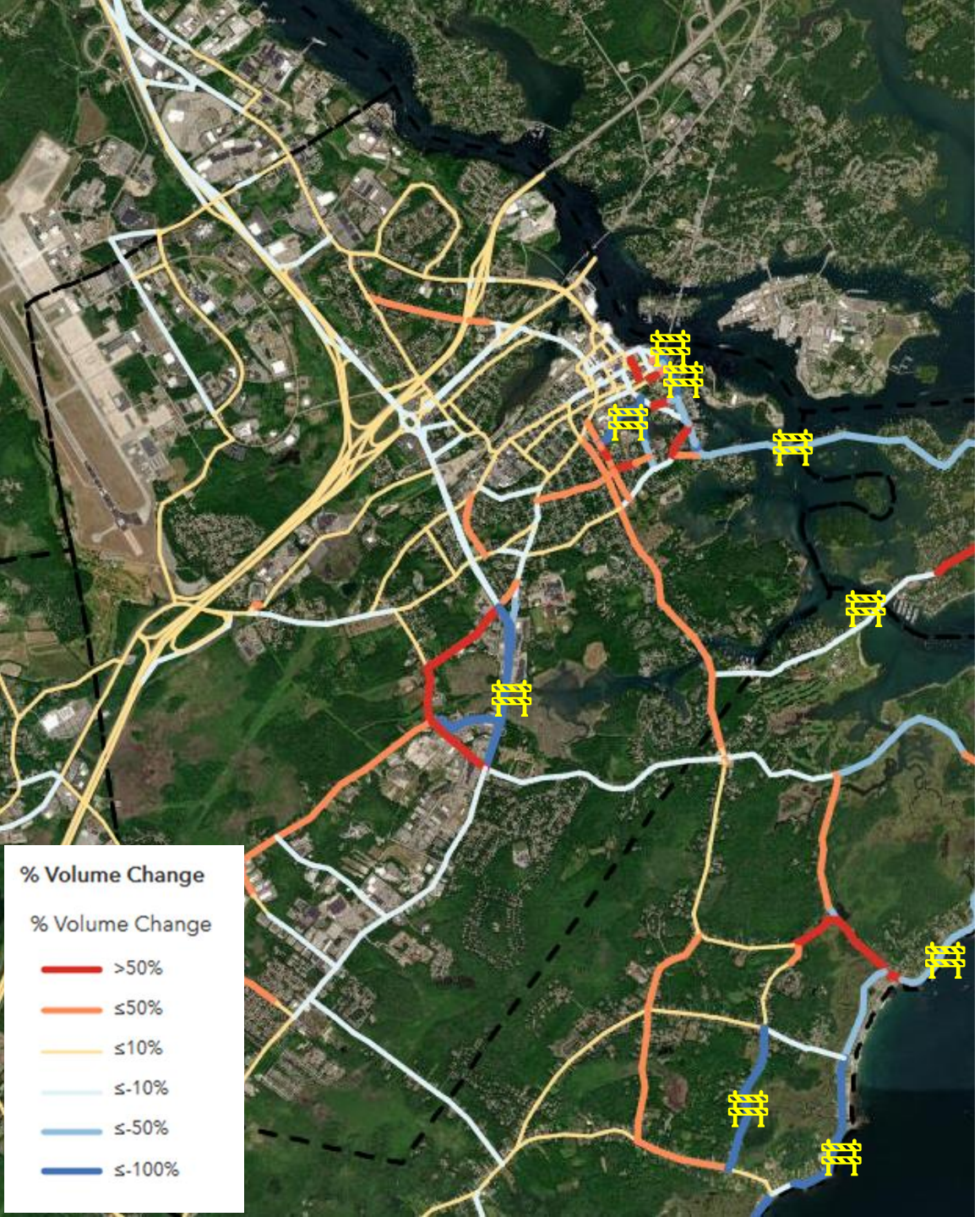
- All Portsmouth sites impacted between 2 and 4 feet of SLR
- Impacts in Rye at < 2 feet will have minor impacts on Portsmouth Roads
- 4’ Sees first significant changes in traffic patterns
- Most impacts are not just to transportation infrastructure
- Streets impacted beyond those in the travel demand model

Town	Site	Map number	SLR Impact level
Portsmouth	State Street	1	4'
Portsmouth	Marcy Street	2	4'
Portsmouth	Junkins Ave/Parrot Ave	3	4’
Portsmouth	New Castle Ave	4	4’
Portsmouth	Lafayette Road	25	4’



Traffic Impacts <2' SLR

- Marsh Road in Rye Impacted
- Shifts Traffic to alternate routes
- Minor impacts to Roads in Portsmouth (<10% change)
- 4% traffic volume increase on NH 1A
- 0.4 to 1% traffic volume increase on US 1



Traffic Impacts at 4’ SLR

- US 1 closed at Sagamore Creek Crossing
- Impacted at ± 2’ SLR
- ~20,000 Vehicles per day re-routed
- 180% Increase in traffic on Greenleaf/Peverly Hill Road
  - Capacity Concerns
  - Access to driveways will become more challenging
  - Safety concerns given narrow shoulders

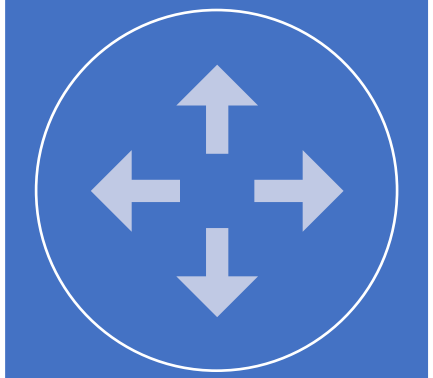
Traffic Impacts at 4' SLR

- State/Daniel Street under Memorial Bridge Closed shifting traffic to Penhollow and other streets.
- Marcy Street & New Castle Avenue limited access
- Junkins Ave and Parrott Ave Impacted
  - Access to Library and Middle School may be impacted
  - Leary Field and South Mill Pond Playground also
- 50%+ Traffic increases on Richards and Miller Avenues
- 20%+ Volume increase on Sagamore Avenue

Actions Considered

No Action

Do nothing



Avoid

Prioritize investment out of the water's way

Accommodate

Options that allow you to better live with the water

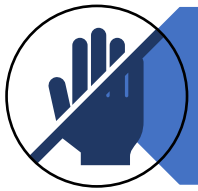
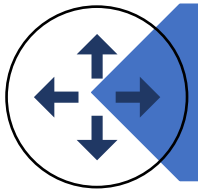
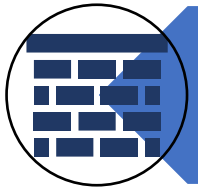
Resist

Options that keep the water away

Relocate

Move assets of facilitate retreat away from the water

Actions - Based on Coastal Flood Risk Guidance

	Level of Risk for Coastal Flooding	Tolerance for Flood Risk
 No Action	Very Low to Low	High
 Avoid	Very Low	Medium to Very Low
 Accommodate	Moderate	Medium
 Resist	High	Low to Very Low
 Relocate	High	Low to Very Low

Lafayette Road

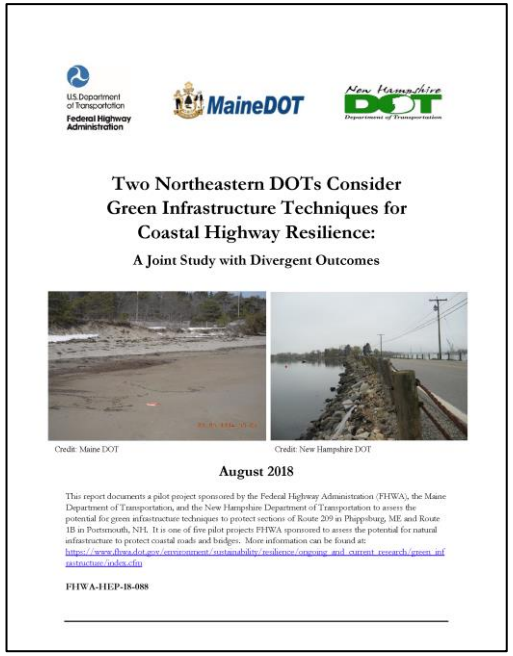
- **Accommodate**
  - Evaluate utility of larger bridge – Increased drainage capacity and potentially reduced flooding levels
  - Detours – Alternate routes are available but most direct are not designed for high volumes of traffic from US 1
- **Resist**
  - Roadway approaches and bridge could be raised above expected SLR levels. This could require increased shoulder area.
  - Tide gate/tide barrier discussed in 2013 Portsmouth Coastal Resilience Initiative Report
- **Retreat/Relocate**
  - Not Desired – Evacuation Route and primary transportation corridor

Daniel/State St., Marcy St., Junkins Ave/Parrott Ave.

- **Beyond just a transportation project to address the flooding**
  - 2013 Portsmouth Coastal Resilience Initiative Report identifies extent of challenges
  - Groundwater rise is a significant issue
  - Underground utilities complicate roadway reconstruction
- **Accommodate**
  - Floodproof everything
- **Resist**
  - Dense development means roads could only be raised with everything else.
  - Berms/Flood Barriers would protect adjacent properties and roadways
- **Retreat/Relocate**
  - May be necessary at higher SLR

New Castle Avenue

- **Beyond just a transportation project to address the flooding**
  - Flooding from both sides of peninsula
- **Accommodate**
  - Floodproof everything
- **Resist**
  - Raising road could protect north side
  - Berms/Flood Barriers would be needed on south side to protect adjacent properties
  - NHDOT Evaluating Options for causeway
- **Retreat/Relocate**
  - Not desired – Evacuation Route for New Castle
  - Both New Castle Approaches Impacted. Can both be addressed?
  - Retreat may be necessary at higher SLR



U.S. Department of Transportation Federal Highway Administration | MaineDOT | New Hampshire DOT

Two Northeastern DOTs Consider Green Infrastructure Techniques for Coastal Highway Resilience:

A Joint Study with Divergent Outcomes

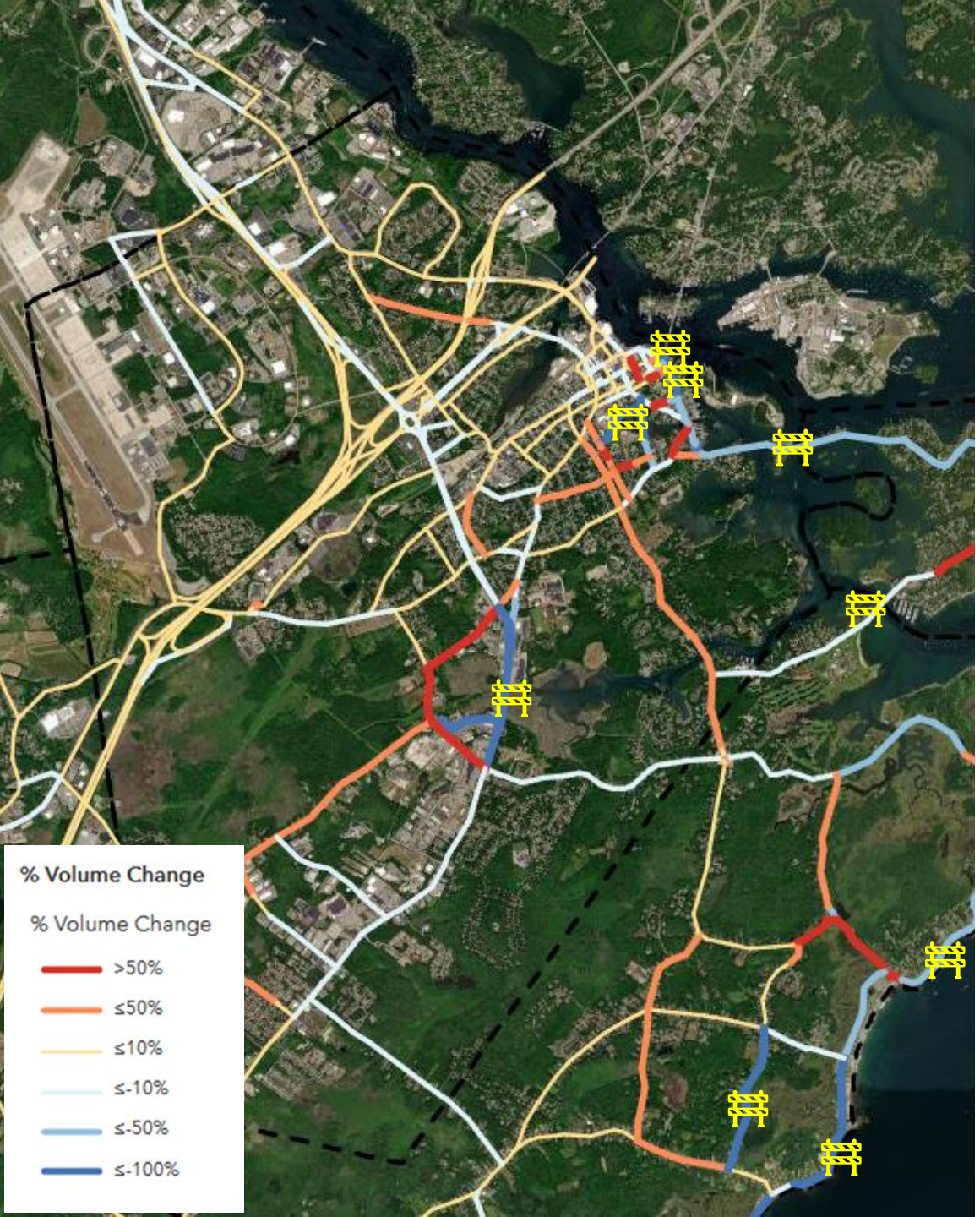
Credit: Maine DOT

Credit: New Hampshire DOT

August 2018

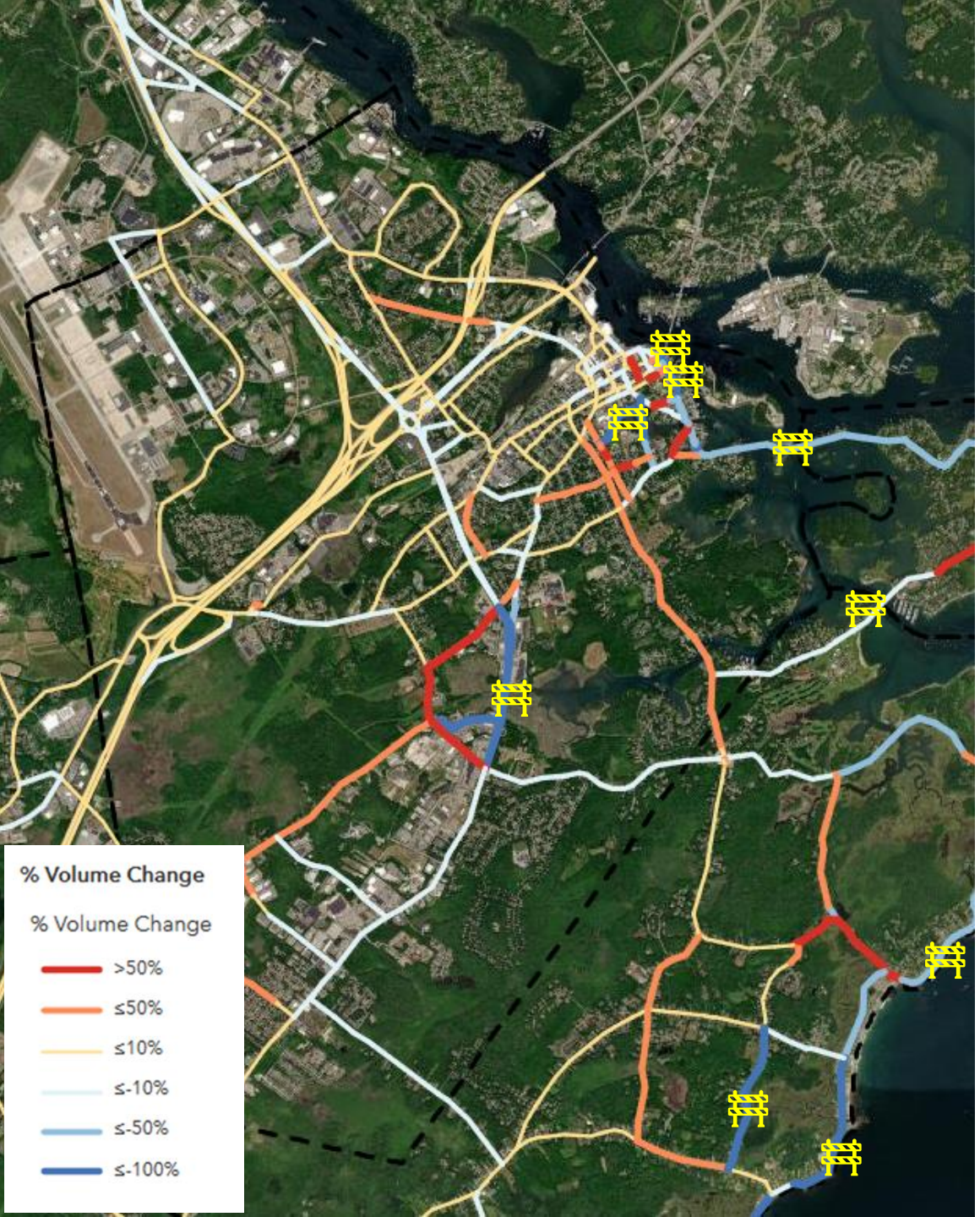
This report documents a pilot project sponsored by the Federal Highway Administration (FHWA), the Maine Department of Transportation, and the New Hampshire Department of Transportation to assess the potential for green infrastructure techniques to protect sections of Route 209 in Phippsburg, ME and Route 1B in Portsmouth, NH. It is one of five pilot projects FHWA sponsored to assess the potential for natural infrastructure to protect coastal roads and bridges. More information can be found at: https://www.fhwa.dot.gov/environment/sustainability/resilience/ongoing_and_current_research/green_infrastructure/index.cfm

FHWA-HEP-18-088



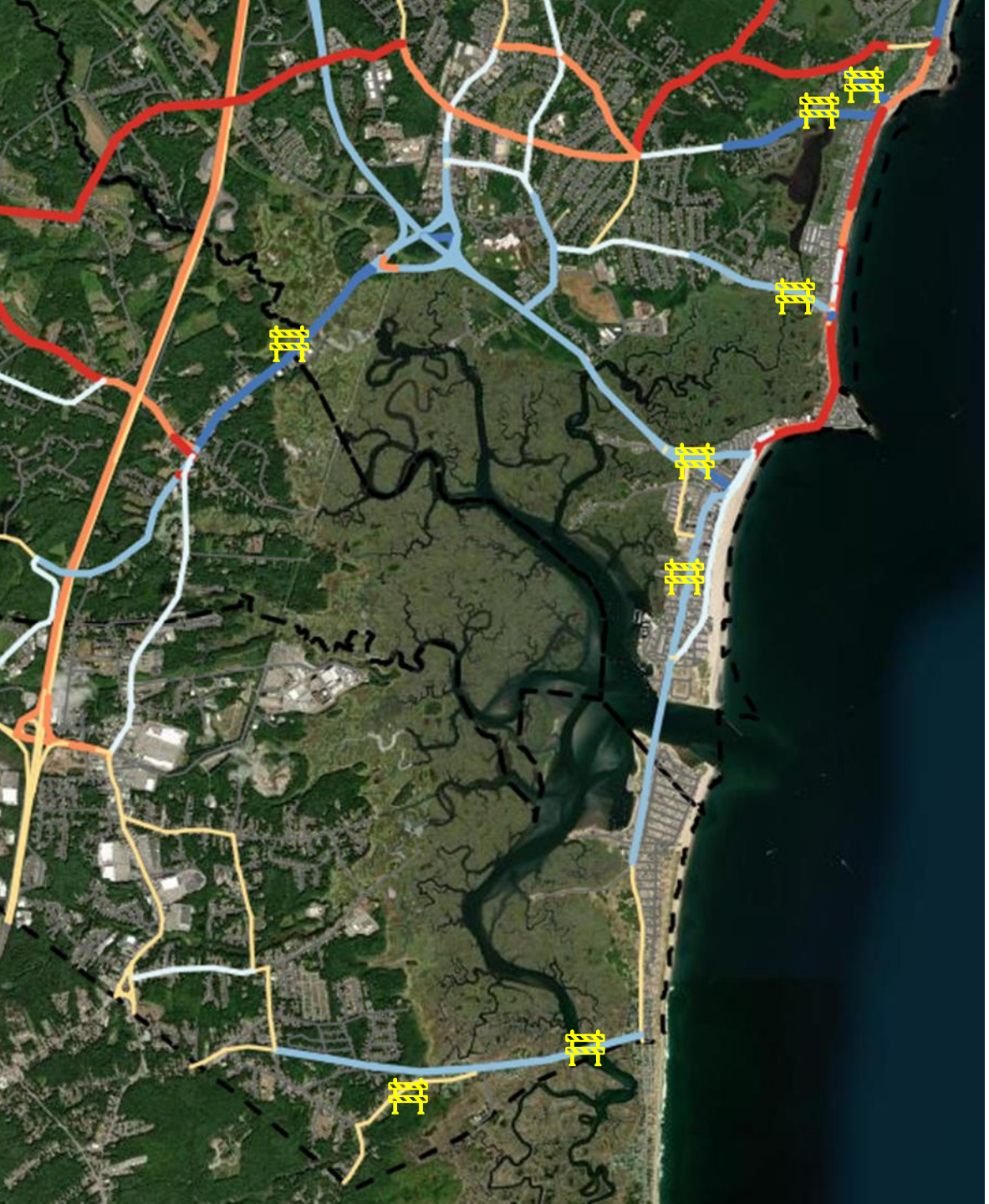
Next Steps

- Complete community meetings
- Development of site profiles
- Continue to refine traffic analysis (Some discussion of 6' SLR Impacts)
- Refining analysis of ten selected locations
- Completing in-depth look at two sites
  - Lafayette Road in Hampton
  - Marsh Rd/Parsons Road/NH 1A in Rye
- Public Meetings this winter
- Finalize project report for March 2022



Beyond the STCVA

- Integrate findings and potential transportation projects into Long Range Transportation Plan
- Refine resiliency criteria in project selection process
- Refine Travel Demand model to include more local roads in seacoast (Component of another study)
- Update and Integrate findings from State Hydrodynamic model after that is complete
- Look for additional grant opportunities to pursue further analysis, design, and engineering



Feedback

- General thoughts on project?
- Something that we missed?
- Options for addressing concerns?
- Output that would be helpful for community?
- Ideas for further analysis?

For More Information

RPC Project Staff

Dave Walker
Assistant Director/Transportation Program Manager
dwalker@therpc.org

Christian Matthews
Transportation/GIS Analyst
cmatthews@therpc.org

https://www.therpc.org/STCVA