Seacoast Transportation Corridor Vulnerability Assessment

David Walker
Assistant Director/
Transportation Program Manager

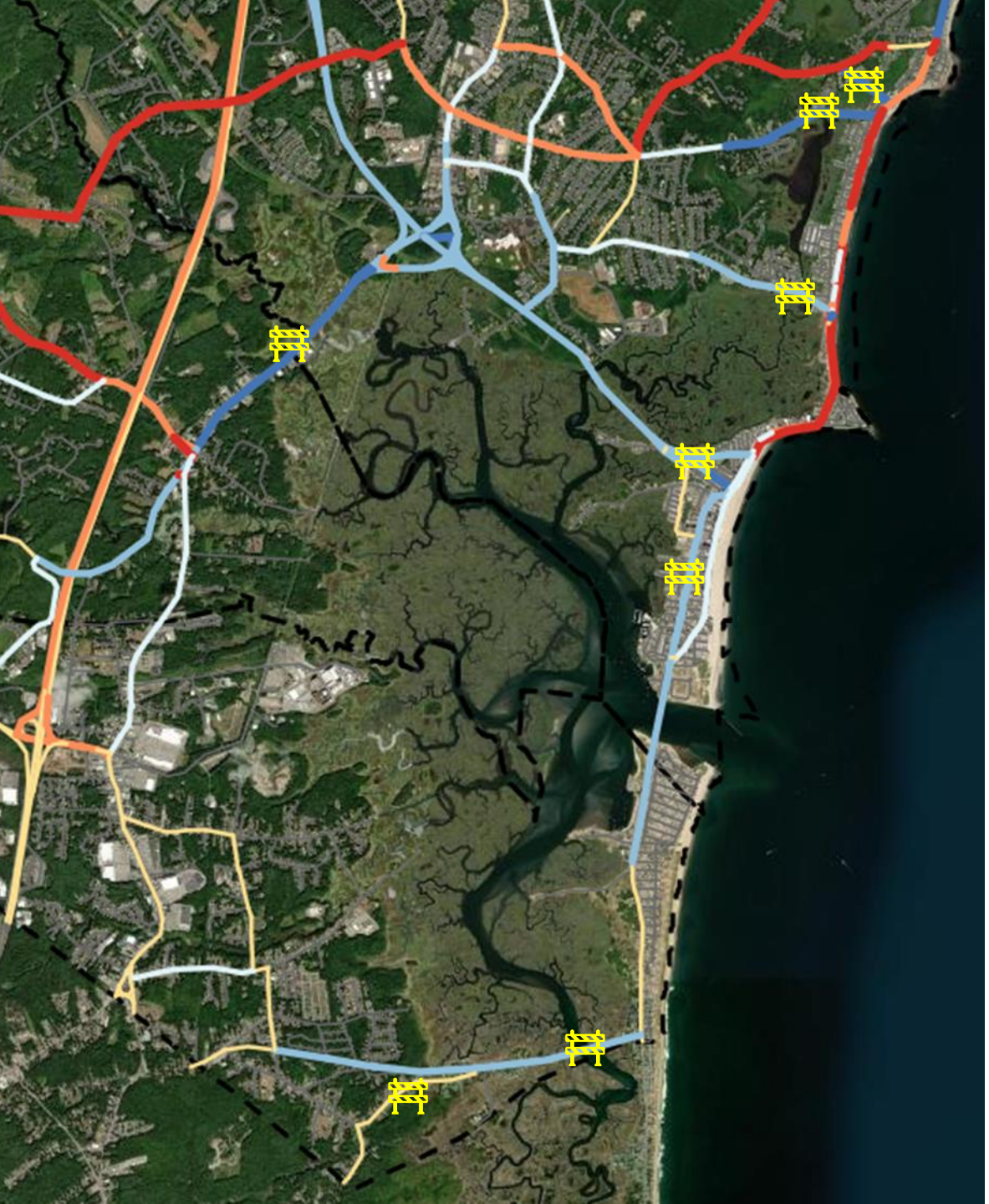
Community Updates & Engagement

Fall, 2021

Image Courtesy of EcoPhotography

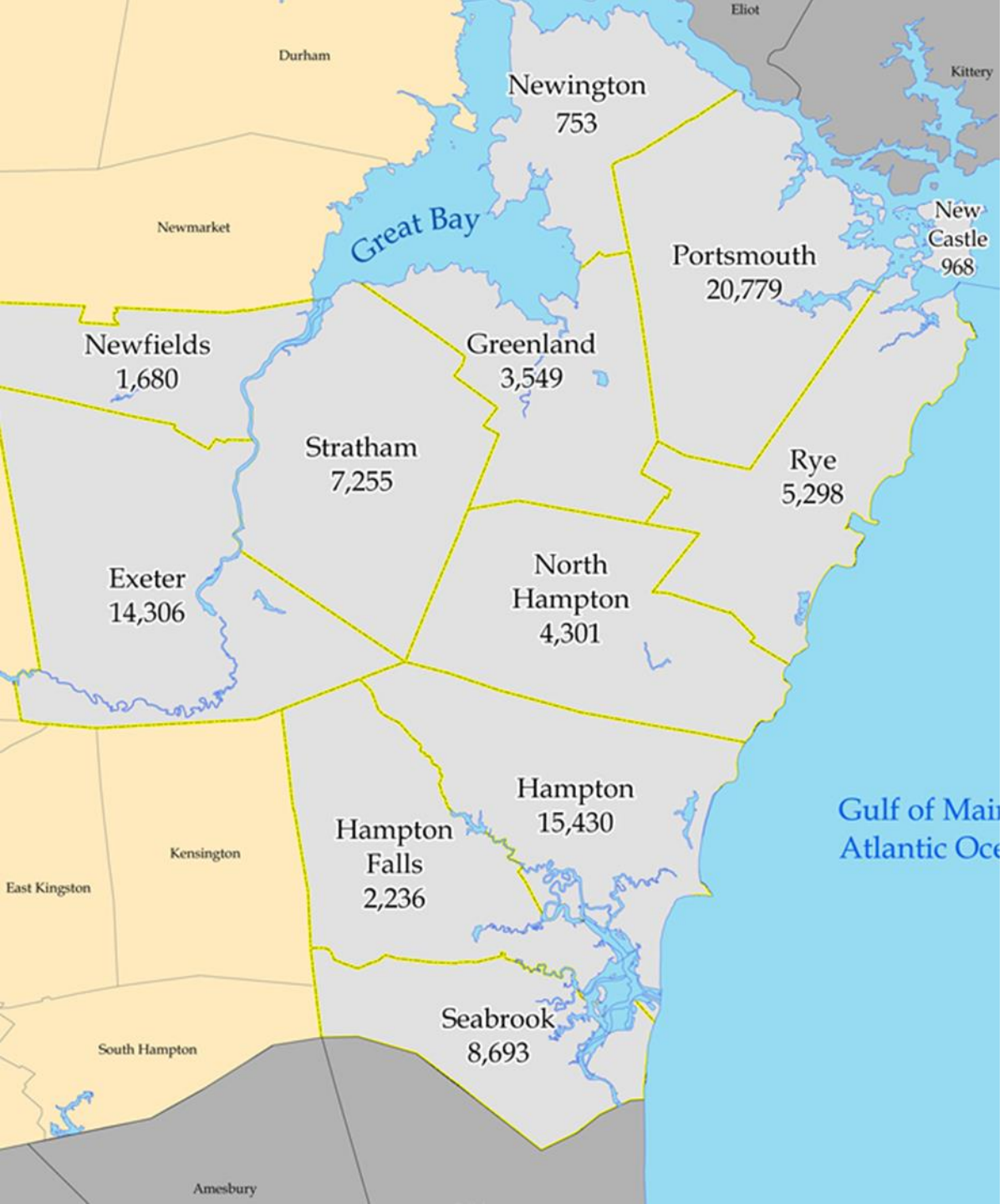
Agenda

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



Feedback

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



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

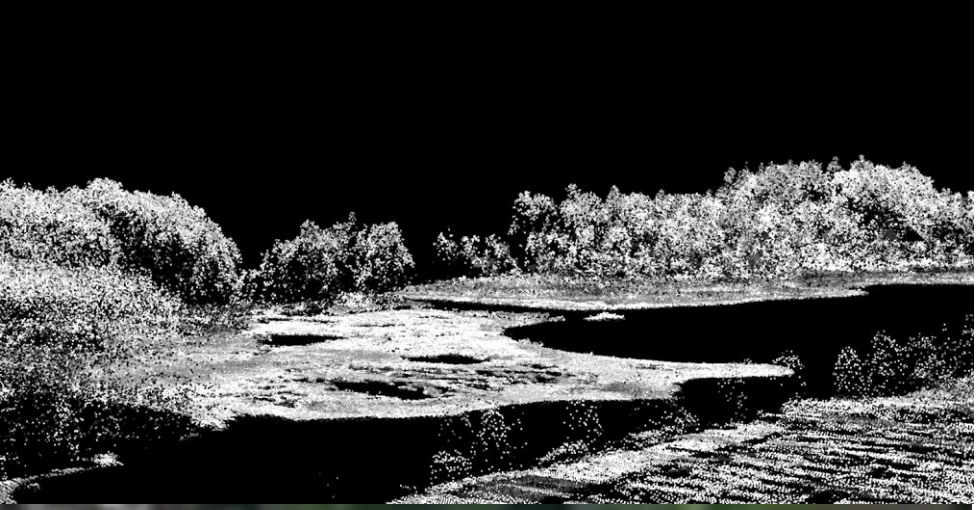
This project was funded,in part, by NOAA's Office for Coastal Management under the Coastal Zone Management Act in conjunction with the New Hampshire Department of Environmental Services Coastal Program.

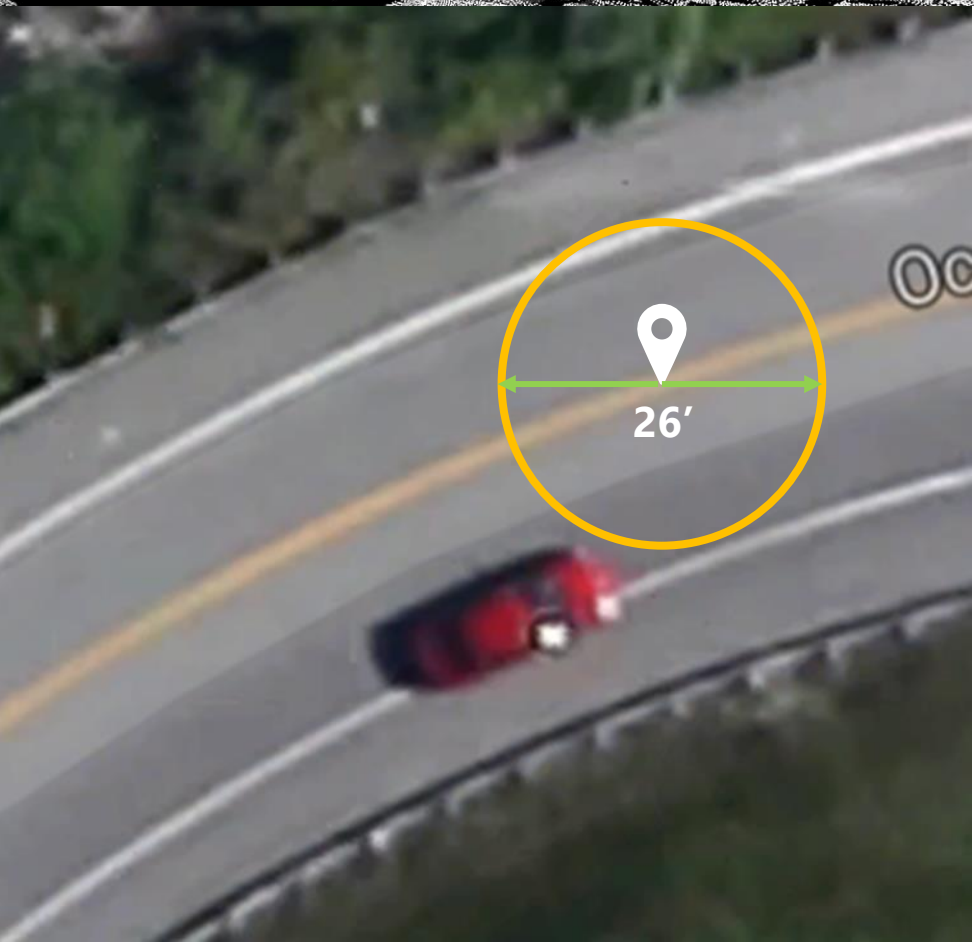
STCVA Goals

- 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

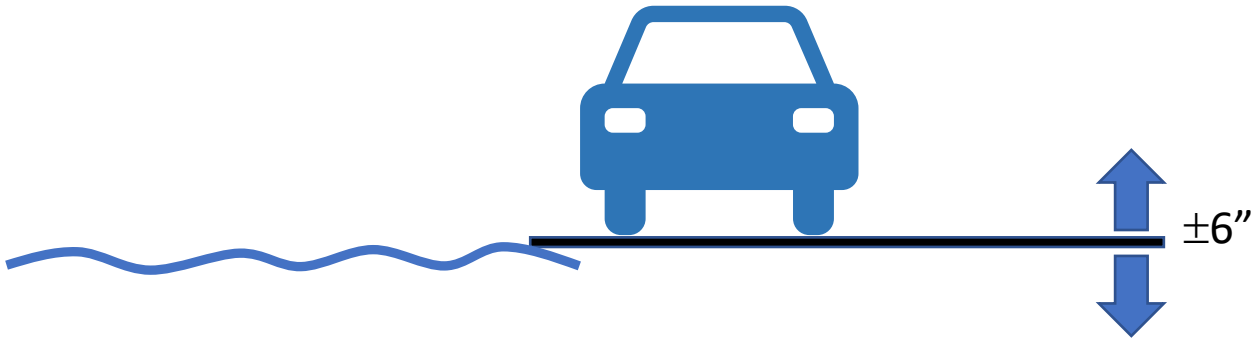
- Enhanced understanding of risks to transportation network from climate change
- Critical links identified and impacts of closures on the transportation network assessed
- Improvement concepts and costs developed for priority locations to better understand scope and scale of building a more resilient 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

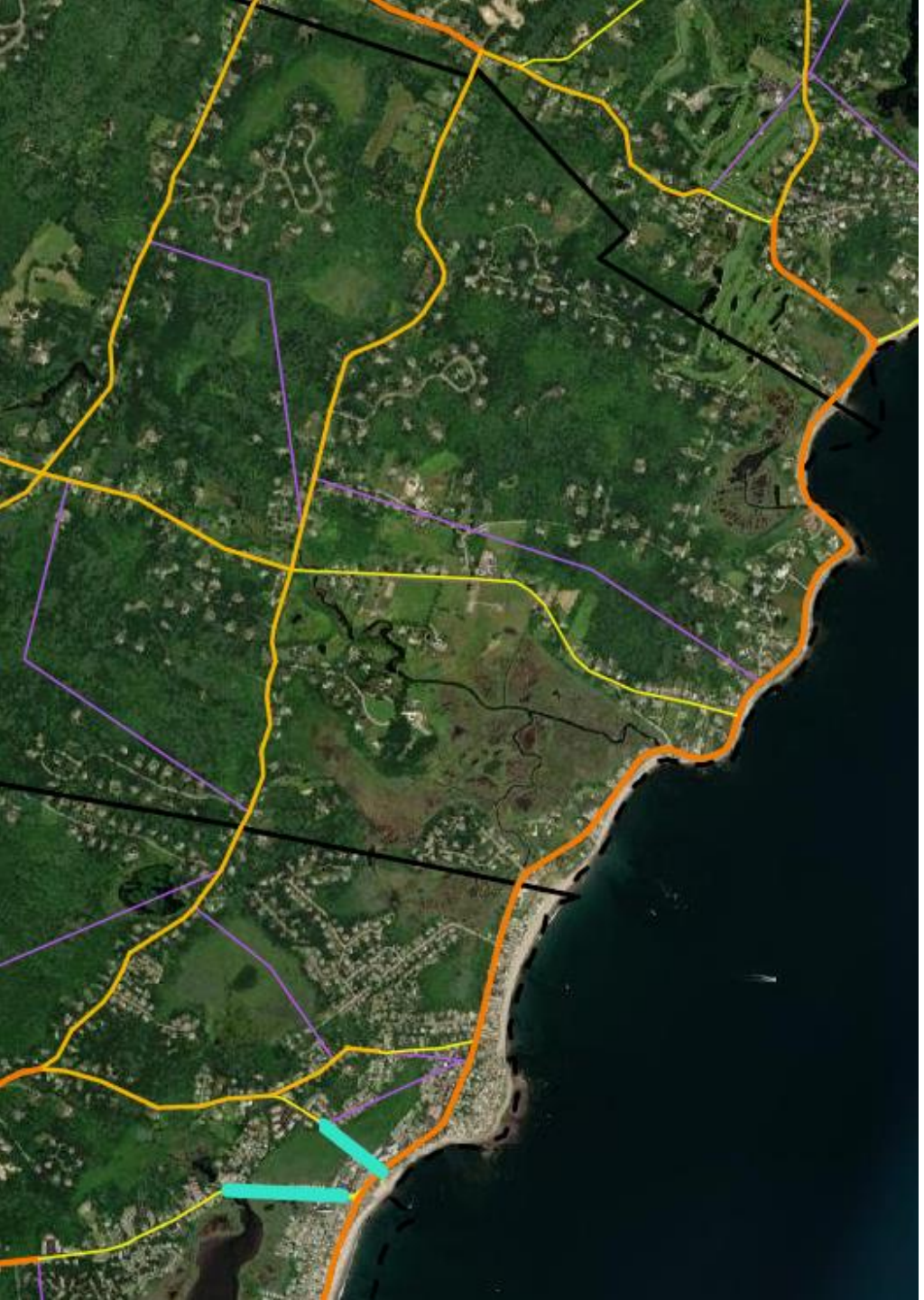




LIDAR Data Accuracy

- 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
- Important to recognize when examining edges and smaller sites





Travel Demand Model Caveats

- Model is primarily intended to look at big-picture traffic patterns but can provide insight into local movement
- Model includes many, but not all, local roadways
- Land use aggregated into zones (Houses create traffic, businesses receive it)
- Trips are loaded from zones to roadway network via load links (purple lines)
- Placement of load links can create odd outcomes
- What the model believes is the most efficient route can sometimes diverge from what is seen in real life

Identifying & Prioritizing Impacted Roadways

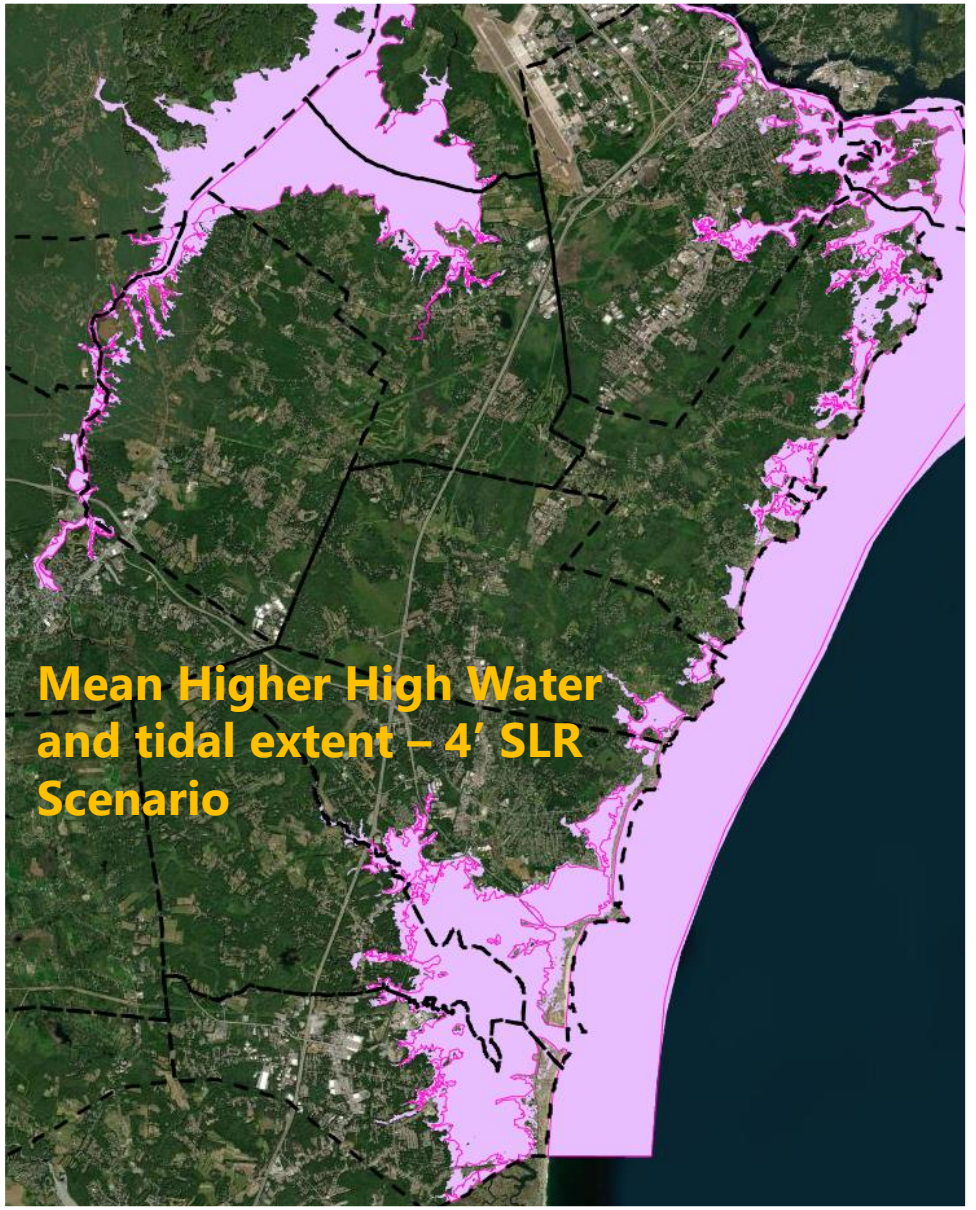
Previous Work on Sea Level Rise Impacts

- 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

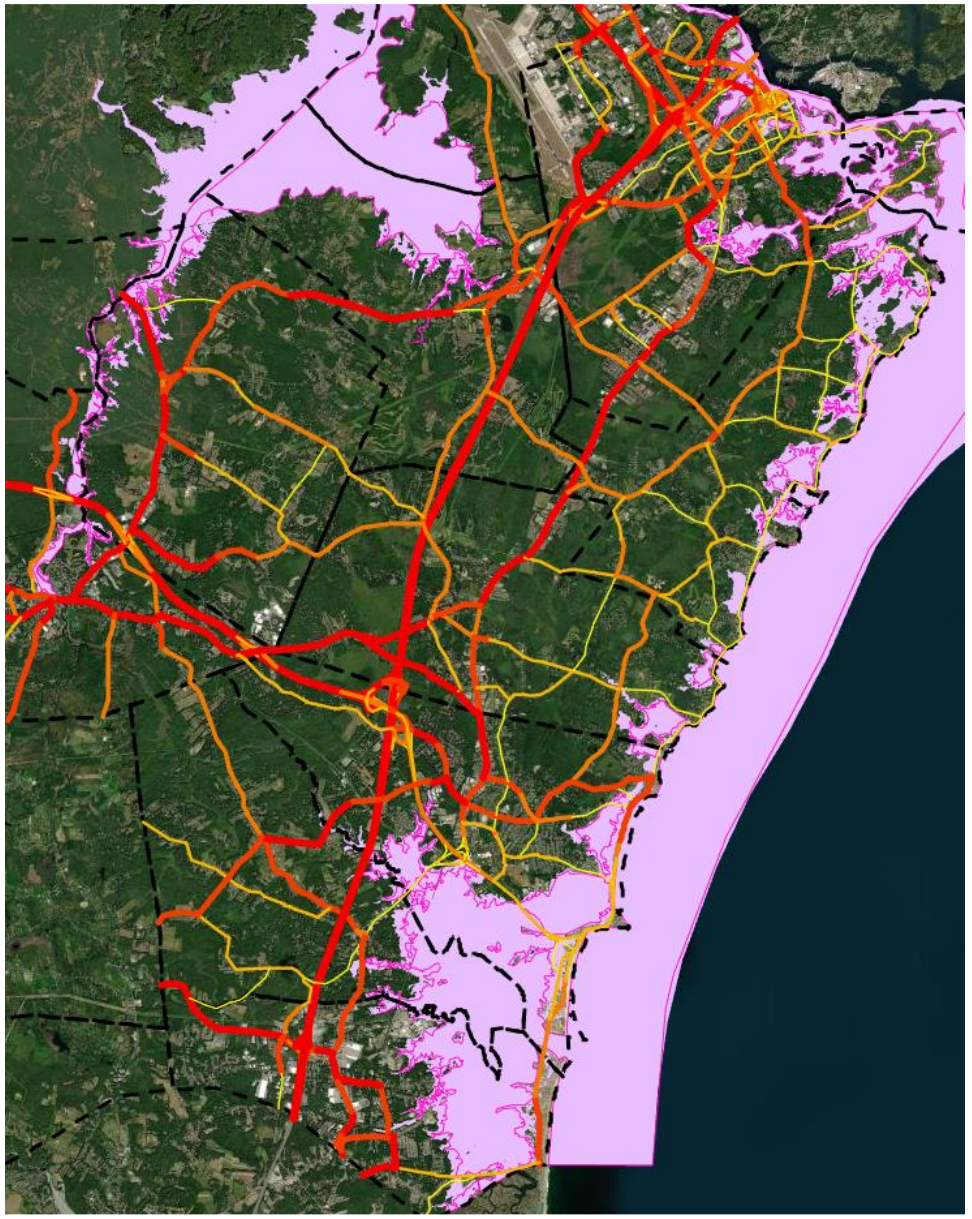
Previous Work on Sea Level Rise Impacts

- 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

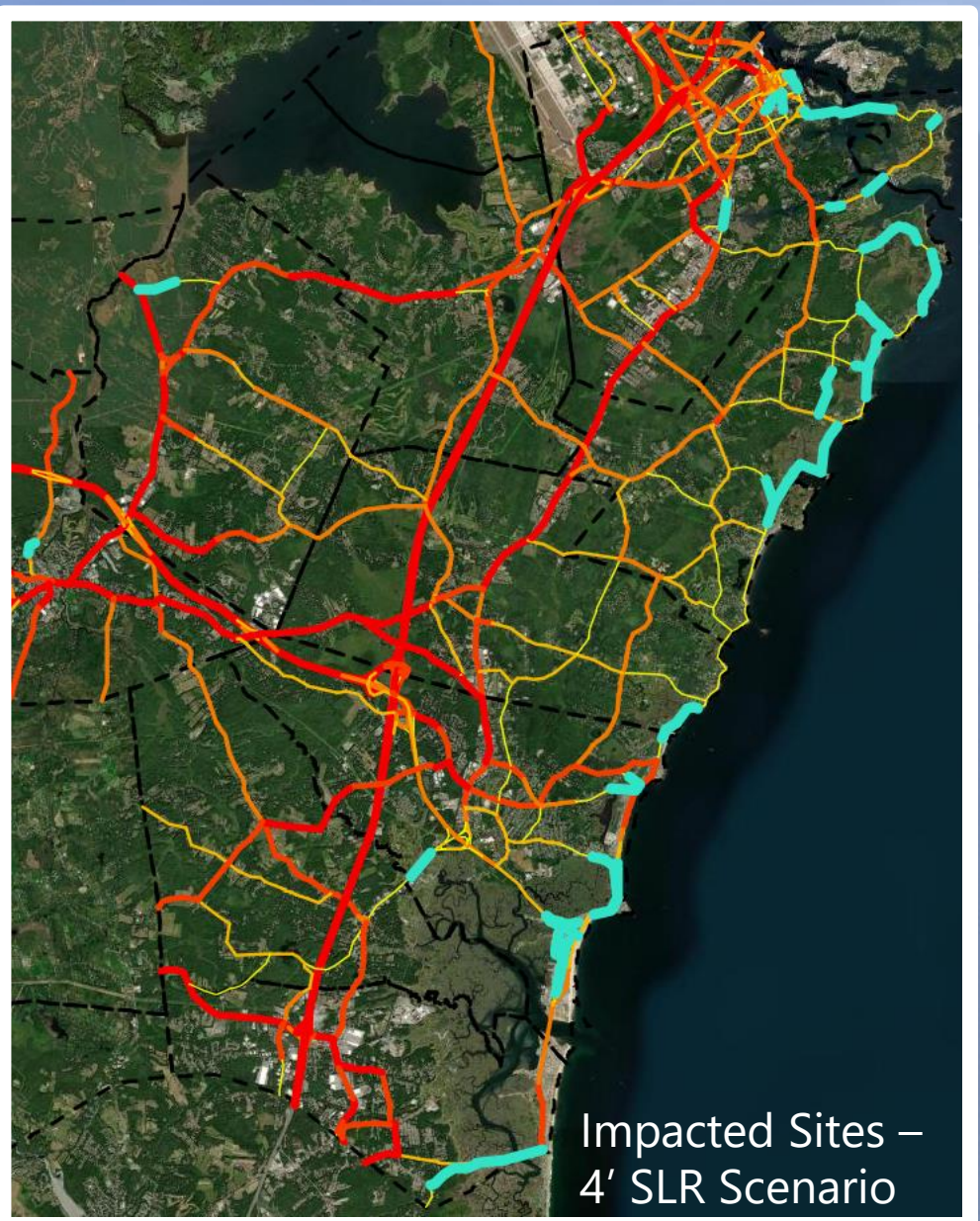
Previous Work on Sea Level Rise Impacts

- 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



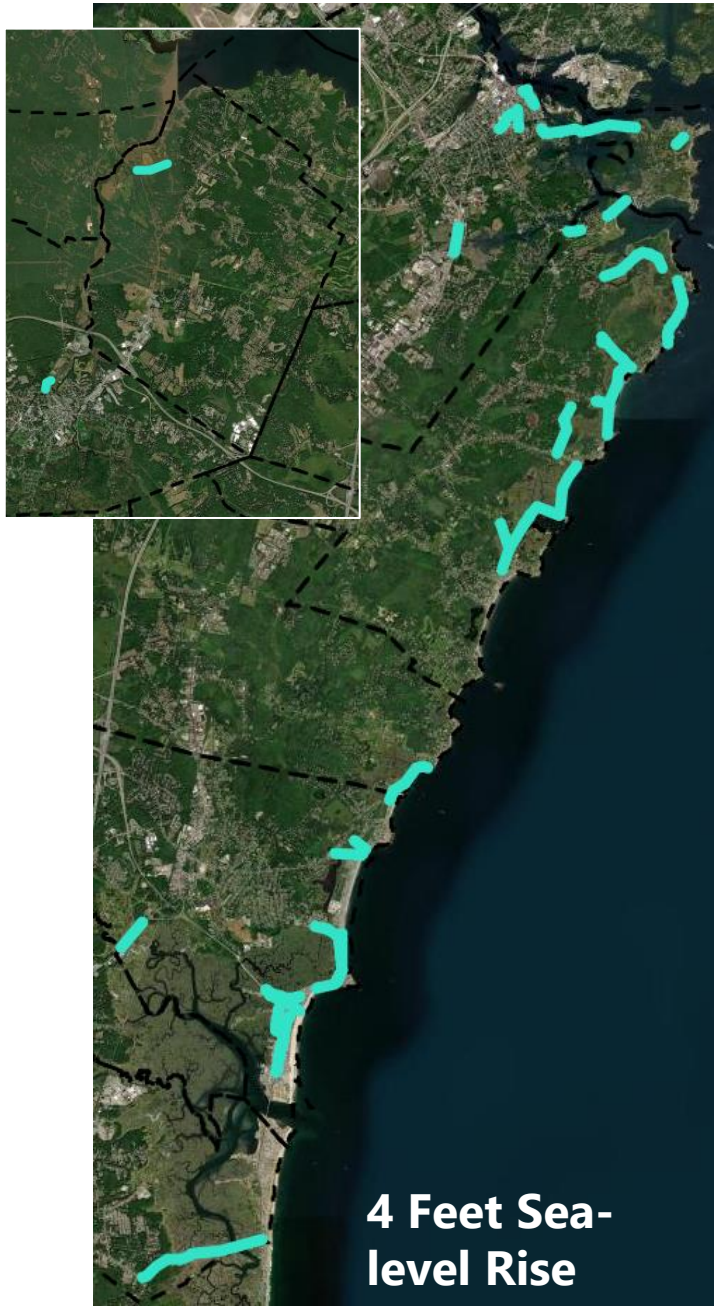
Impacted Sites – 4' SLR Scenario

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

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

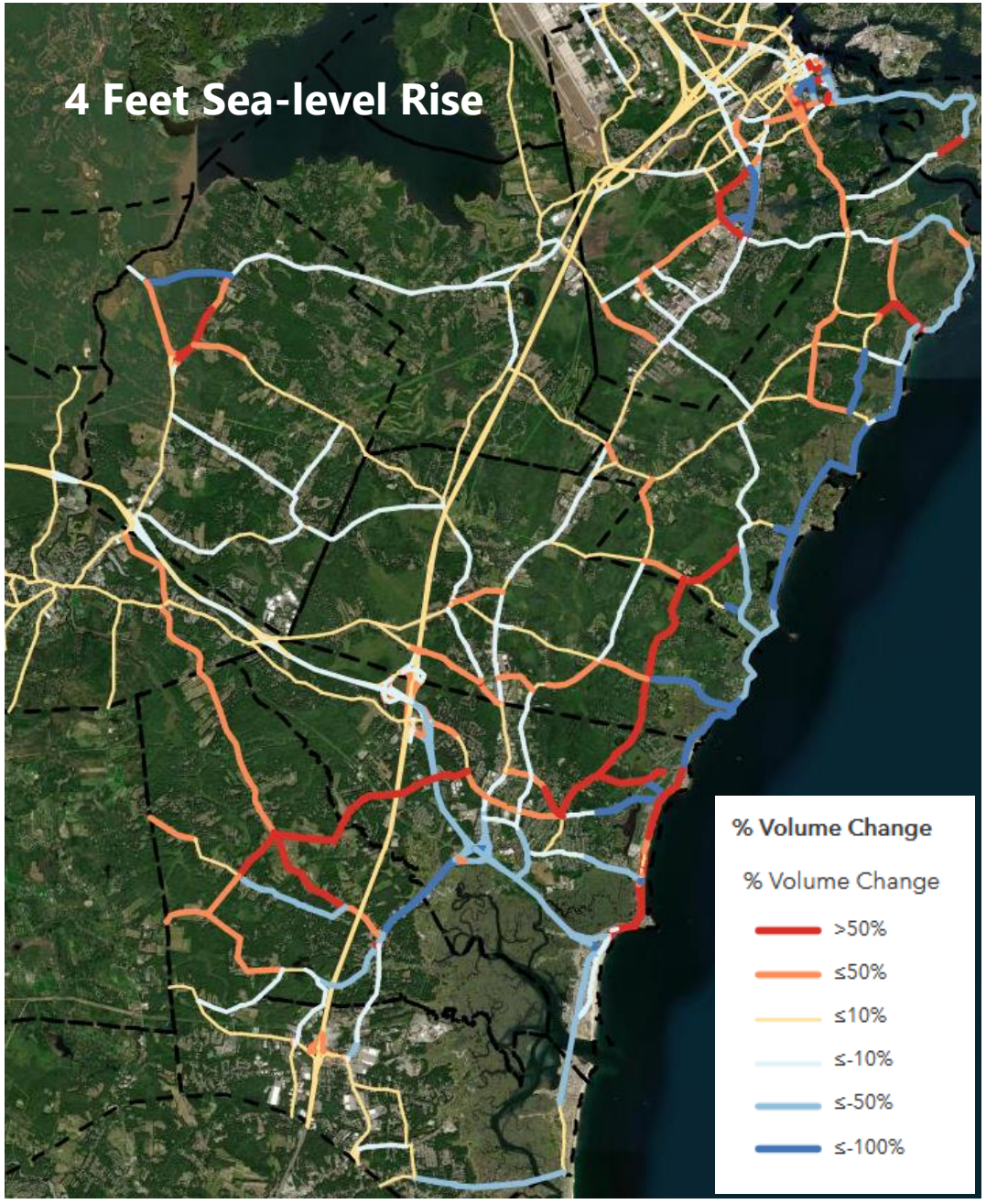
Indirect Transportation Network Impacts

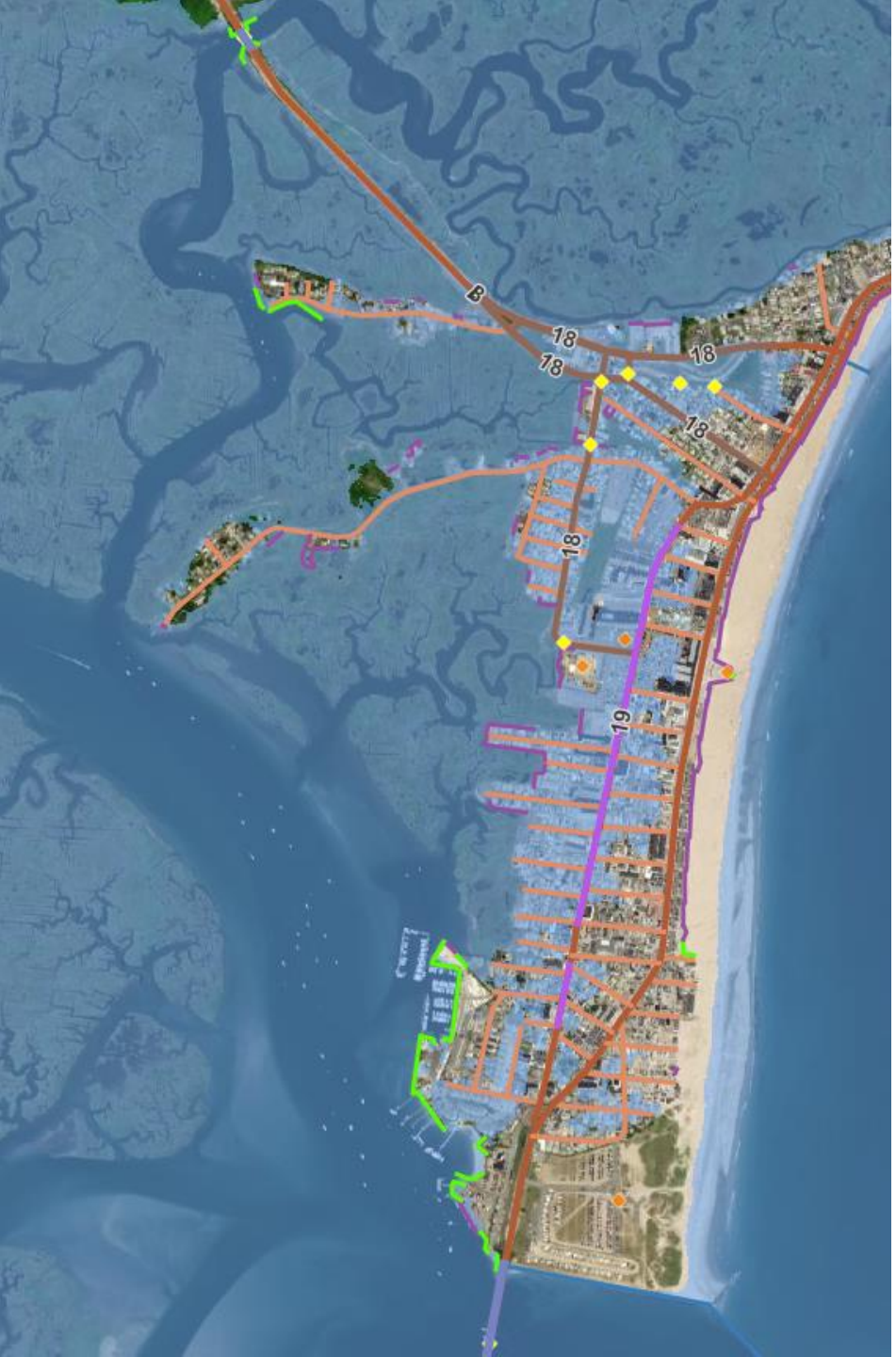
- Travel Pattern Changes
- Traffic Volume Changes
- Impacts on Roadway capacity and condition

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
6.3 Feet	259 model links	50+

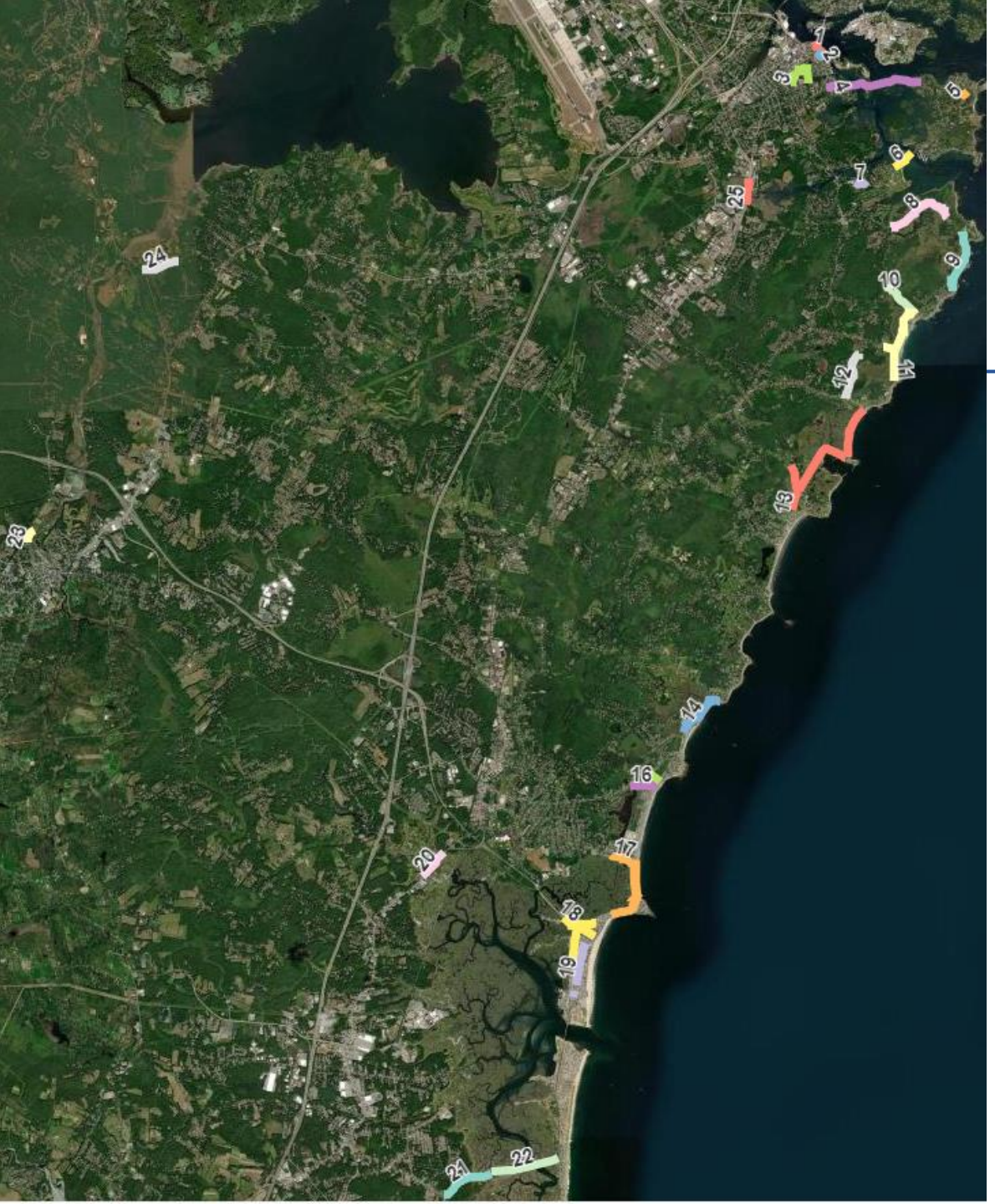
Estimate Traffic Impacts of Road Closures





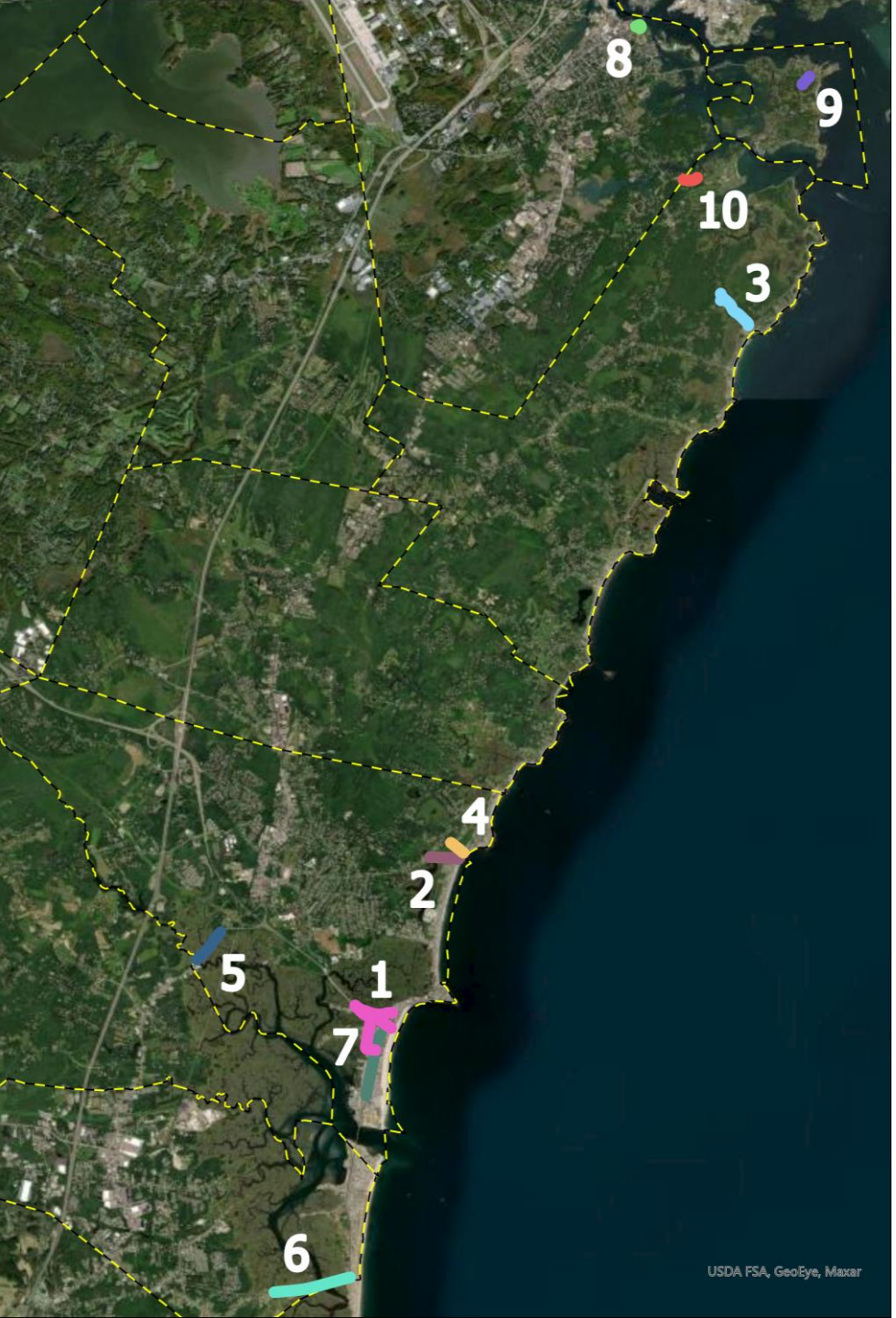
Score Sites Against Criteria to Determine Criticality

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'

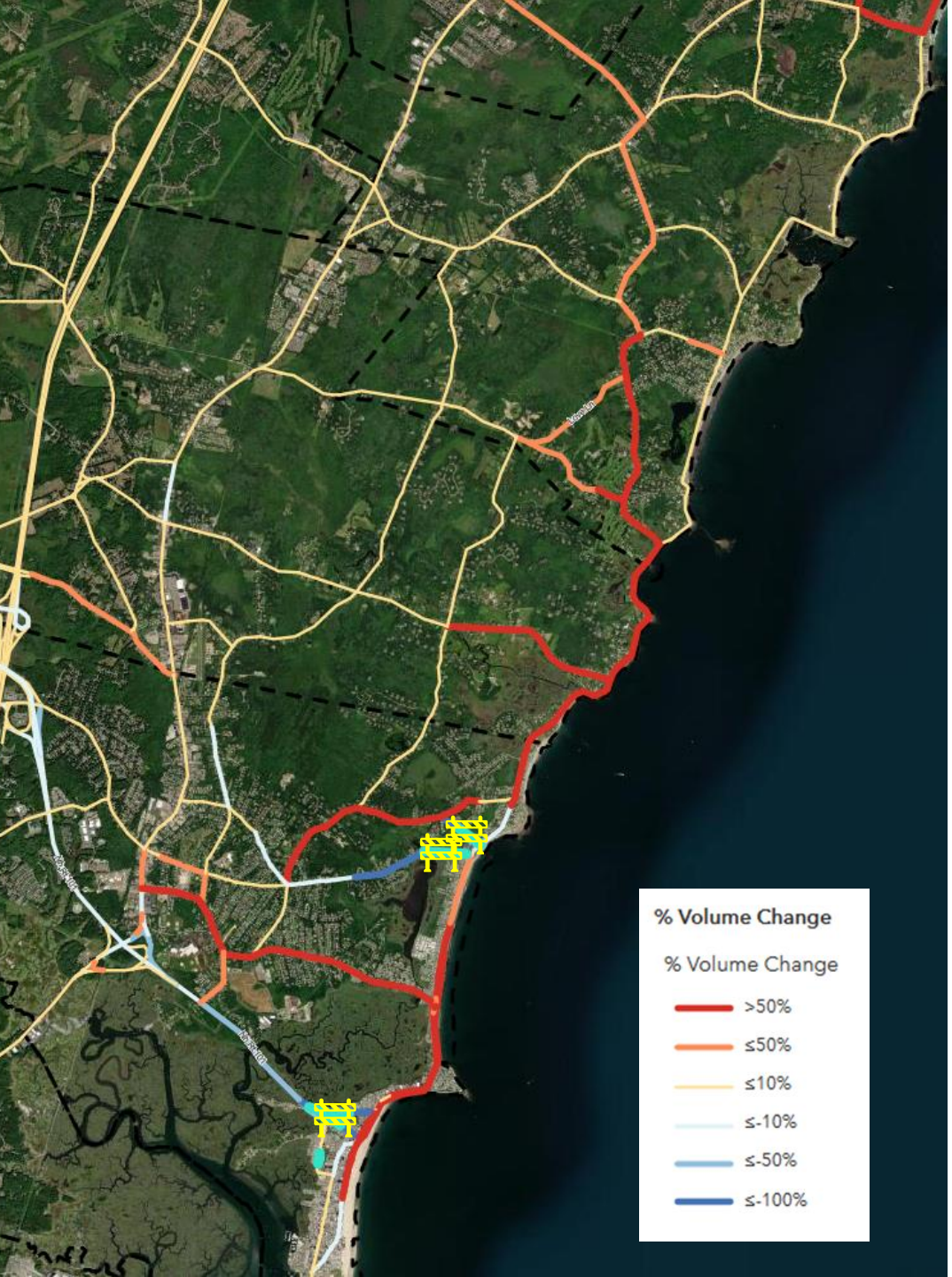
North Hampton Site

- NH 1A Impacted between 2’ and 4’ SLR
- Sites in Rye and Hampton have impacts on North Hampton traffic patterns
- Network Impacts seen starting at 1’ SLR

Town	Site	Map number	SLR Impact level
Hampton/North Hampton	Ocean Blvd	14	4’
Hampton	Cusack Road	15	1.7’
Hampton	High Street	16	1’
Hampton	Winnacunnet Rd/Ocean Blvd	17	4’
Hampton	NH 101/Church St/Highland Ave/Brown Ave	18	1’
Rye	NH 1A/ Locke Road	13	4’

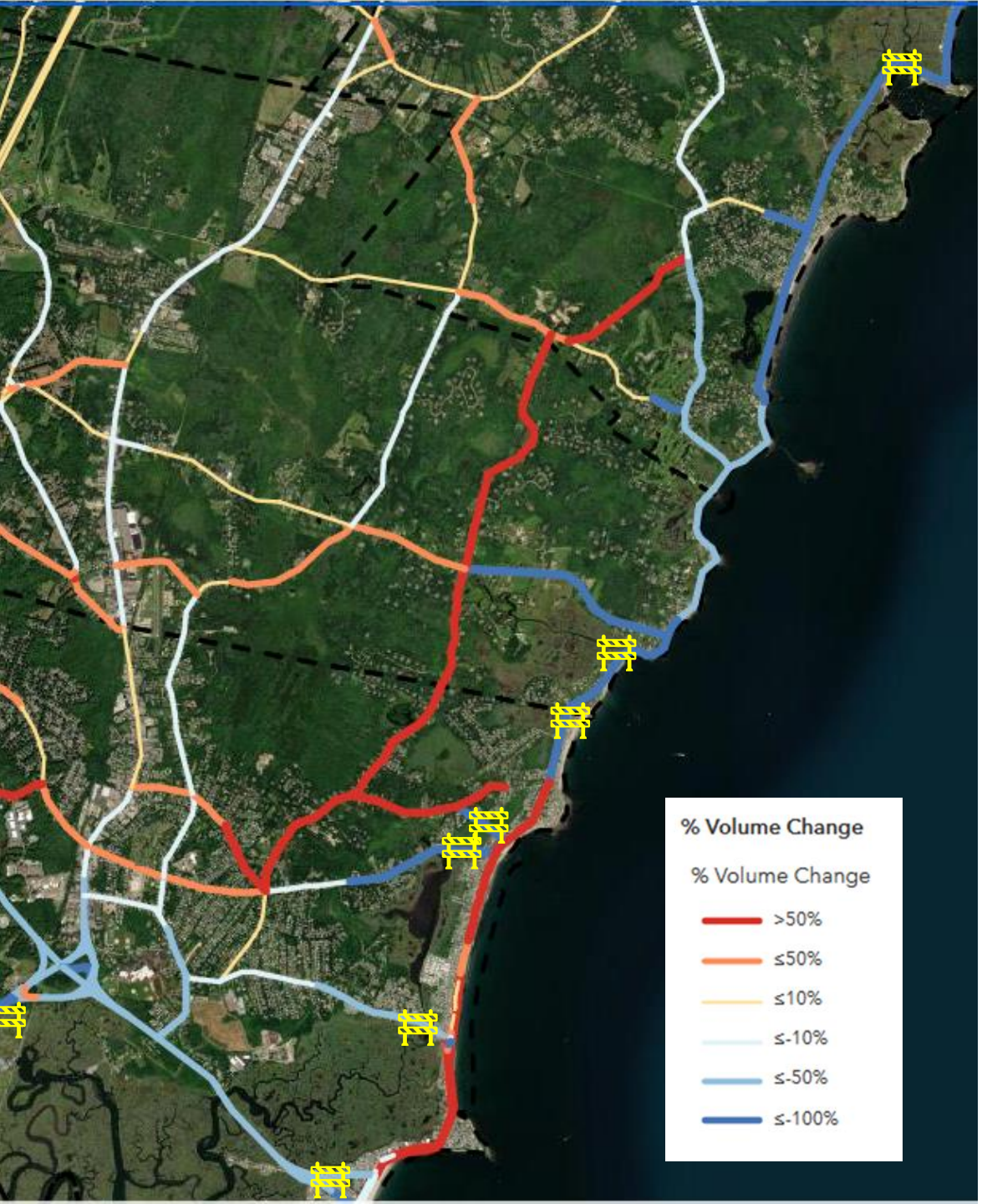
Traffic Impacts 1' SLR

- Marsh Road in Rye (Only localized impacts)
- Highland Avenue & High Street in Hampton
- Shifts Traffic to alternate routes
- Most uses Winnacunnet Rd (+113-166%)
- Woodland Rd – more through traffic accessing the coast
  - +120-170 vehicles per day south of NH 111 (+12-17%)
  - +60 per day north of NH 111 (+8%)
- <10% increase on NH 111



Traffic Impacts 1.7' SLR

- Traffic shifts to Winnacunnet Road, Woodland Rd, and North Shore Road
- Other alternative routes to coast become more popular
- NH 111 - 70% volume increase near coast
- NH 1A – 60-70% volume increase
- US 1 to Lang Road to Central Road in Rye becomes more heavily travelled route to coast.

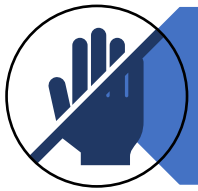
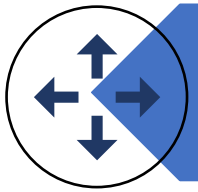
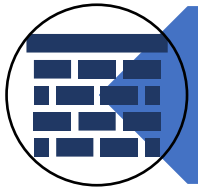


Traffic Impacts at 4' SLR

- NH 1A impacted near North Hampton Beach State Park
  - Travel through that area eliminated
- Woodland Road Traffic Increases Further
  - 125-140% south of NH 111 (2,225-2,400 vehicles per day)
  - 86% north of NH 111 (1600 vehicles per day)
- Traffic decreased substantially on eastern portion of NH 111 and on NH 1A north of NH 111
  - Model Pattern here doesn't reflect expectations given continued access to the coast via NH 111
  - Southbound travel from NH 111/NH 1A intersection would be eliminated but northbound would be available.

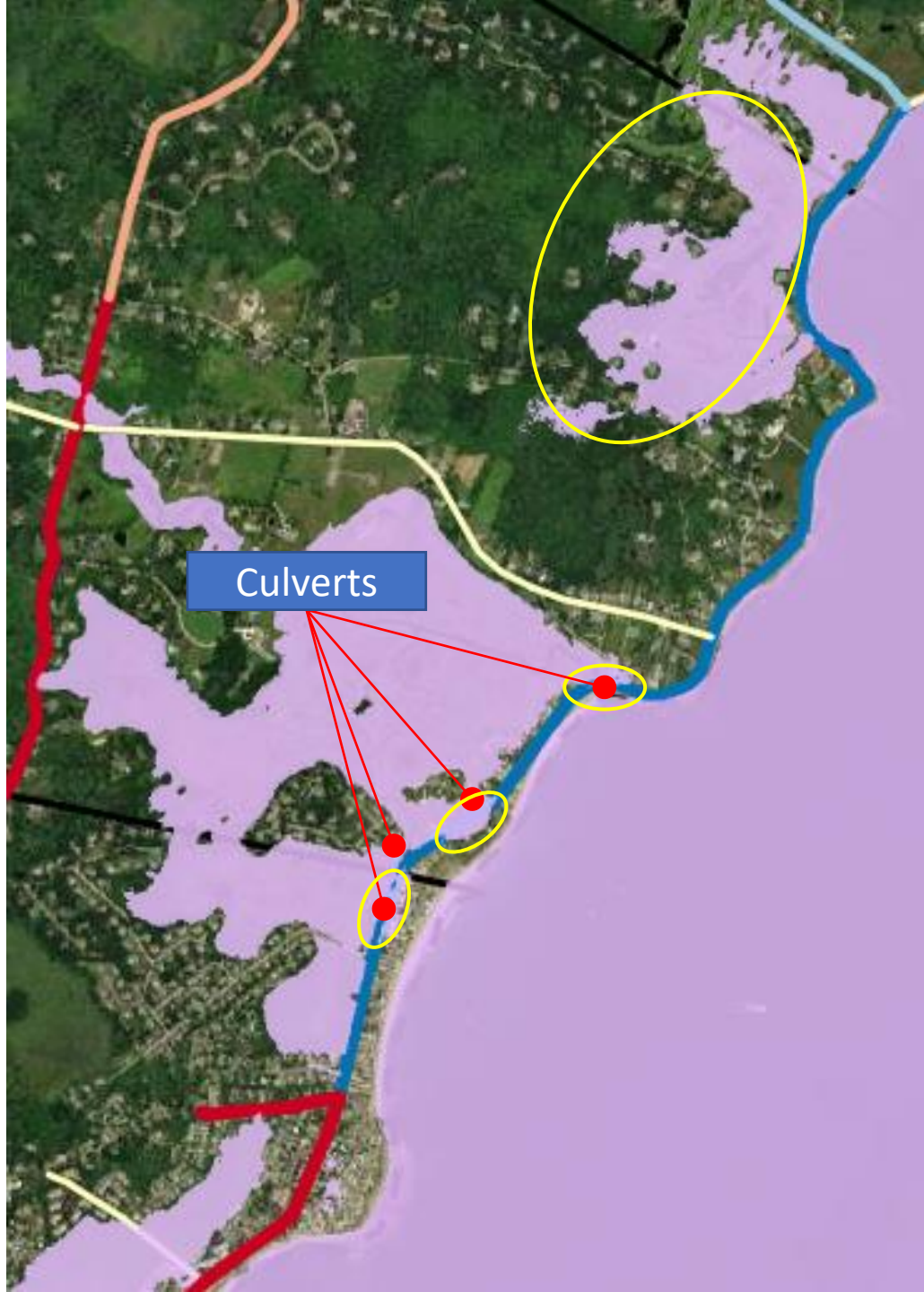
Actions Considered

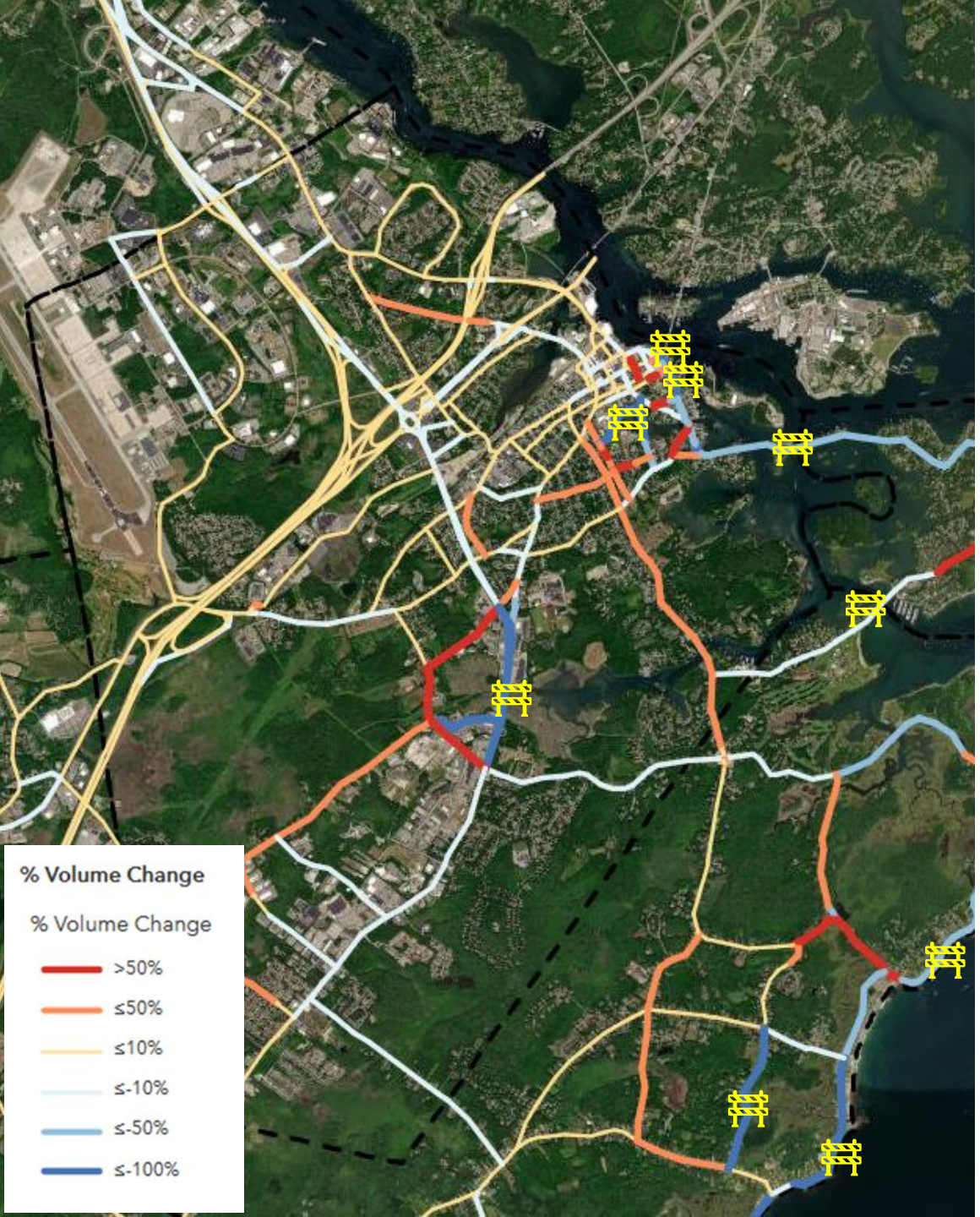
Actions - Based on Coastal Flood Risk Guidance

	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

Ocean Boulevard (NH 1A)

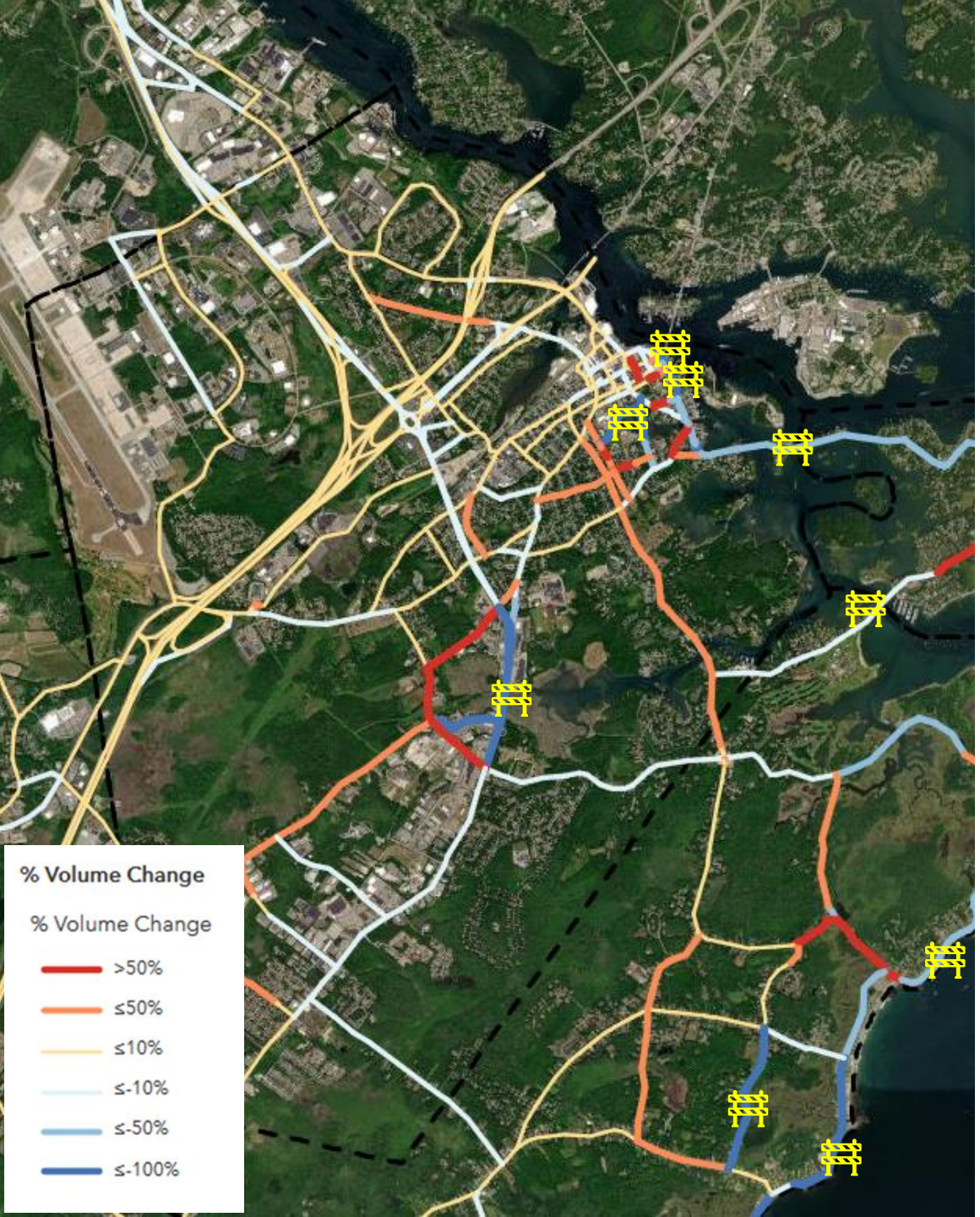
- **Accommodate**
  - Reconstruct roadway with materials less susceptible to changes in moisture levels. Accommodates SLR up to pavement surface
  - Culvert Redesign – Culvert south of Sea Road intersection is recognized to be undersized. Culvert north of Noreast Lane is recognized to have some ecological limitations. Appledore Ave and Huckleberry Lane culverts also have limitations. All four are tidal
  - Detours – Woodland Avenue alternative route
- **Resist**
  - Raising Roadway to elevate pavement surface above expected SLR. Likely impacts on adjacent wetlands and properties
- **Retreat/Relocate**
  - Not desired –Retreat may be necessary at higher SLR
  - ~45 Residences Isolated + businesses





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
    - Neil Pit Lane/Lavender Creek Culvert 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