VIRGINIA INSTITUTE OF MARINE SCIENCE RECURRENT FLOODING STUDY

January 2022 Update to Commonwealth Transportation Board

Center for Coastal Resources Management

VDOT/VIMS Partnership

"This Memorandum of Understanding (MOU) provides for coordination among the Virginia Institute of Marine Science (VIMS), the Chief Resilience Officer of the Commonwealth of Virginia (CRO) and the Virginia Department of Transportation (VDOT) in developing a proactive strategy for understanding and addressing sea level rise, land subsidence and recurrent flooding impacts on existing and planned road infrastructure as well as how that infrastructure will impact natural ecosystems in Virginia's coastal zone as the climate changes."

Study Goals

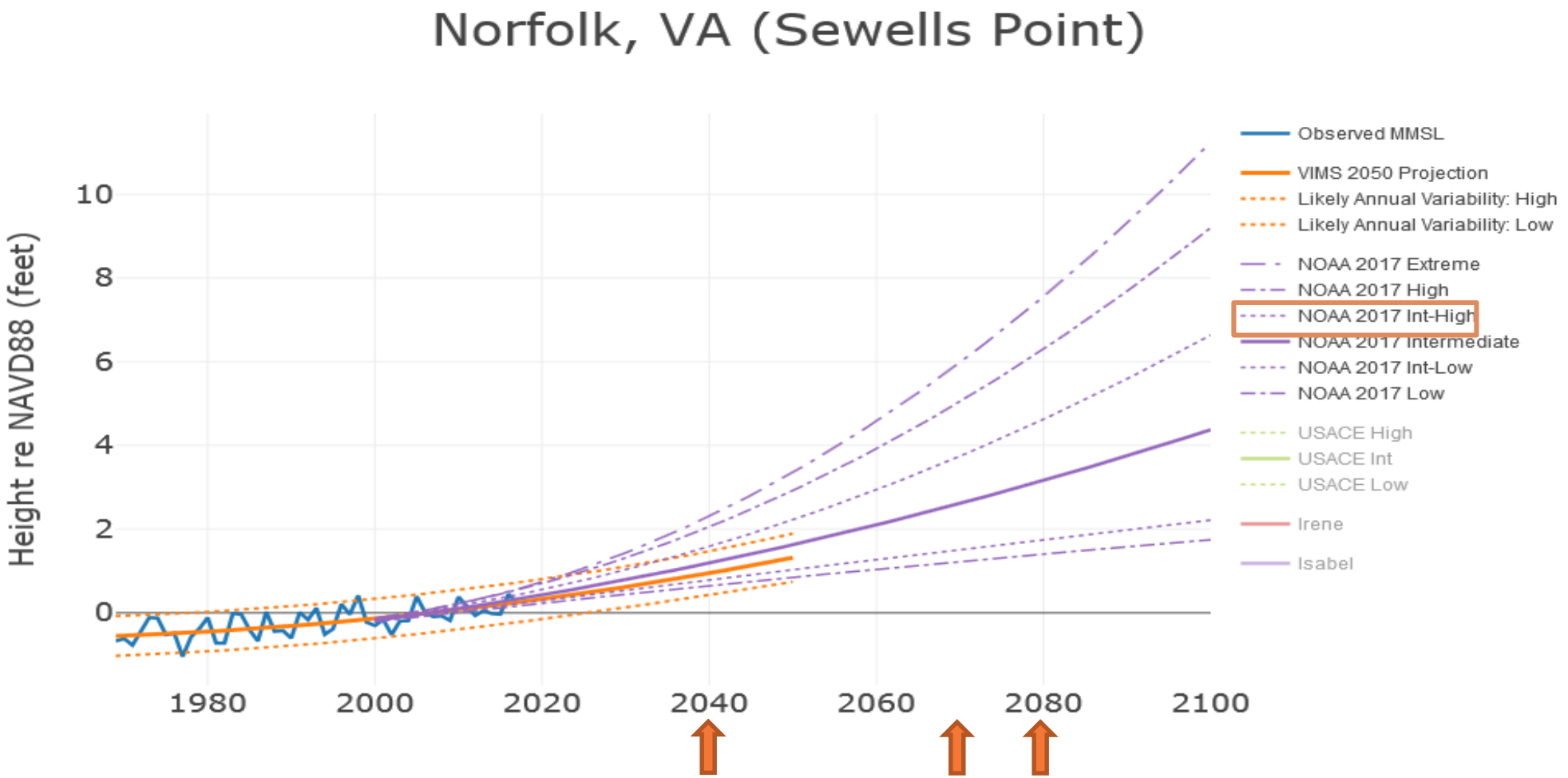
1) Assess climate vulnerability and adaptation of transportation infrastructure
2) Assess ecosystem use conflicts of transportation infrastructure under rising sea levels
3) Assess current policy and regulatory requirements potentially affecting VDOT

Project Details

- MOU between VDOT and Secretary of Natural Resources: signed June 2019
- Official start date: October 2019
- Anticipated completion date: September 2024
- Timeframe covered: 2020 – 2080
- Study Area: Virginia's Coastal Zone (Tidewater Virginia)
  - 46 localities: 29 counties and 17 cities
- Sea Level Rise Curve: NOAA 2017 Intermediate High

BACKGROUND

ROAD NETWORK ANALYSIS:
What sea level rise projection should we be using?



ROAD NETWORK ANALYSIS:
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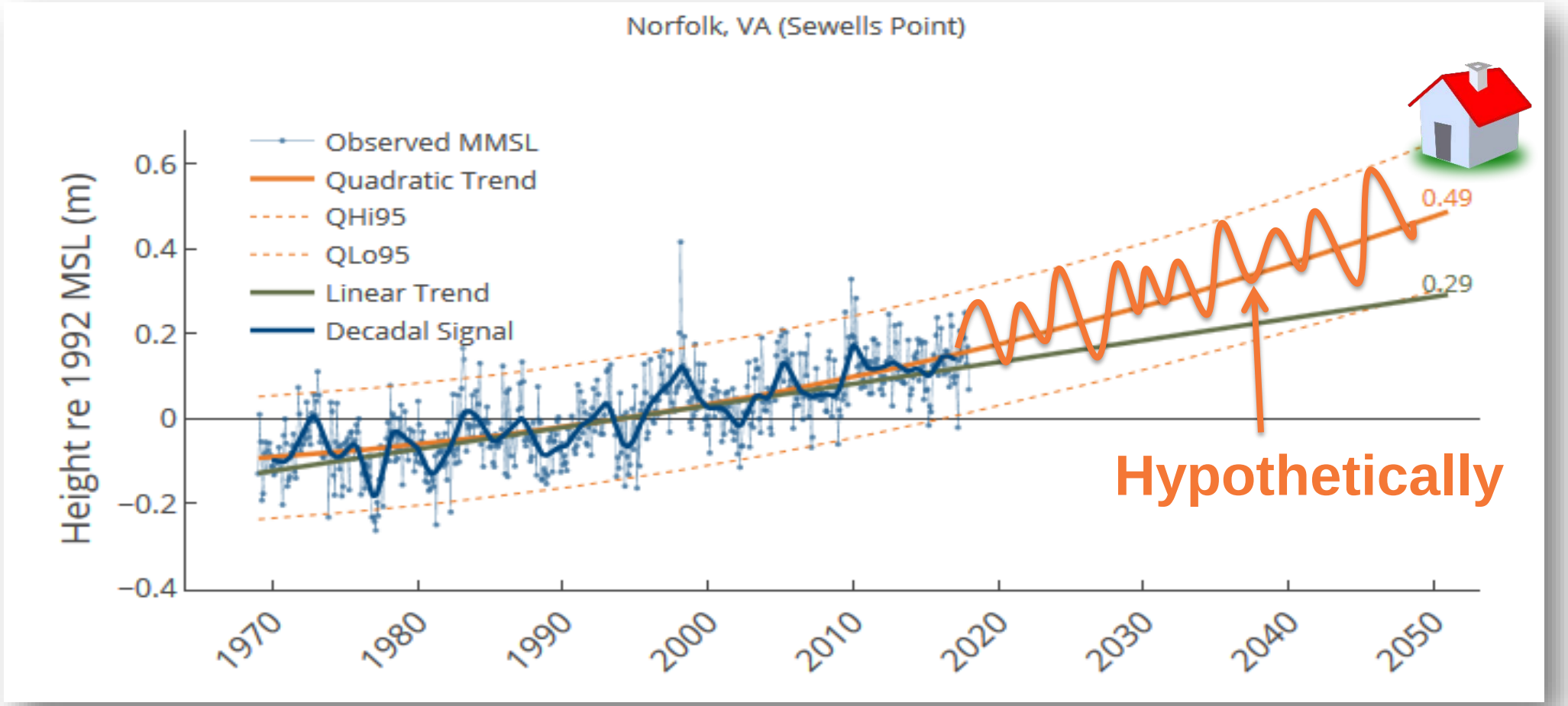


Related Efforts

- **VDOT**
  - House Bill 1217 – recurrent flooding affecting Planning District 8
  - Atlas 14 Update – update historical rainfall information
  - Intensity, Duration, and Frequency (IDF) Predictive Curve Development
  - OIPI / VTRANS
  - VDOT Resilience Steering Committee
  - CTB Environmental Subcommittee
- **Other**
  - Virginia Coastal Resiliency Master Plan
  - PDC / Locality Efforts

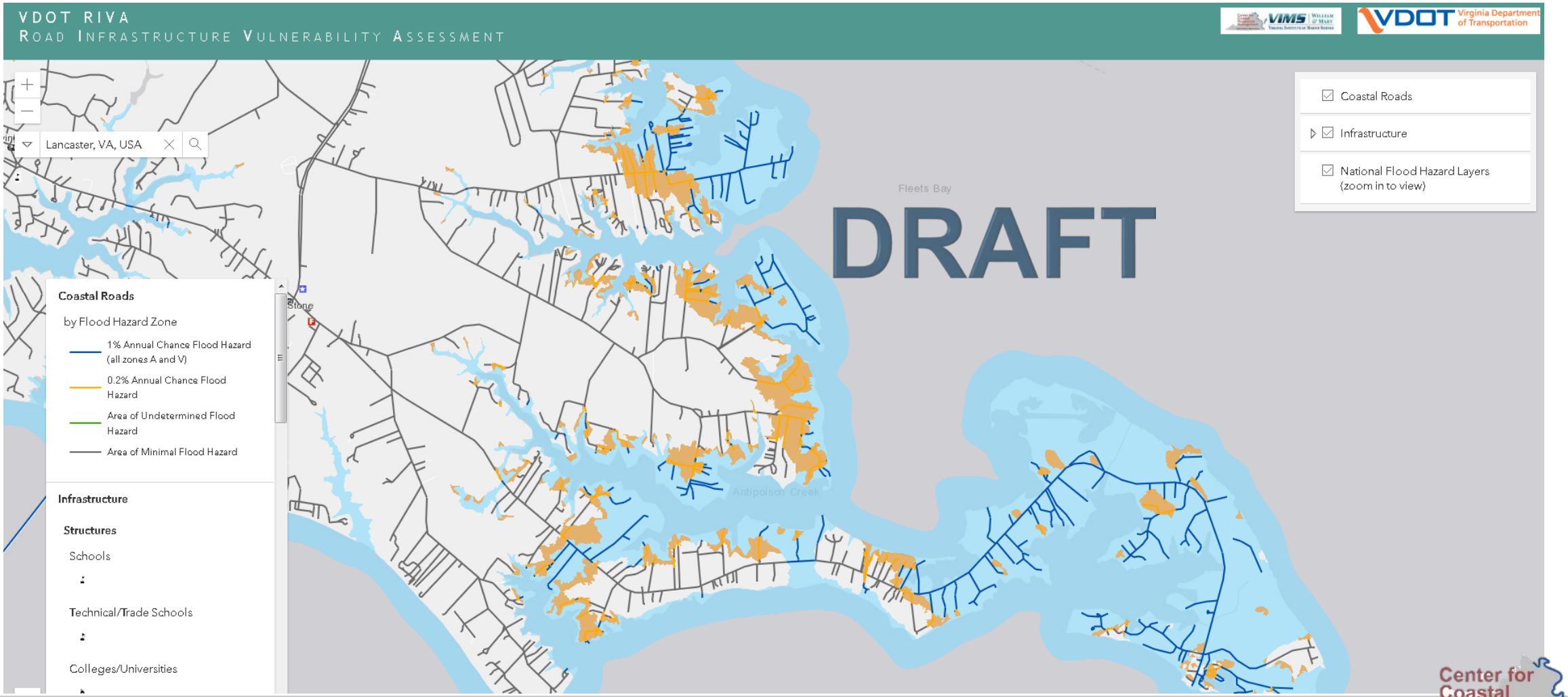
CURRENT WORK

Task 1. Determine Transportation Infrastructure Vulnerability

- Examine all roads with respect to FEMA Flood Hazard Zones
- Analyze road elevations and Return Flood Frequency (RFF) relative to the best available tide gauge data for the area
- Perform Road Network Analysis (RNA) to evaluate vulnerability of major VDOT infrastructure
- Determine most useful method of making data available – both for VDOT and those outside of VDOT

CURRENT WORK

FLOODPLAIN ANALYSIS:
Transportation in FEMA Flood Hazard Zones



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FLOODPLAIN ANALYSIS:
Flood Zone Summary Tables

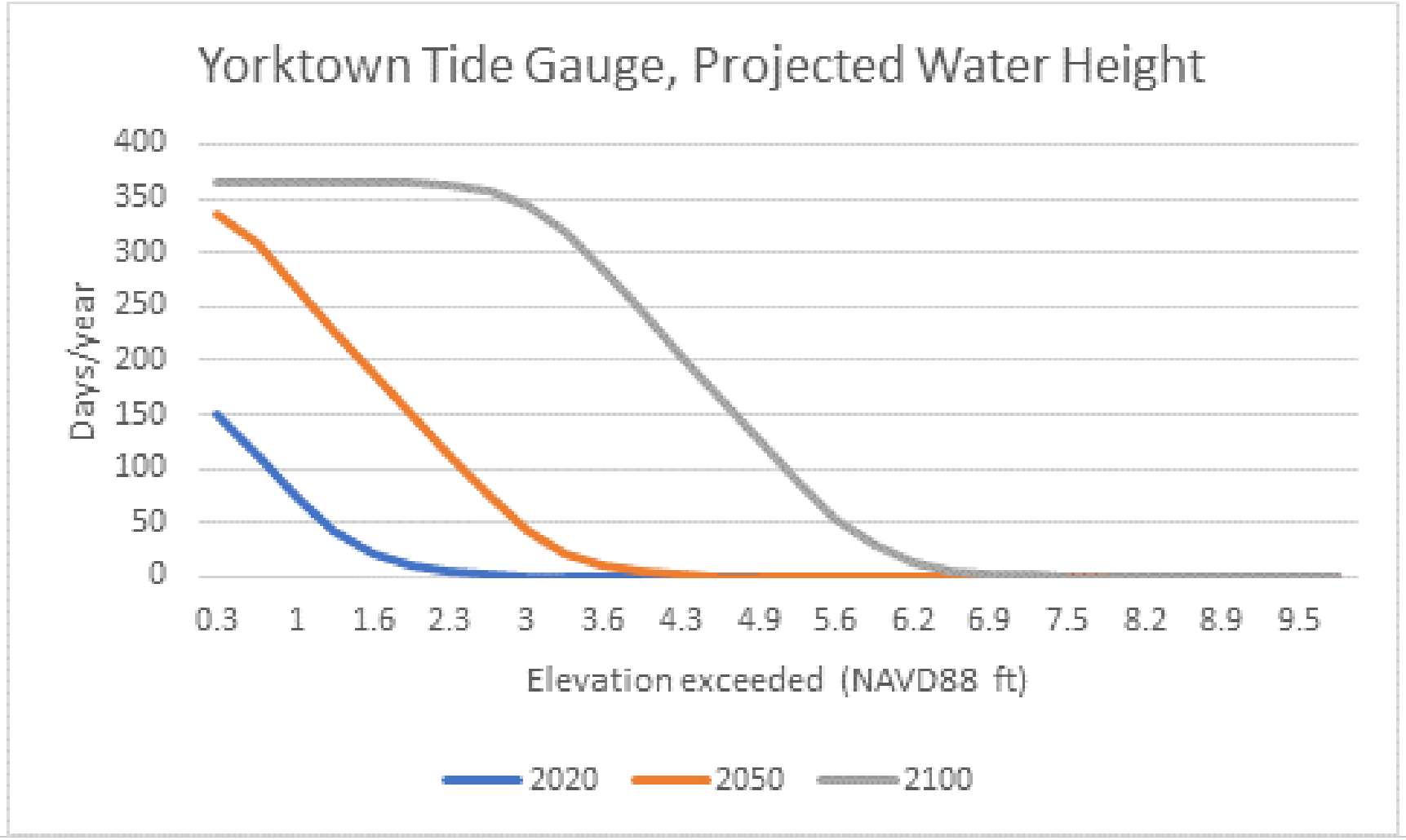
CURRENT WORK

		Total Road Length (miles)	1% Annual Chance Flood Hazard (all A and V zones) (miles)	0.2% Annual Chance Flood Hazard (miles)	Area of Minimal Flood Hazard (miles)	Area of Undetermined Flood Hazard (zone D) (miles)
Summary	All Coastal Roads	58446	3048	1485	53863	50
	Road Type	**Total Road Length** *(miles)*	**1% Annual Chance Flood Hazard (all A and V zones)** *(miles)*	**0.2% Annual Chance Flood Hazard** *(miles)*	**Area of Minimal Flood Hazard** *(miles)*	
Accomack County	Local Main Arteries	153	21	14	118	
	Local Secondaries	1266	349	96	821	
	Ramp	<1			<1	
	US and VA Primary Highways	92	5	<1	88	
		1512	**375**	**109**	**1027**	
	Road Type	**Total Road Length** *(miles)*	**1% Annual Chance Flood Hazard (all A and V zones)** *(miles)*	**0.2% Annual Chance Flood Hazard** *(miles)*	**Area of Minimal Flood Hazard** *(miles)*	
Alexandria City	Alleys	2	<1	<1	2	
	HOV Lanes	4	<1	<1	4	
	Limited Access Highway	14	3	1	9	
	Local Main Arteries	53	4	3	47	
	Local Secondaries	382	13	18	352	
	Other	<1	<1	<1		
	Parking Lot Roads	29	1	1	26	
	Ramp	19	4	3	12	
	US and VA Primary Highways	44	2	1	41	
		547	**27**	**27**	**493**	

CURRENT WORK

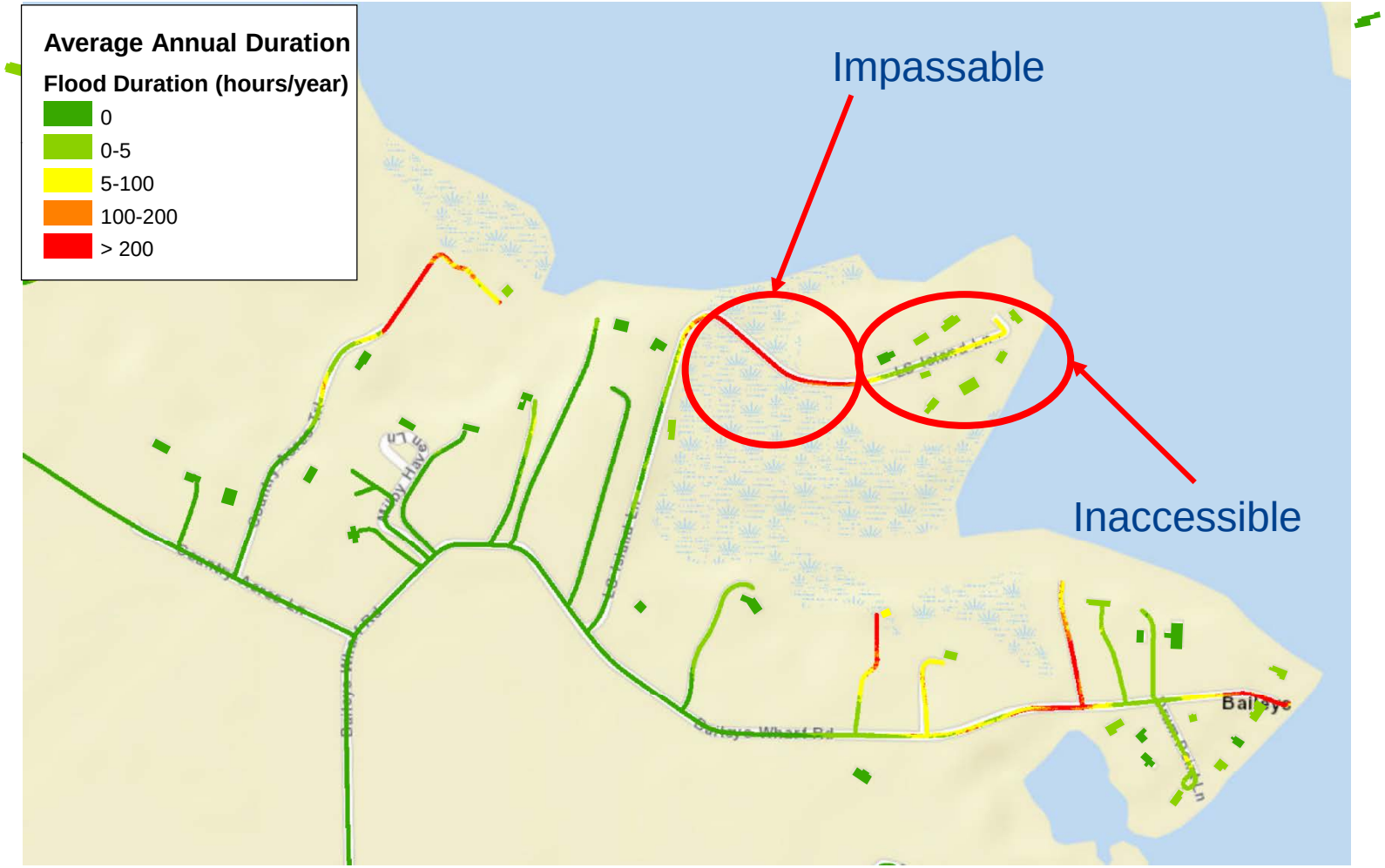
ROAD NETWORK ANALYSIS:

Tide gauge water level analysis



CURRENT WORK

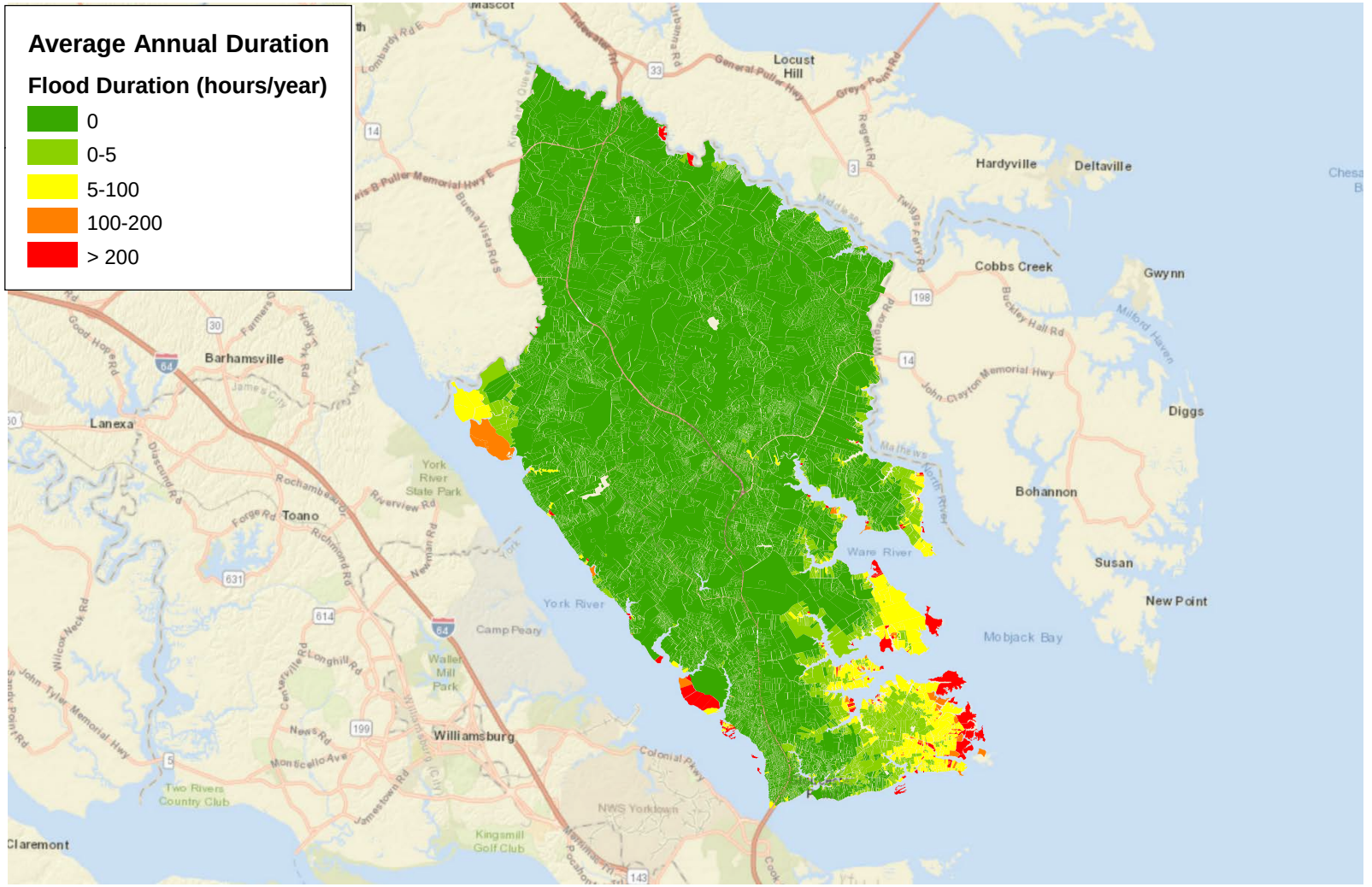
ROAD NETWORK ANALYSIS:
What roads are likely to flood in the future?



Average Annual Flooding: 2050

CURRENT WORK

ROAD NETWORK ANALYSIS:



Average Annual Flooding: 2000-2017

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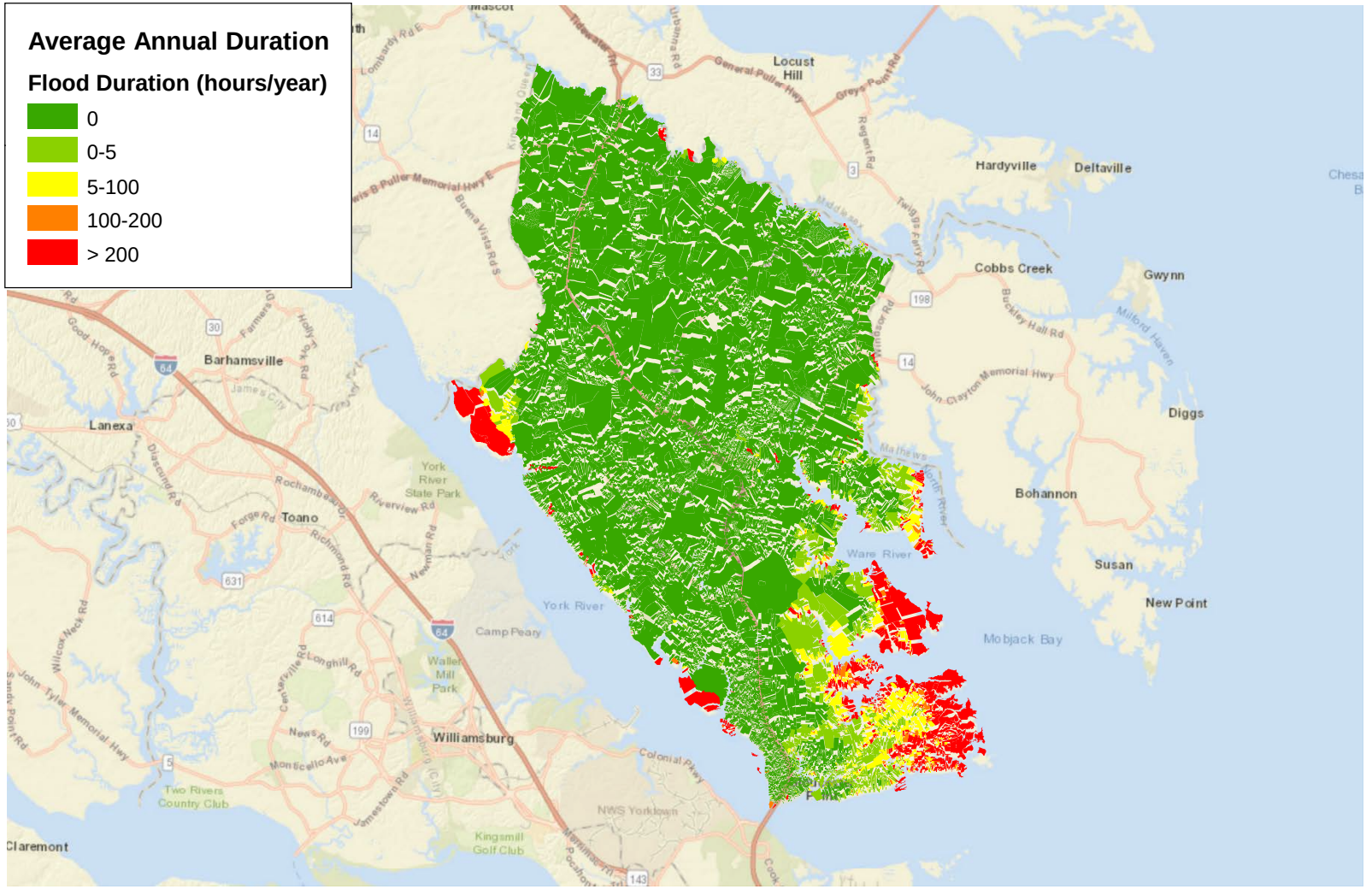
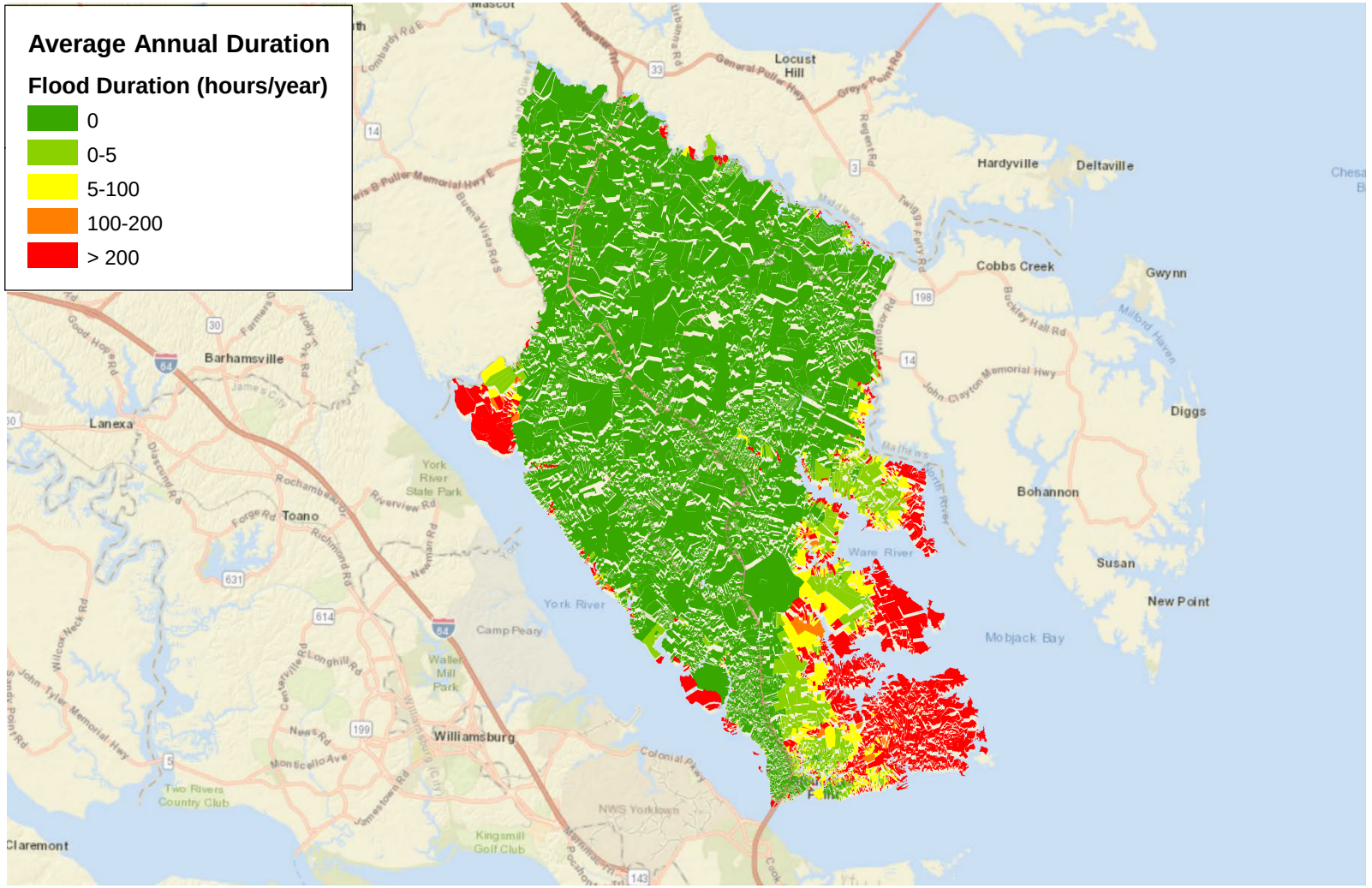
ROAD NETWORK ANALYSIS:



Average Annual Flooding: 2050

CURRENT WORK

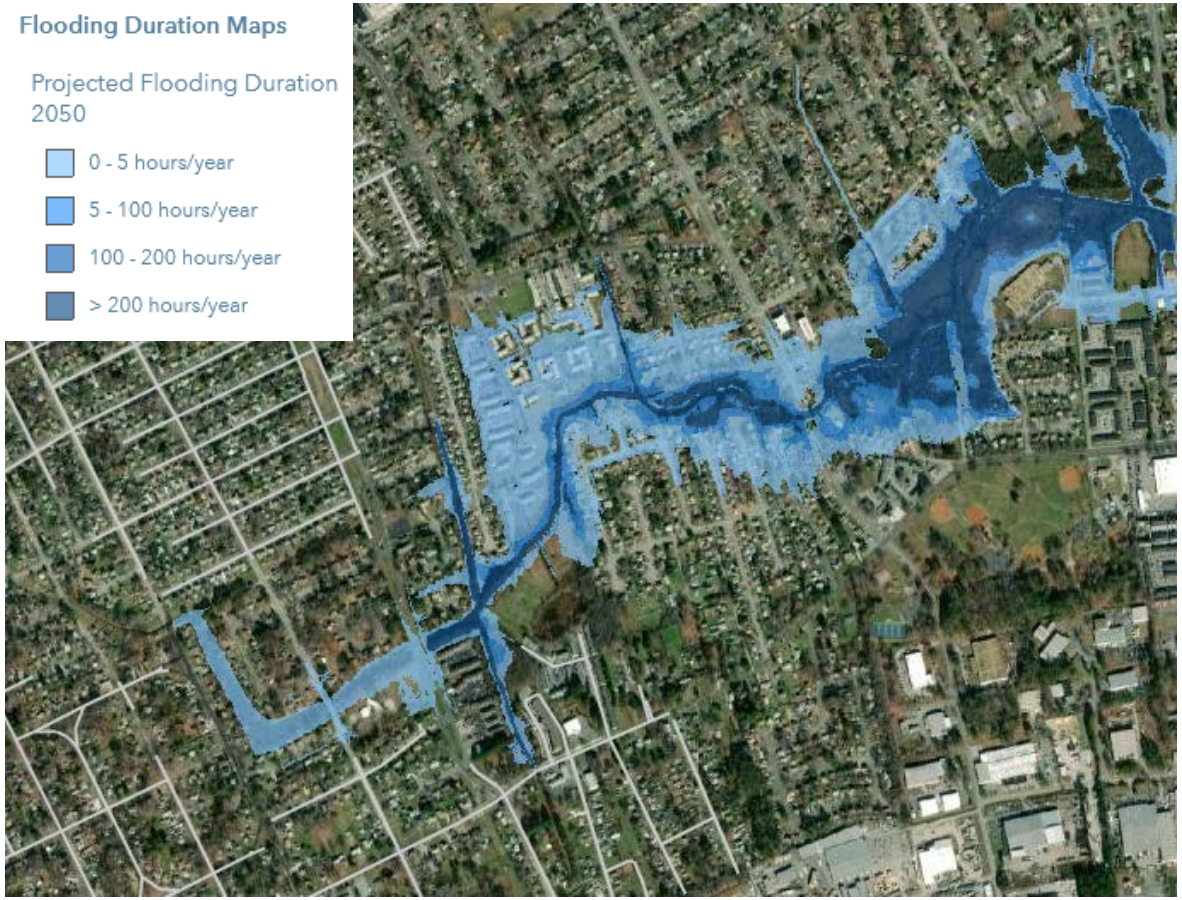
ROAD NETWORK ANALYSIS:

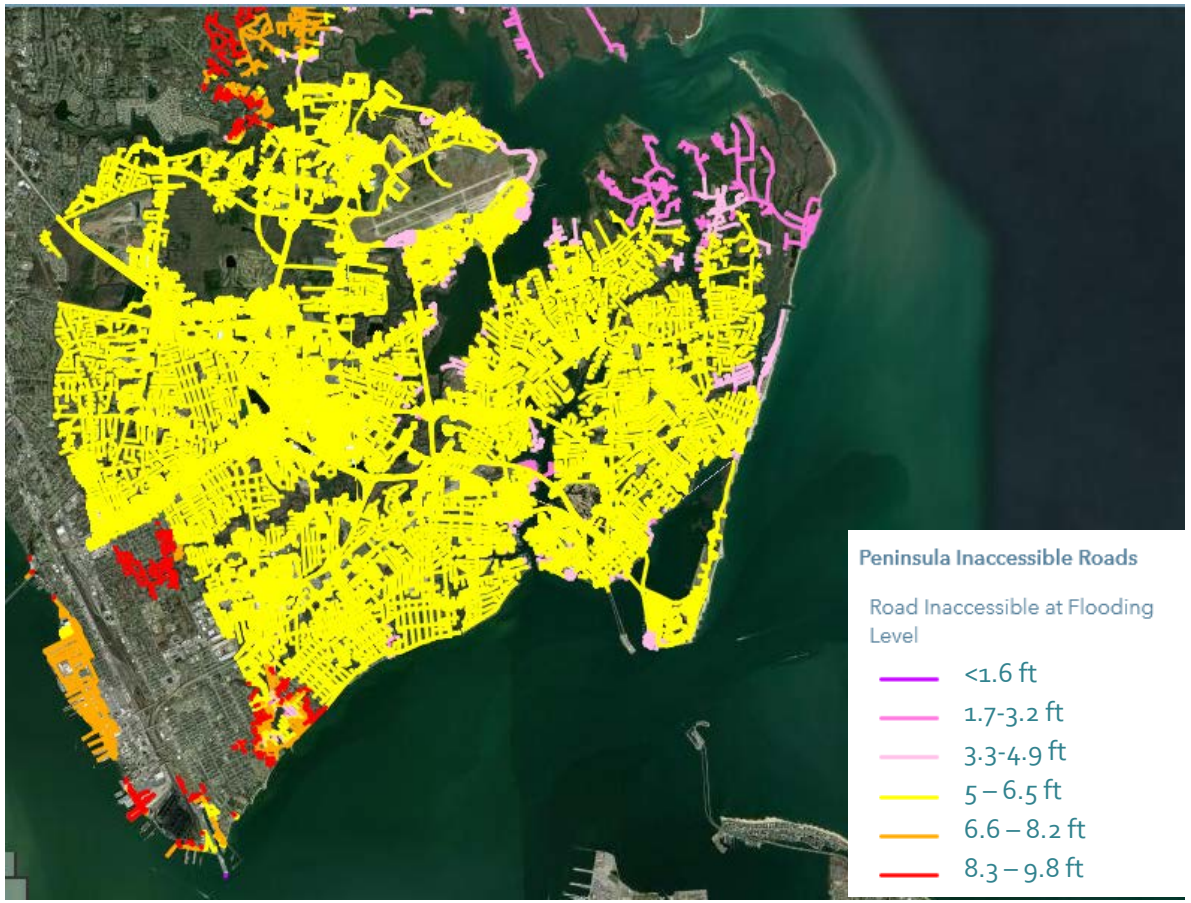


Average Annual Flooding: 2100

CURRENT WORK

ROAD NETWORK ANALYSIS: Inaccessible roads

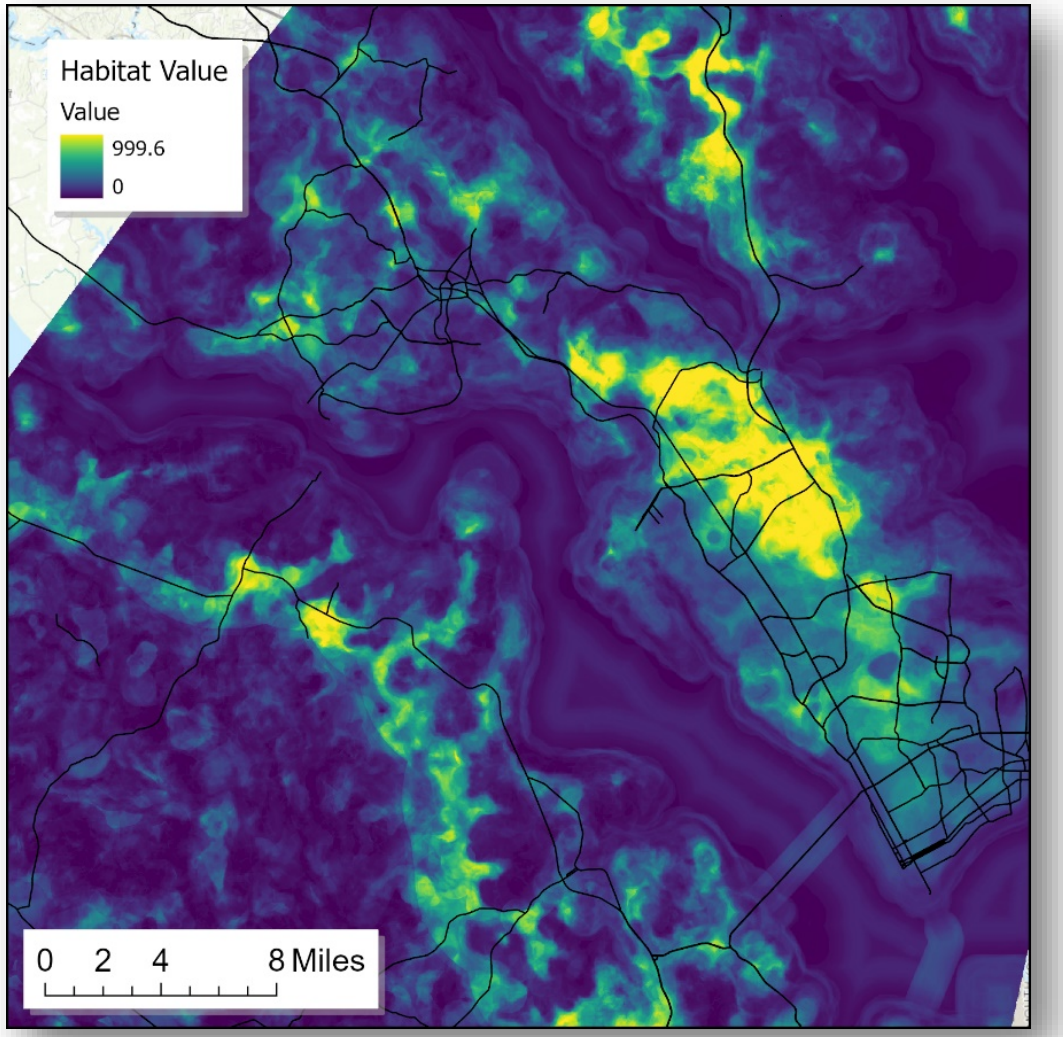




CURRENT WORK

Task 2. Study Ecosystem Impacts of Transportation Infrastructure

- Modeling current habitat distribution for rare, threatened or endangered (RTE) and migratory bird species
- Forecasting habitat distribution shifts for target species
- Assess the potential conflicts for existing and planned local land use changes and transportation infrastructure



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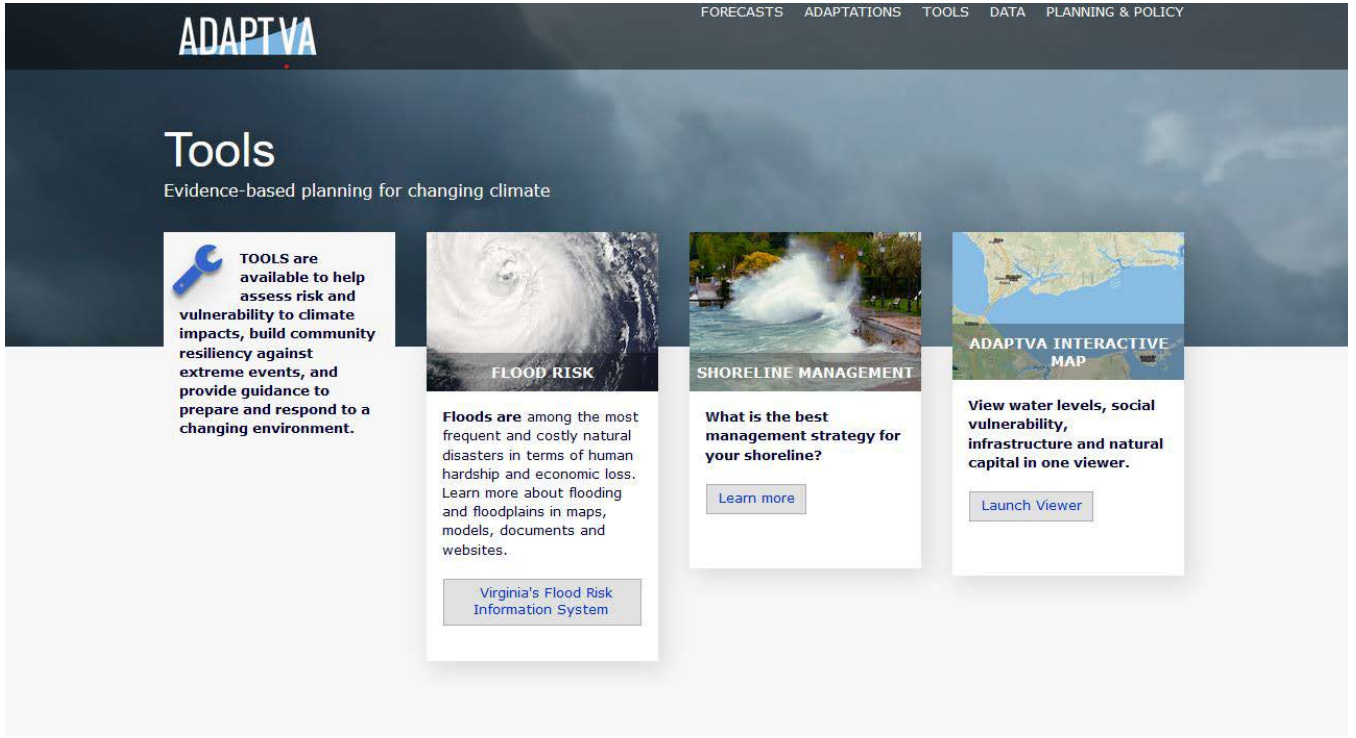
CURRENT WORK

Task 3. Policy and Regulatory Requirements

- Determine how resiliency related policy and regulatory requirements have been handled by other states
  - Example: Chapter 51 of 2021 Acts of Assembly requirement to include resiliency in design standards; no formal definition
- Analyzing legal framework informing duties to maintain and authority to abandon

Additional Tasks Being Considered

- Utilize participatory mapping
  - Make use of local expertise
- Determine method of data approval and governance
  - Who reviews and accepts?
  - What is the timing?
  - Interactive map development
- Determine prioritization and decision making approaches
- Engagement with impacted communities and PDCs

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