Climate Change Adaptation Strategy

Maryland State Highway Administration

January 13, 2013

Climate Change in Maryland

Maryland Climate Action Plan

- Required by Governor's Executive Order (January 2007) - Released August 2008
- MD Commission on Climate Change Phase II Strategy for Reducing Vulnerability to Climate Change

Maryland Greenhouse Reduction Plan

- Draft February 2012 - Final 2013

Plan Maryland – MD Comprehensive Plan for Sustainable Growth & Development – December 2011

- Climate Change Impact Areas are to be mapped, preserved, and protected
- Avoid infrastructure capacity improvements that increase human exposure to natural disasters
- Avoid financial risk of development and redevelopment in vulnerable or hazardous coastal areas
- Ensure wise public investments in the SLR inundation zone

Coast Smart Construction EO 01.01.2012.29

- Requires 2 ft. freeboard from 100-yr floodplain for any State funded structure – "walled or roofed building" effective 7/1/2013

ADAPTATION

Projected Changes

Transportation Systems & Engineering must Adapt Assets for:

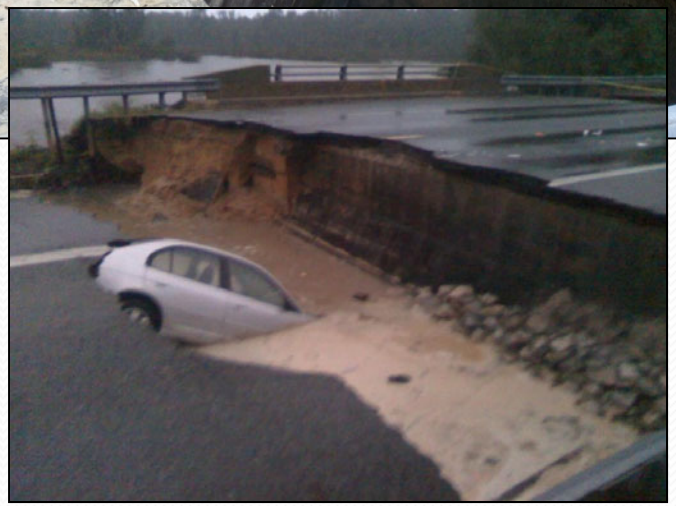
Precipitation	• Drainage Conveyance & Flooding • Power Disruption • Erosion
Sea Level Rise	• Flooding • Scour of Bridge Foundations • Infrastructure Instability
Temperature	• Pavement Rutting & Buckling • More days over 90°F

2011 Tropical Storms Irene & Lee

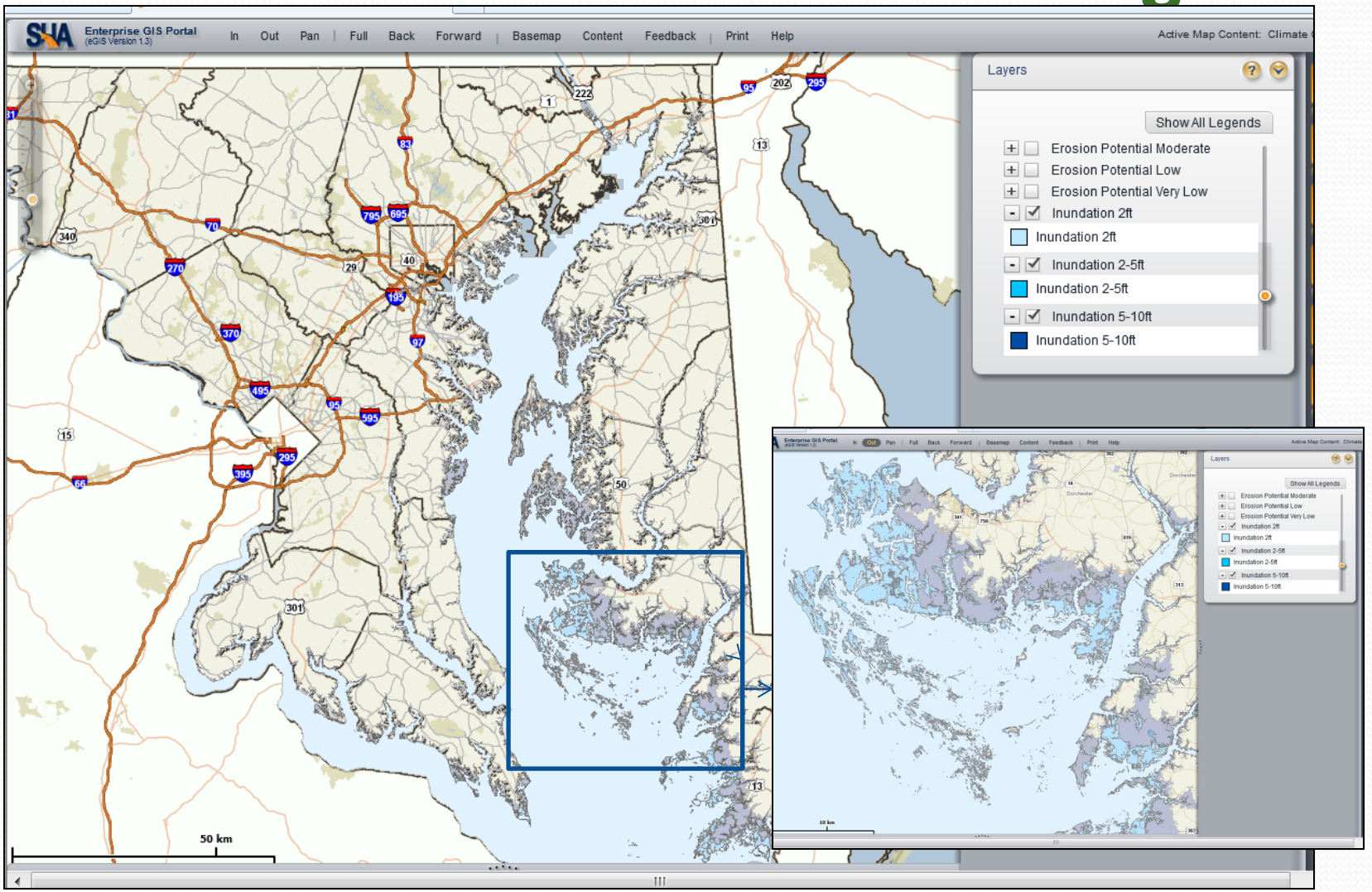

MD 25 over Georges Run in Baltimore County


Allen's Fresh Bridge MD 234


MD 355 over Little Bennett Creek in Montgomery County



Inundation at 2 ft. 5 ft. & 10 ft. of Sea-Level Rise/Storm Surge



Highway System Vulnerability

Infrastructure requiring further evaluation for impacts due to SLR

Sea Level Rise	State Roads Impacted	State Structures Impacted
2 feet	156 miles – 2%	93 structures – 3.5%
5 feet	371 miles – 4.5%	132 structures – 5%
10 feet	792 miles – 10%	196 structures – 7.5%

- Prioritization of assets must consider emergency evacuation planning, resiliency and system redundancy
- FEMA 100-Year Floodplain indicates 28% of SHA Structures (bridges to culverts) need further impact evaluation
- State Maintained Roadways -

  103 miles in 500-year floodplain I 413 miles in 100-year floodplain

SHA Strategy or Policy?

- **Adaptation – Build into Project Development Process**
  - **Policy to cover not what to adapt to but when to adapt**
  - **Assess risk and prioritize activities by anticipated impact and whether near- or long-term consequences**
  - **Focus on near-term impacts with low variability of occurrence**

Climate Change Adaptation Implementation Strategies

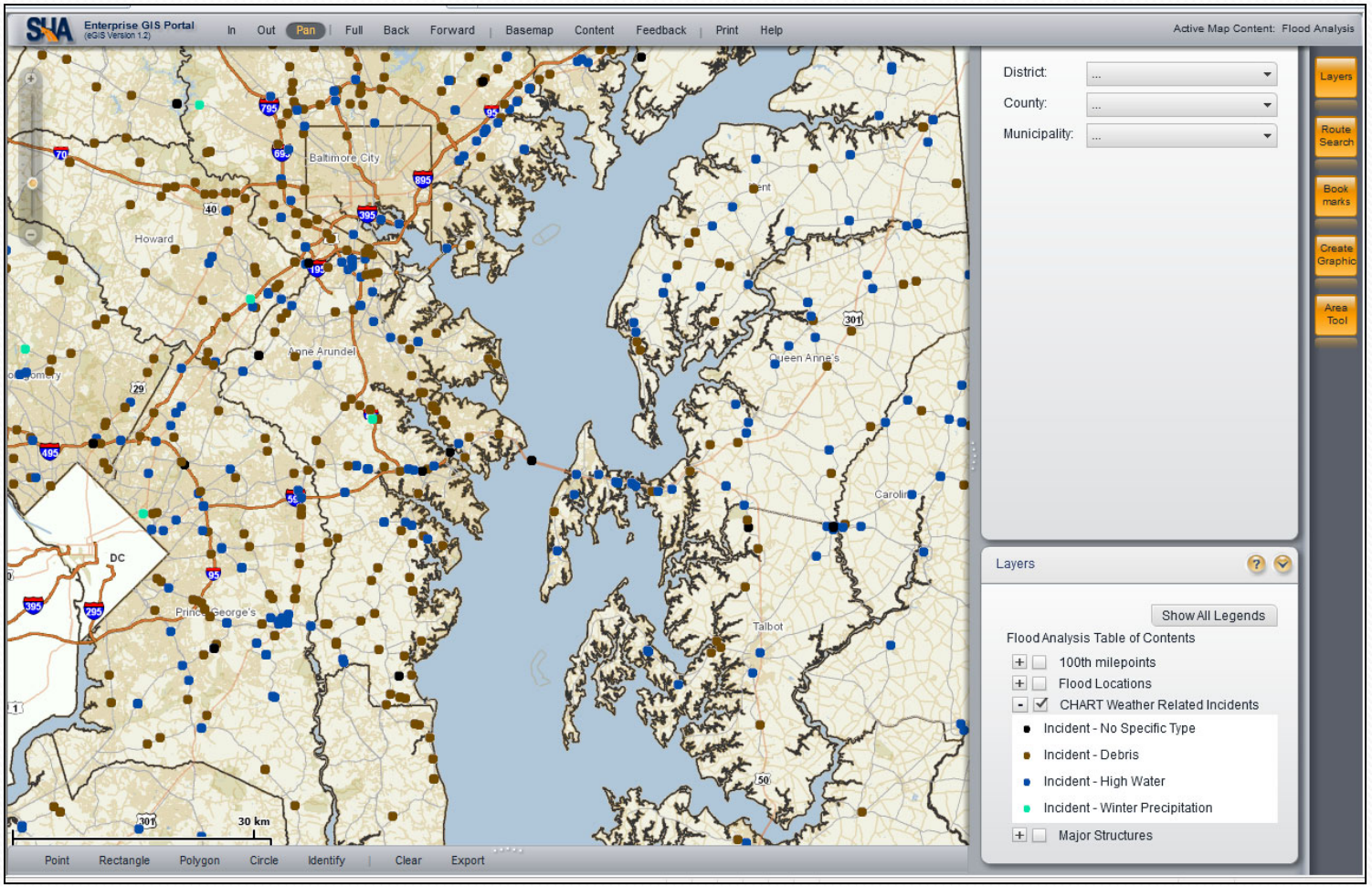
- Evaluate practical operations, maintenance, and administrative actions to respond to and limit damage from extreme weather events that are already occurring and may worsen with time
- Develop a stronger understanding of the longer-term threats to the state's highway network posed by the prospect of a changing climate
- Develop approaches for adapting existing infrastructure to climate changes as an improved understanding of risks develops
- Consider adaptation for new projects to increase their resiliency to potential climate impacts

Climate Change Adaptation Implementation Action Items

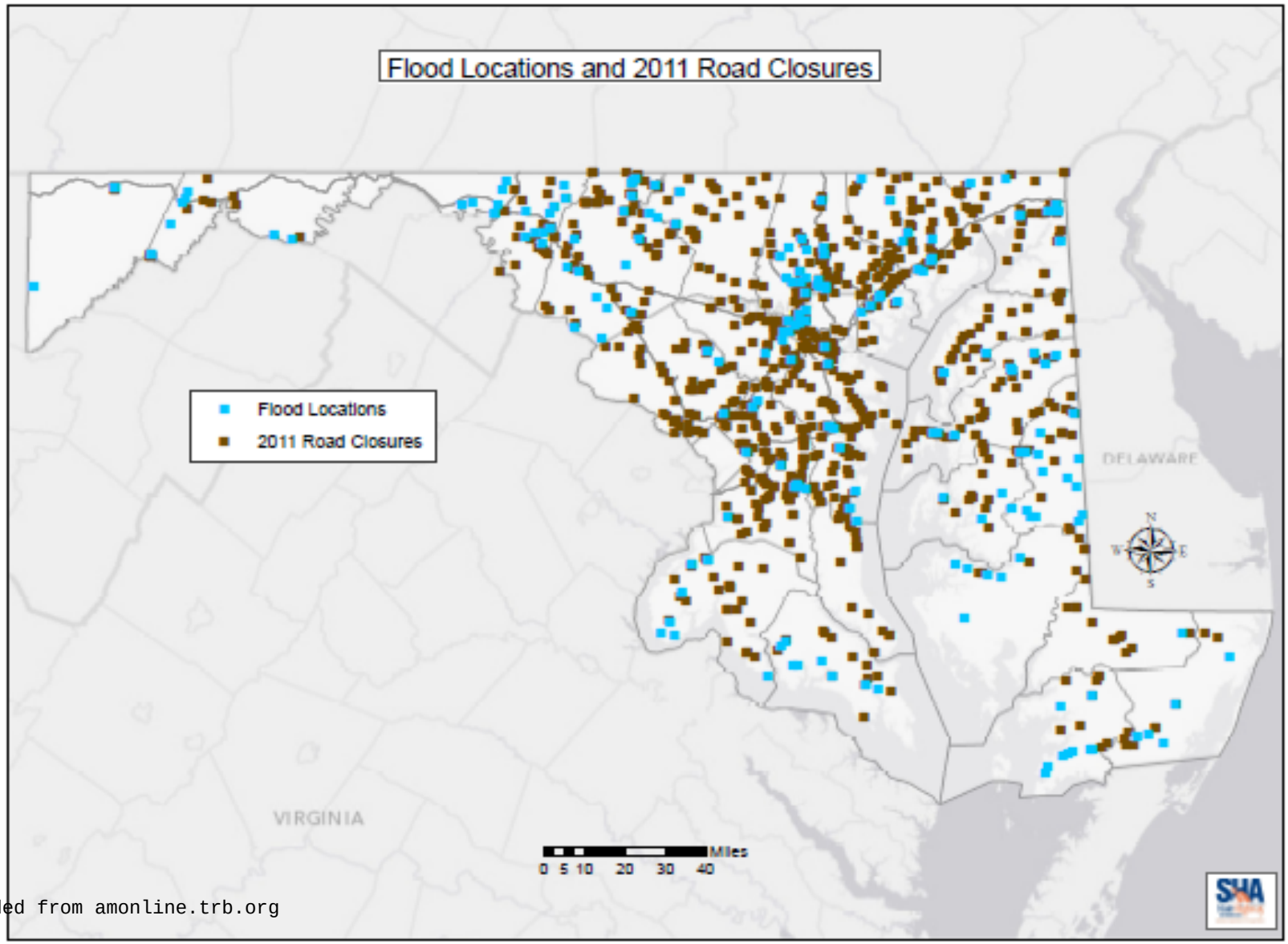
- **Many Action Items are actively being implemented or complete**

- **Focus on Drainage**
- **Enhance the culvert and stormwater maintenance program and provide additional funding**
- **Work with MDE to streamline environmental regulations relating to culvert cleaning**
- **Install monitoring devices on slopes when appropriate and proactively address signs of failure**

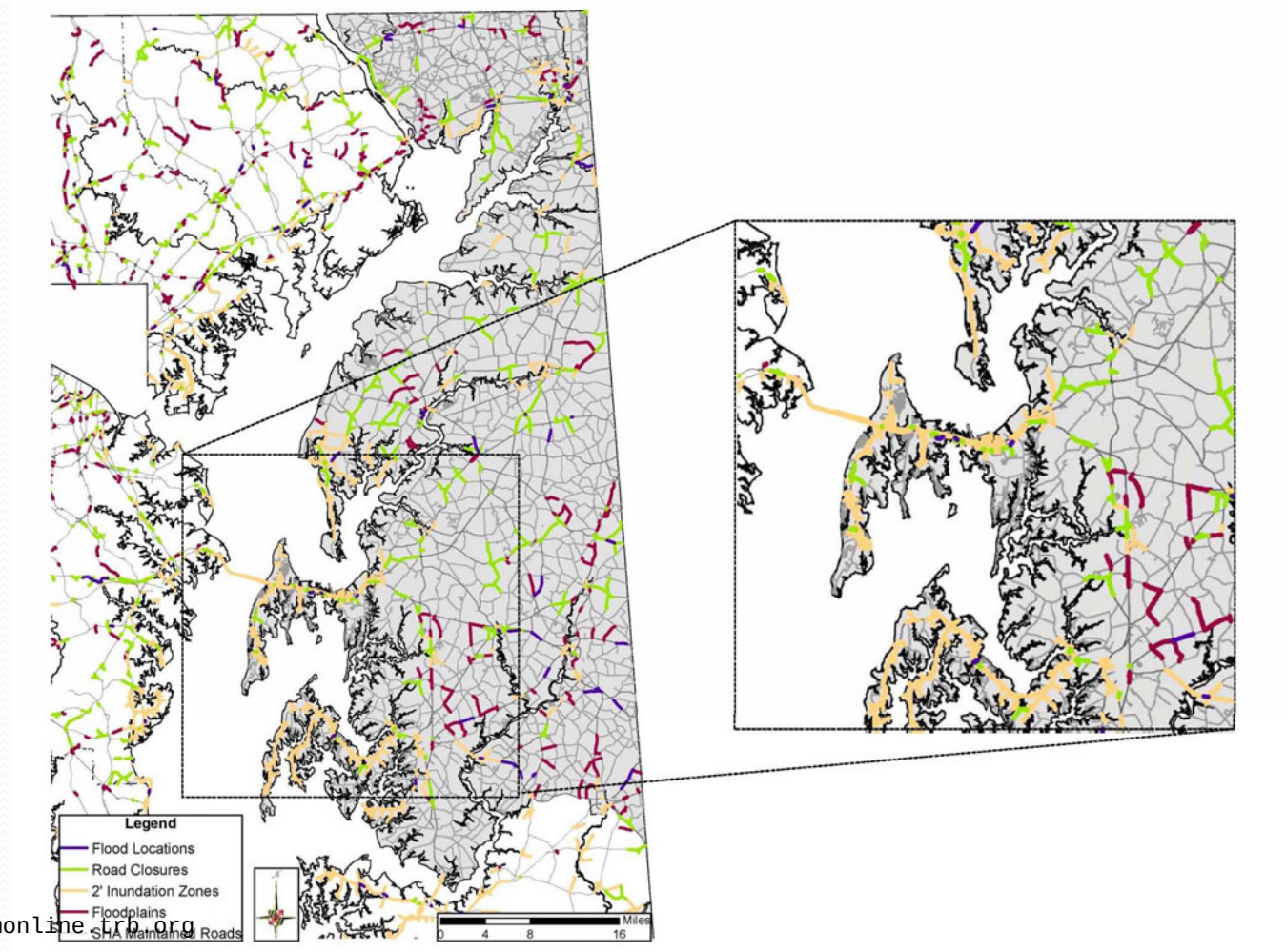
Closures on SHA Maintained Network



Water Water Everywhere!



Vulnerability Assessment

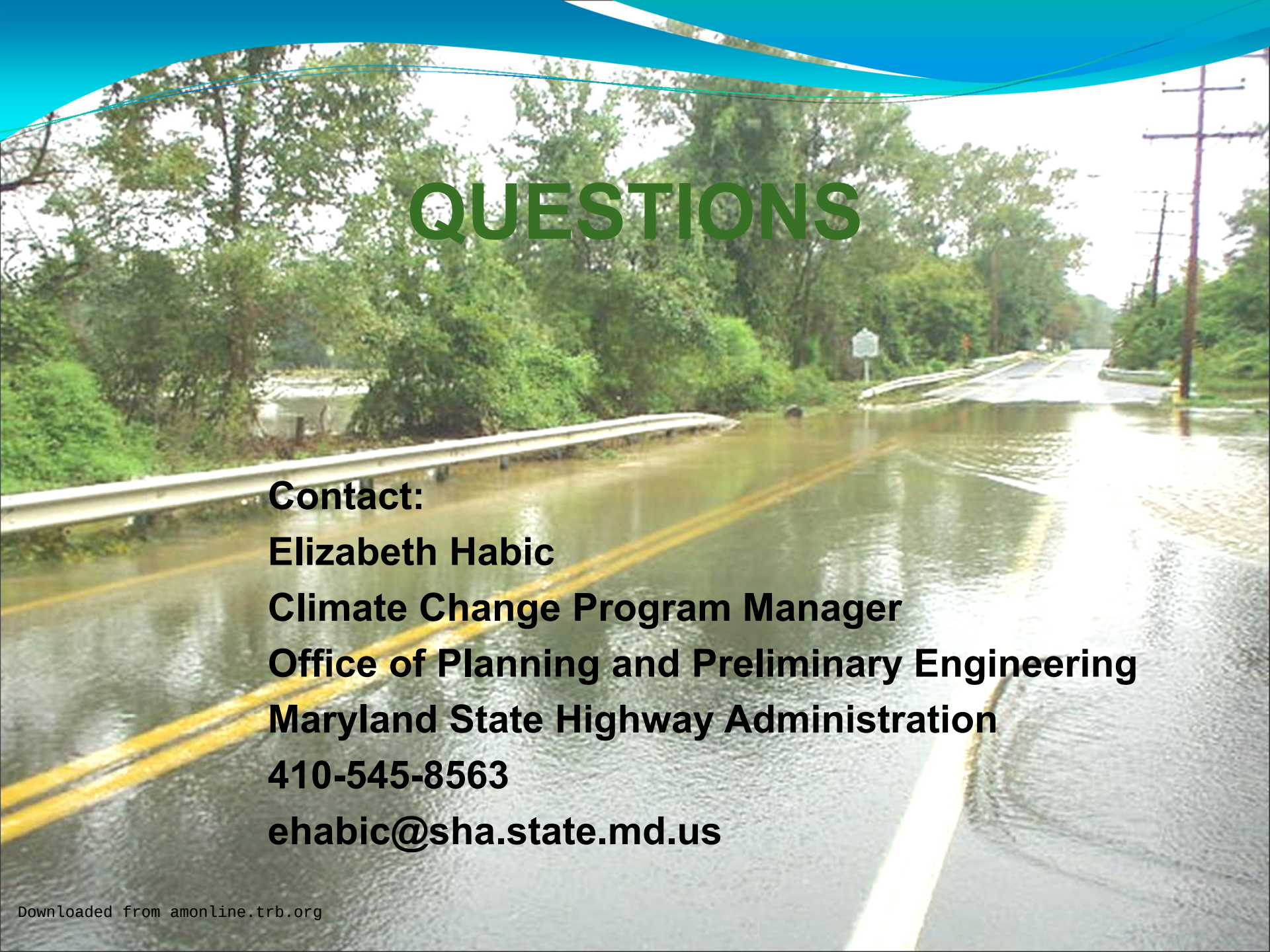


Climate Change Adaptation Implementation Strategies

- **Designate official SHA/MdTA climate projections (climate models, downscaling technique, & emissions scenarios to use) – MD Accepted**
- **Identify critical thresholds where asset functionality and safety will be jeopardized and enter into asset management system**
- **Conduct high-level system wide risk analysis of the climate threats to SHA assets**
- **Conduct detailed asset-specific vulnerability analyses for the most critical and unsafe high-risk assets**
- **Create a lessons learned library for responding to climate change and extreme weather**

Next Steps

- **Submit Application for FHWA Pilot Project: Climate Change and Extreme Weather Vulnerability Assessments and Adaptation Options Analysis**
- **Work on Climate Adaptation Implementation Strategies**
- **Conduct Eastern Shore Study using Implementation Strategies focused on drainage**
- **Further Develop Vulnerability Assessment**
- **Develop GHG Mitigation Plan**
  - Develop SHA greenhouse gas baseline inventory (footprint)
  - Identify greenhouse gas mitigation strategies



QUESTIONS

Contact:

Elizabeth Habic

Climate Change Program Manager

Office of Planning and Preliminary Engineering

Maryland State Highway Administration

410-545-8563

ehabic@sha.state.md.us