



# *Resilience and Project Integration:* “Evaluating with the Future in Mind”

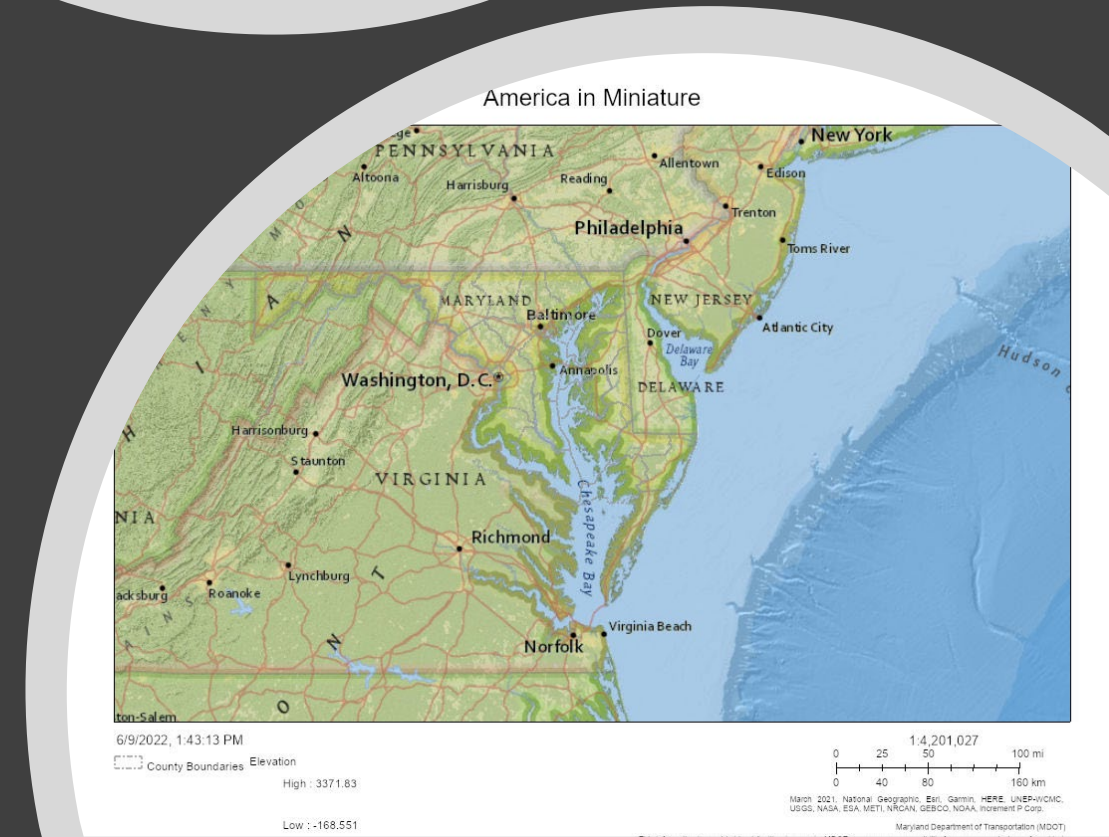
*June 16, 2022*

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*Director, Office of Climate Change Resilience and Adaptation*

# Maryland “America in Miniature”

- 10,460 square miles
- 6 Distinct Physiographic Provinces
- Diverse Population
- Among the Most Vulnerable States to Sea Level Change



# A History of Resiliency Planning.....

- MDOT joins the Maryland Commission on Climate Change (2008)
- Greenhouse Gas Reduction Act (GGRA) – 25% by 2020 (2009), 40% by 2030 (2016), 60% by 2030 (2022)
- MDOT MPA Climate Change Vulnerability Assessment (2010)
- FHWA Pilot Study – Vulnerability Assessment of Maryland's Highway System (2013)
- MDOT joins the Maryland Coast Smart Council (2014)
- MDOT SHA Climate Change Vulnerability Viewer (2018)
- Coast Smart Climate Ready Action Boundary Mapping (2020)
- Maryland Climate Adaptation and Resilience Framework (2021)

# Vulnerability Analysis Approach

01

## Compile

- Compile Asset and Hazard Information

02

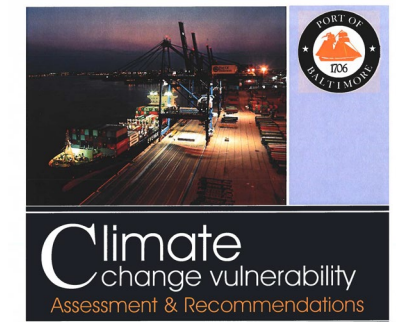
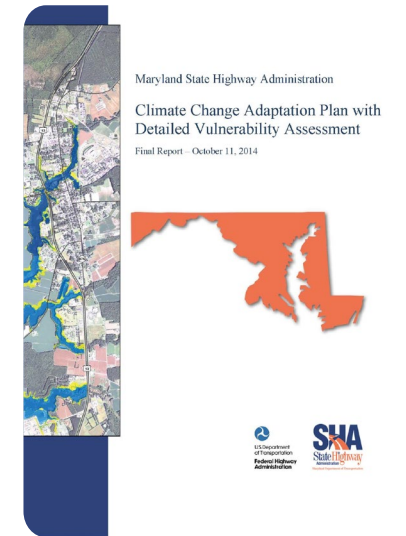
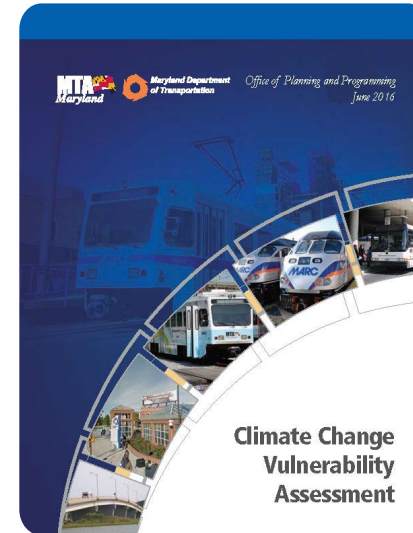
## Develop

- Develop Predictive Models

03

## Evaluate

- Evaluate Risk to Assets



A Collaborative Prepared by:

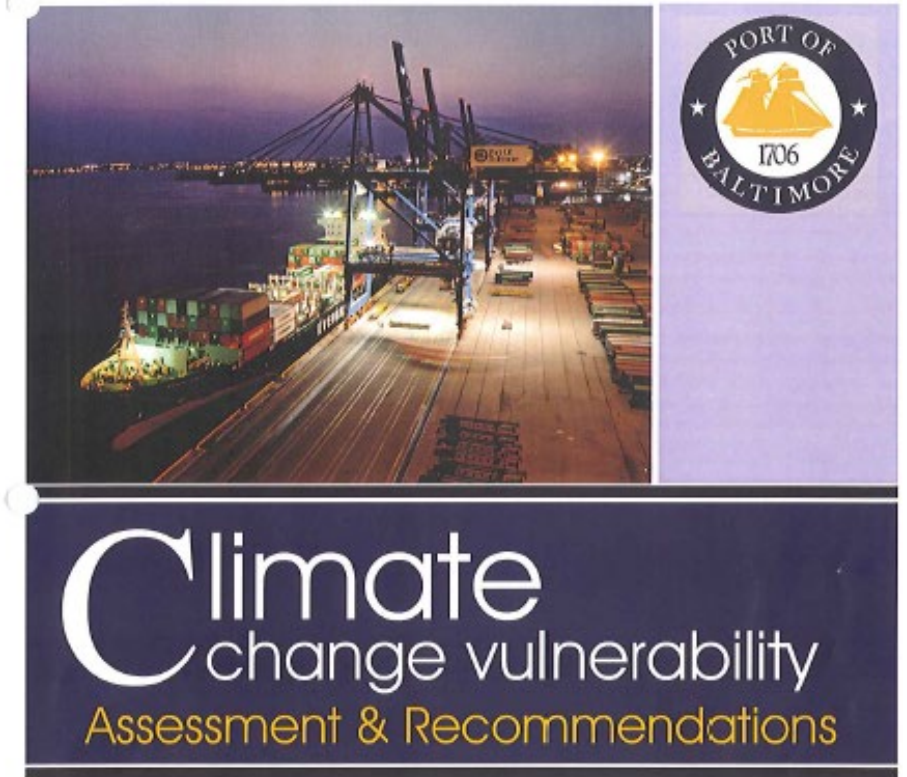


September 23, 2010



# MDOT MPA's 3-Pronged 'MEM' Approach to Capital Planning and Design

- **Migrate** (non-essential uses) out of flood prone areas;
- **Elevate** new structures +2 feet above 100-years flood elevation; and
- **Mitigate** by strengthening essential uses in place.

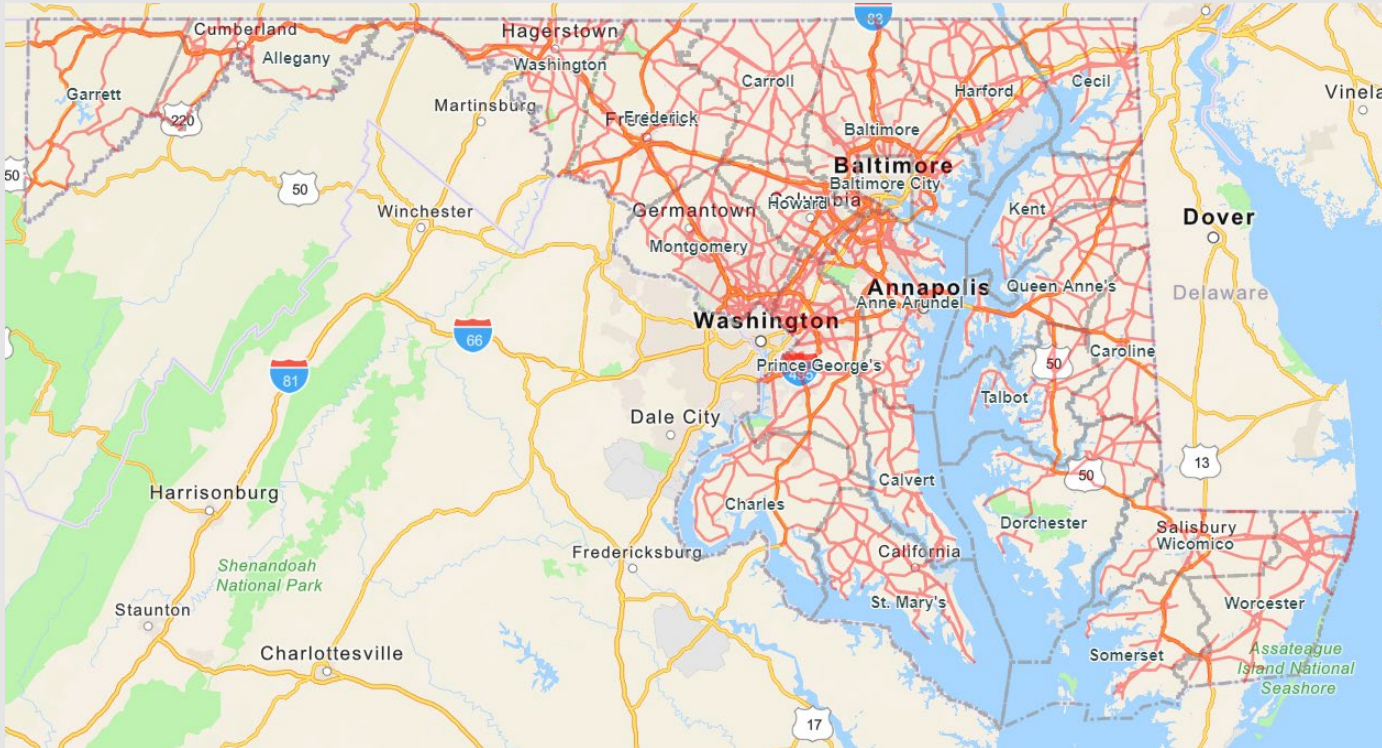


A Collaborative Prepared by:

September 1, 2010



# MDOT SHA Pilot Study – Vulnerability Assessment of Maryland's Highway System



- TIER 1
  - Map Sea Level Change
  - Develop Climate Change Impact Zone
  - Analyze Flood Depth Grids with Centerline elevation
  - Develop Risk Indicators
- TIER II
  - Utilize Tools
  - Vulnerability Assessment Scoring Tool (VAST)
  - Hazard Vulnerability Index (HVI) = (Evacuation Code\*0.5+1) + (Flood Depth Code+0.01)/4 + (0.7/Functional Classification)
- PROVIDE ACCESSIBLE RESULTS

## Climate Change Impact Areas

Is this Project within an area potentially affected by Sea Level Change?

Project must consider sea level change.

☒ Mean Sea Level 2050

☒ Mean Sea Level 2100

See attached Sea Level Change Map, if applicable

☒ Mean High High Water 2050

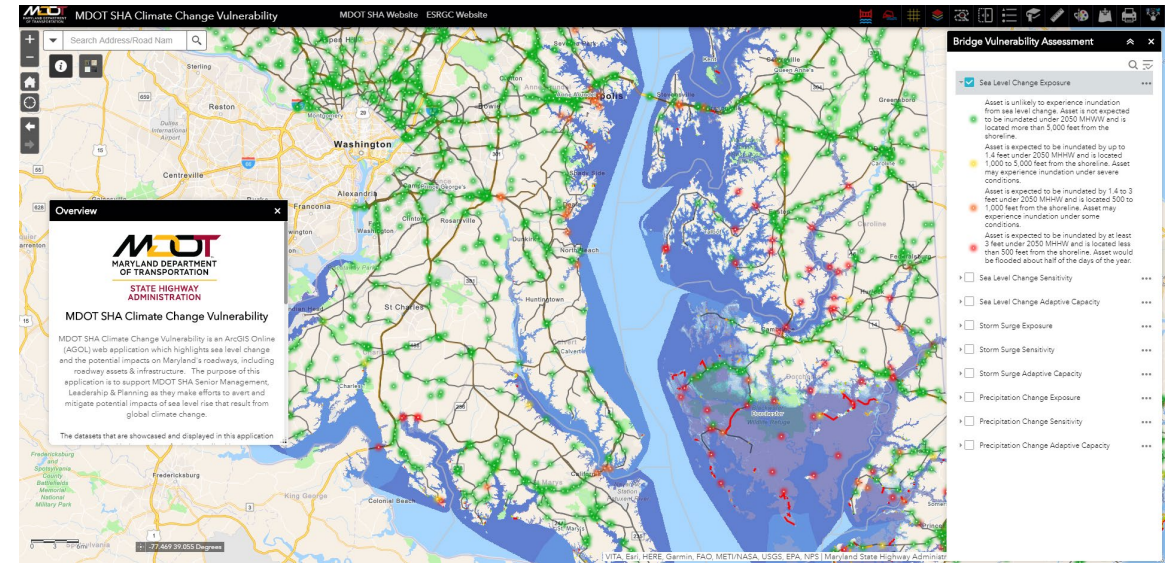
☒ Mean High High Water 2100

Is this a non-state Project located on State lands?

Is this project involving construction of a new road or bridge, or reconstructing an existing road or bridge due to a storm event?

Is this project involving construction of a new building/facility or reconstructing an existing building/facility due to a storm event?

Notes: The hydraulics analysis determined that up to 100-year storm flooding events would not overtop the bridge. The roadway approaches to the bridge are being raised between 1 to 2.5 feet. Additional roadway improvements may be needed to address future flooding.



# Integrating Results into Practice: Planning

# Collaboration is Critical!

## **Public Sector**

Maryland Commission on  
Climate Change

Coast Smart Council

State and State Agencies

Academia

Local Jurisdictions

## **Private Sector**

Association of Climate  
Change Officers

Engineering Consultants

Industry/Business/NPOs

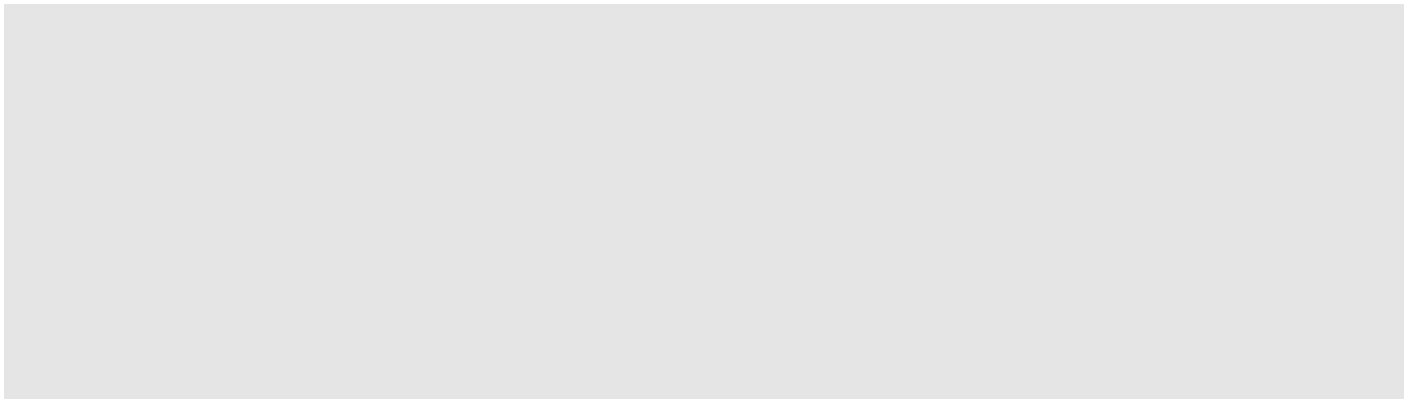
Subject Matter Experts

Communities



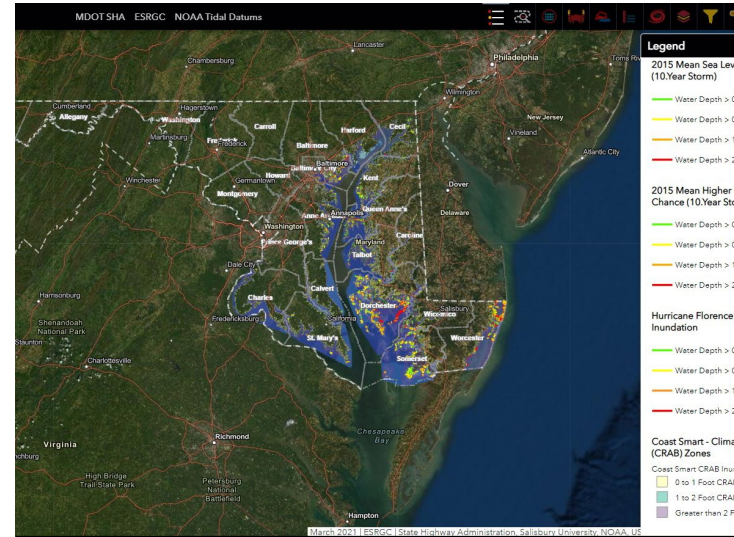


# Resiliency Planning Tools





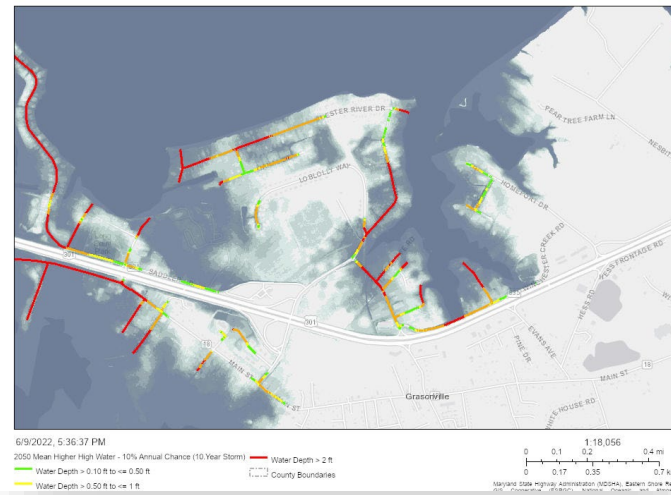
# MDOT SHA Climate Change Vulnerability Viewer



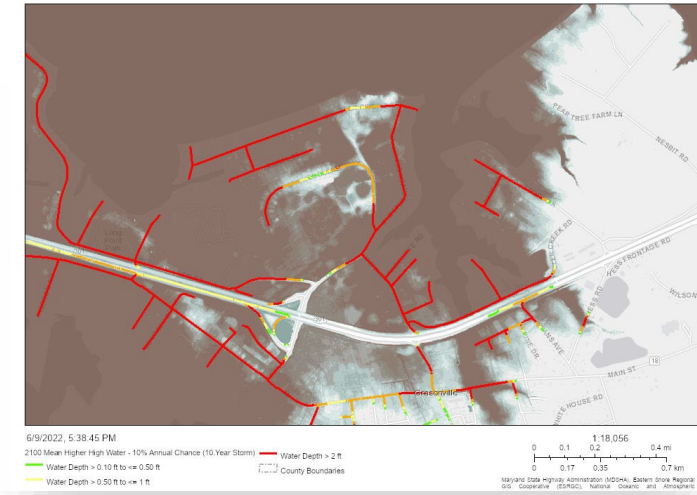
MDOT SHA CCVV 2015 10-Year Storm



MDOT SHA CCVV 2050 10-Year Storm



MDOT SHA CCVV 2100 10-Year Storm



# MDOT MTA's Adaptation and Resiliency Toolbox

## Toolbox Elements

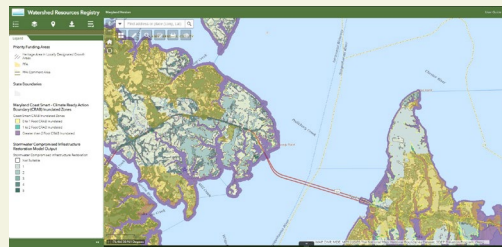
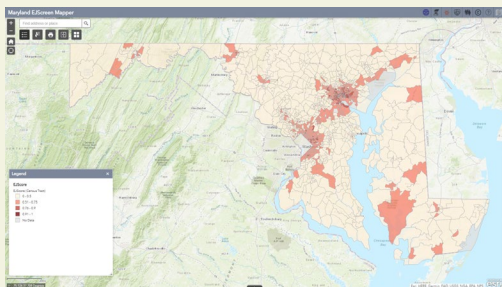


Toolbox Elements

- Decision Making for Planning and Design of Projects and Emergency Preparedness
- Incorporates Vulnerability Assessment Data
- Identifies Vulnerable Assets by Type
- Database of Potential Adaptation Measures
- Includes Mode Specific Assets and Adaptation Measures
- Technical Specifications for Engineered Solutions

# Maryland ArcGIS Online Tools

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# Ongoing MDOT Efforts

## Top 5 Weather-Related Hazards

1

**EXTREME WEATHER**



2

**WINTER STORMS**  
(snow and ice)



3

**EXTREME TEMPERATURE**  
(heat and cold)



4

**HIGH WINDS**  
(gusts 100 mph+, derechos,  
hurricanes, tornadoes)



5

**FLOODING**  
(frequent, or  
deficit drainage)



## Strategic Asset Management Plan



# Putting the “Tools” to Work



There is no easy button!



# MDTA Bay Bridge Facility

## Project Considerations:

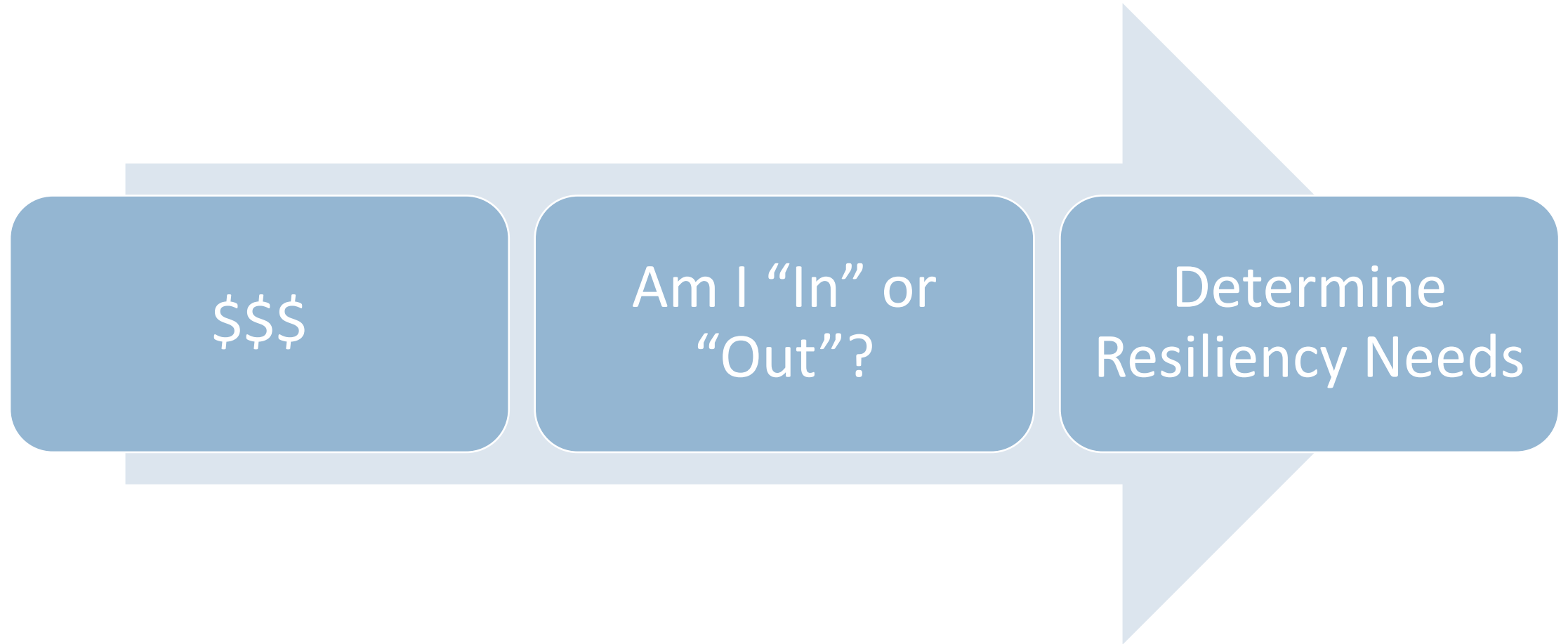
- Replacing an existing vehicle storage building and office building
- New Coast Smart Program Siting and Design Criteria Going into Effect
- Uncertainty about applicability of new requirements
- Need for future resiliency based on location proximate to water

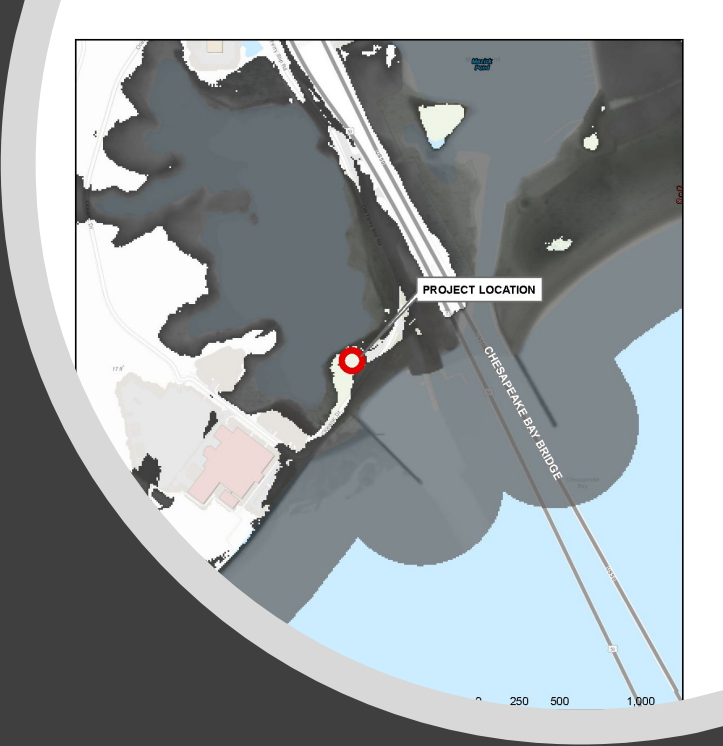
Note: MDOT was deeply involved in the development of siting and design criteria and MDTA was reaching out to us for a consistency review.



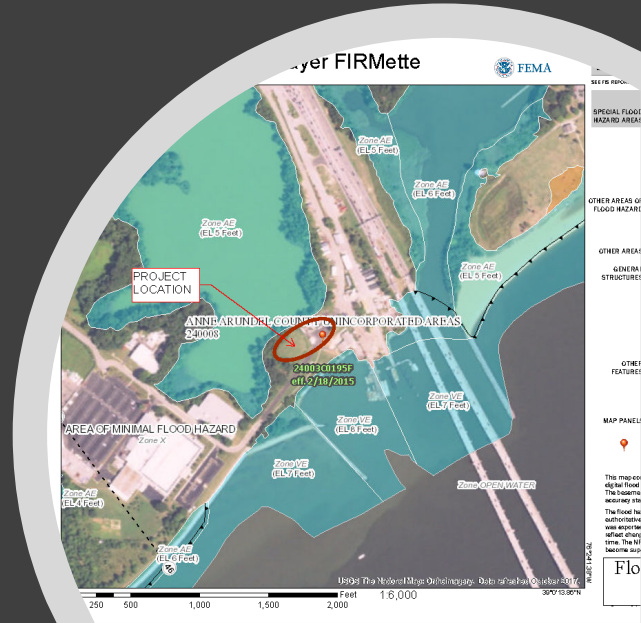


# Coast Smart Requirements Over Simplified!

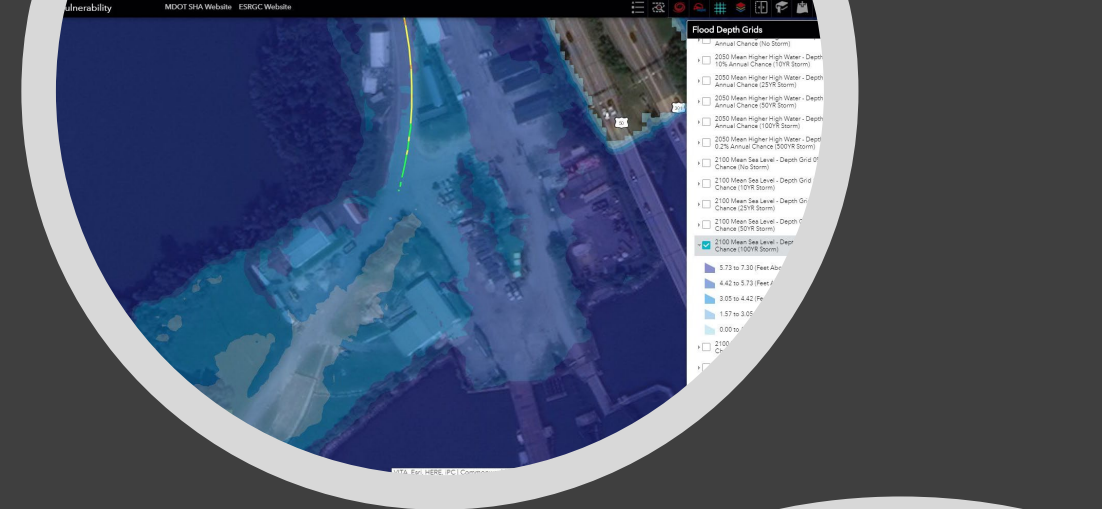
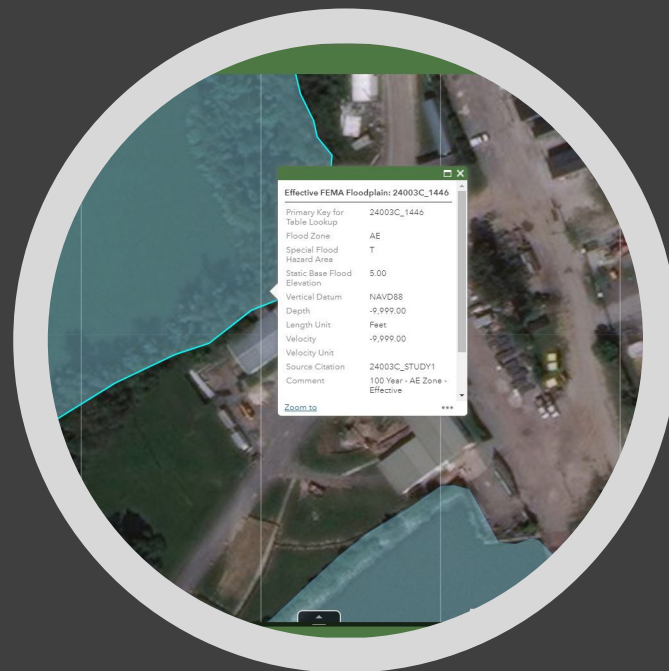
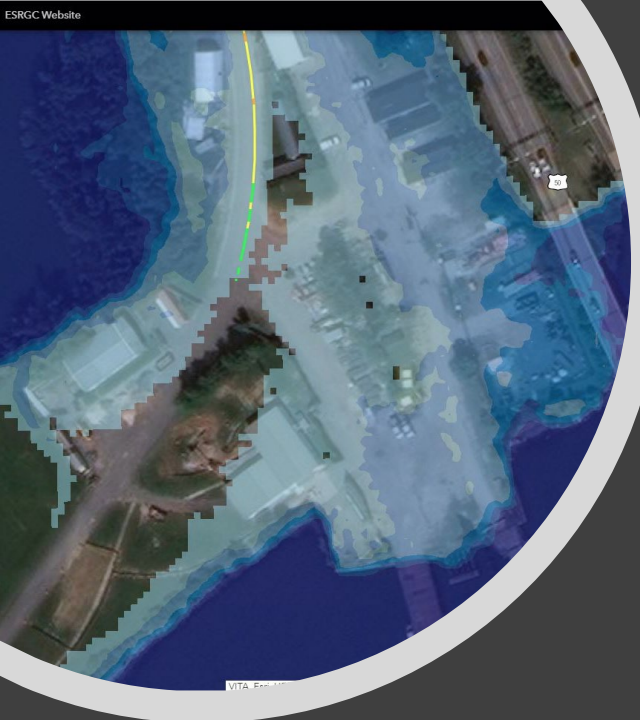




Am I “In” or “Out”?







# Be Resourceful!





# Stepping Through Resiliency...

- Do I qualify for an approved Categorical Exception?
  - What is the project design life?
  - What are the proposed project's vulnerabilities to SLR over the course of the project's design life?
  - Are there existing natural features on site that may serve to buffer the project from the impacts of sea level rise and coastal storms?
  - What additional resiliency measures were incorporated into the project?
  - Assess anticipate benefits and costs...
-

# Lessons Learned

- Data Governance is Key
  - How current is your information?
  - Is there consistency in data capture?
  - Can you measure resilience?
- Strong Partnerships can Accelerate Implementation
- Resiliency Planning for Transportation Extends Beyond Our ROW
- Multi-Disciplinary Approach to Resilience

Thank You!



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