



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

June 16, 2022

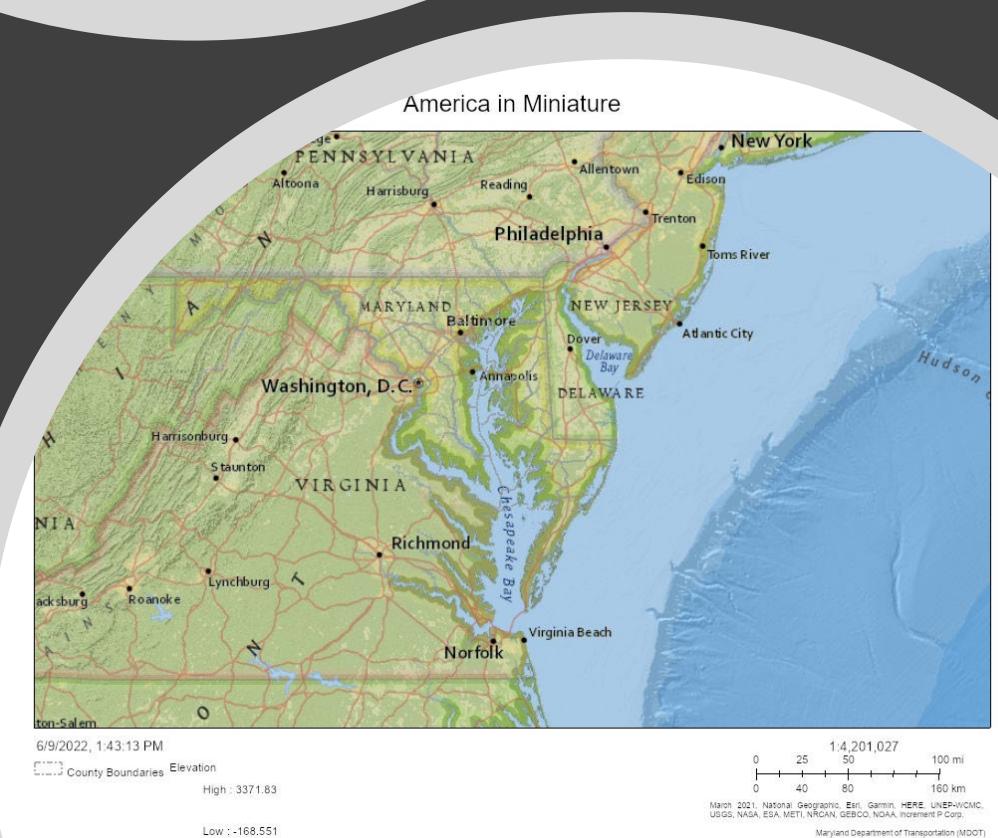
Sandy Hertz, CC-P

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

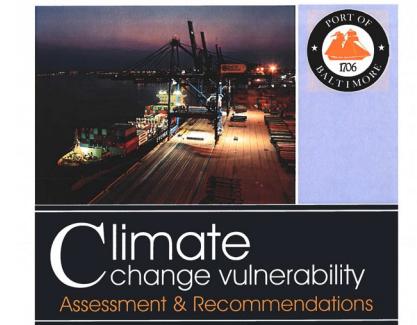
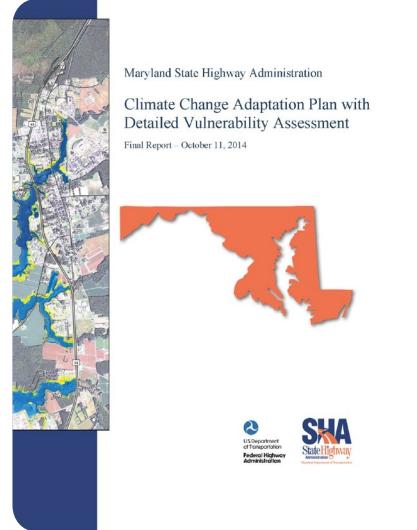
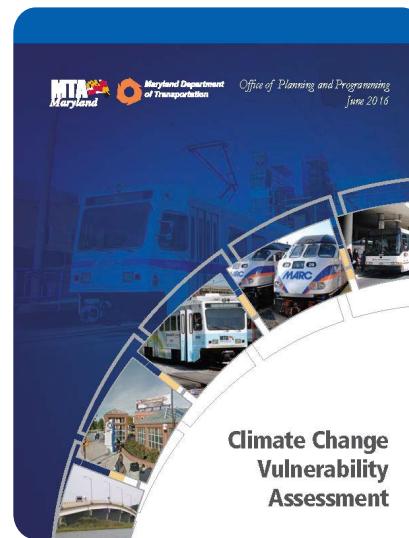


A History of Resiliency Planning.....

- 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)

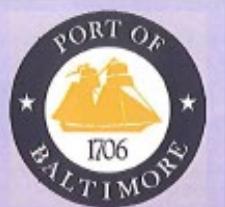
Vulnerability Analysis Approach

- 01**
Compile
 - Compile Asset and Hazard Information
- 02**
Develop
 - Develop Predictive Models
- 03**
Evaluate
 - Evaluate Risk to Assets



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.



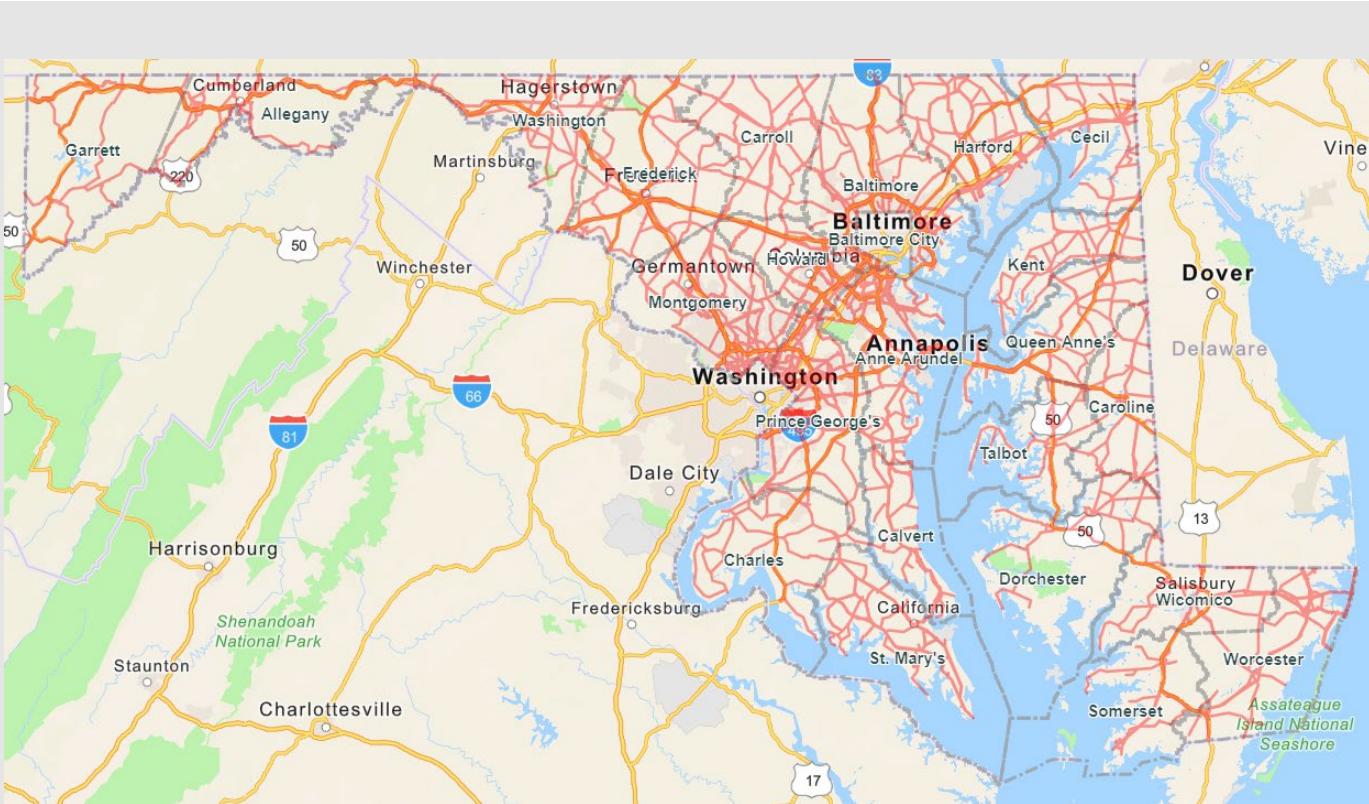
Climate
change vulnerability
Assessment & Recommendations

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? Yes

Project must consider sea level change.

Mean Sea Level 2050

Mean Sea Level 2100

Mean High High Water 2050

Mean High High Water 2100

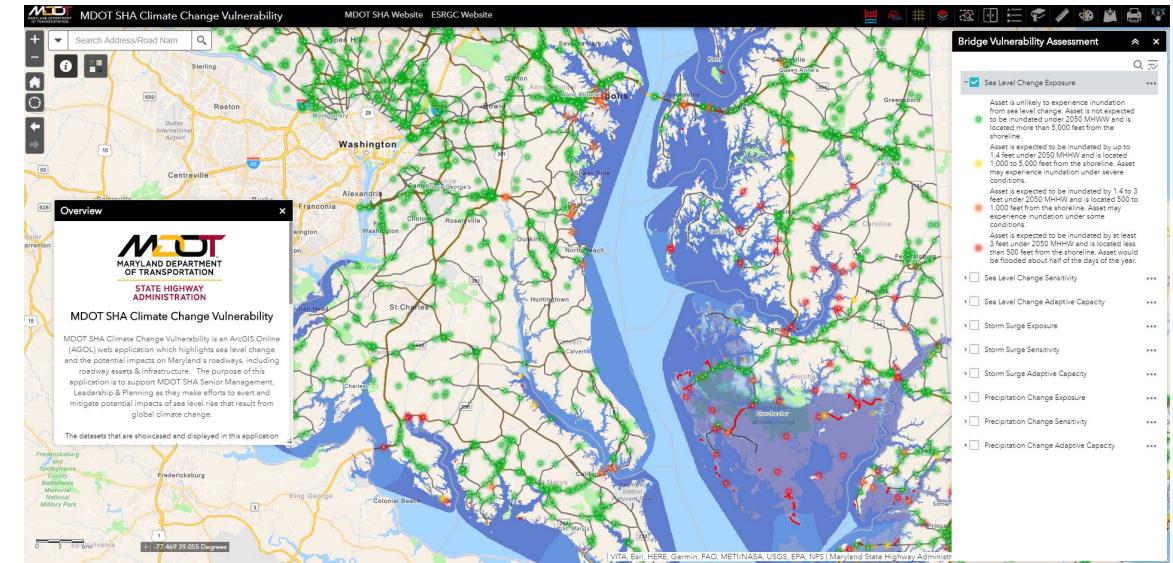
See attached Sea Level Change Map, if applicable

Is this a non-state Project located on State lands? No

Is this project involving construction of a new road or bridge, or reconstructing an existing road or bridge due to a storm event? No

Is this project involving construction of a new building/facility or reconstructing an existing building/facility due to a storm event? No

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

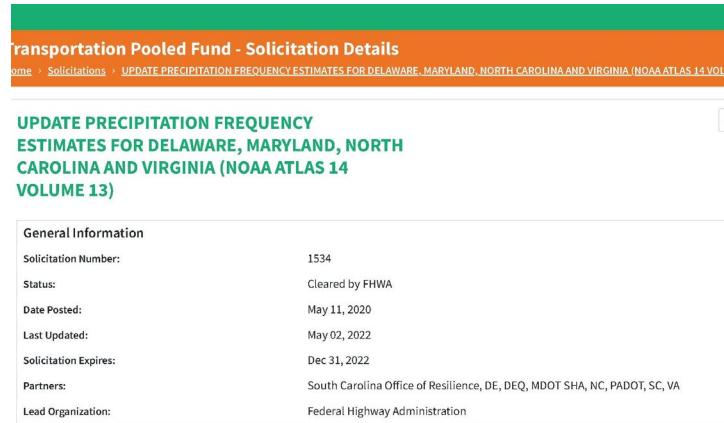
Private Sector

Association of Climate
Change Officers
Engineering Consultants
Industry/Business/NPOs
Subject Matter Experts
Communities

 Maryland Resiliency Partnership
Working together for a more flood resilient Maryland

Resiliency is...
... "the ability to prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions."

 High Performance Pond Partnership
Congratulations to our partners on the 2022 MdQI Award of Excellence for Innovation!

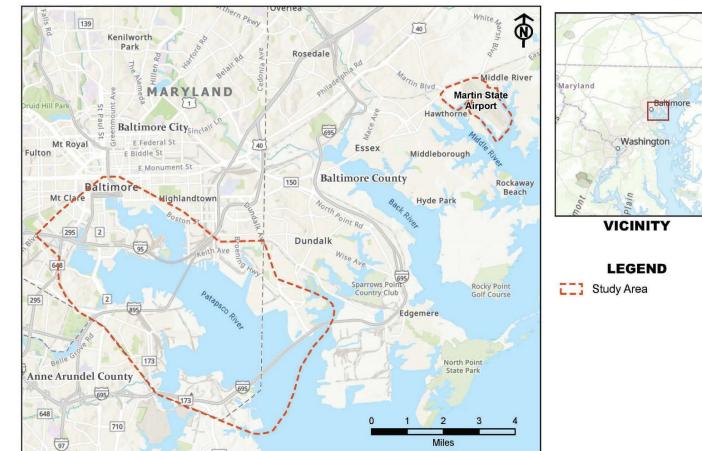
 Transportation Pooled Fund - Solicitation Details
Home > Solicitations > UPDATE PRECIPITATION FREQUENCY ESTIMATES FOR DELAWARE, MARYLAND, NORTH CAROLINA AND VIRGINIA (NOAA ATLAS 14) VOLUME 13

UPDATE PRECIPITATION FREQUENCY ESTIMATES FOR DELAWARE, MARYLAND, NORTH CAROLINA AND VIRGINIA (NOAA ATLAS 14) VOLUME 13

General Information

Solicitation Number:	1534
Status:	Cleared by FHWA
Date Posted:	May 11, 2020
Last Updated:	May 02, 2022
Solicitation Expires:	Dec 31, 2022
Partners:	South Carolina Office of Resilience, DE, DEQ, MDOT SHA, NC, PADOT, SC, VA
Lead Organization:	Federal Highway Administration

Baltimore Coastal Storm Risk Management Study



Flooding Concerns

- Future coastal storms may result in increased flood risk economic

Study Goals

- Investigate coastal storm flooding
- Develop coastal storm risk

Maryland Climate Leadership Academy

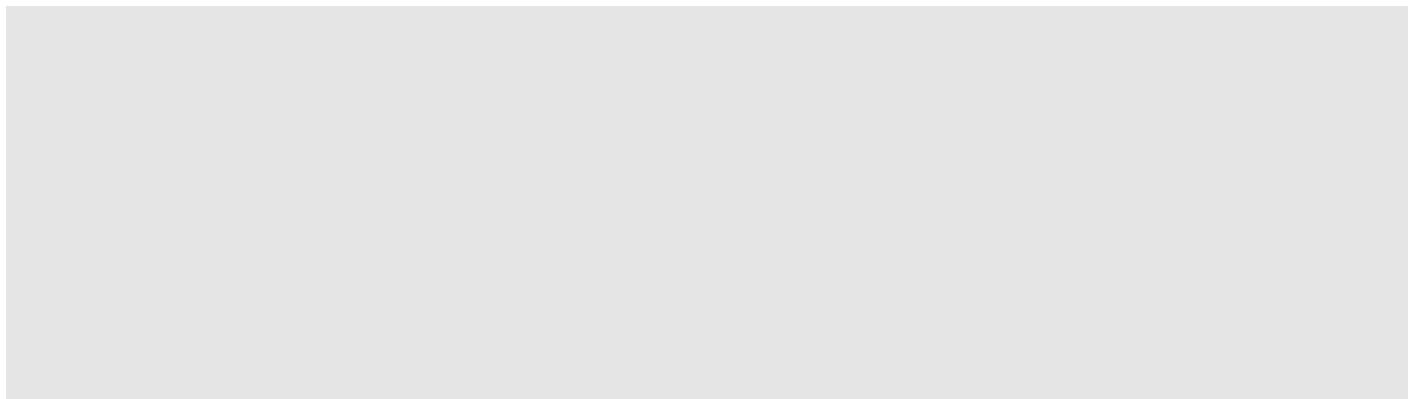
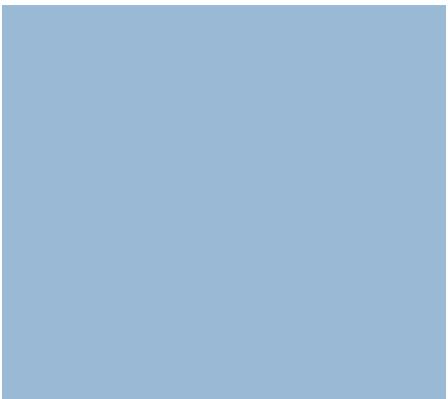
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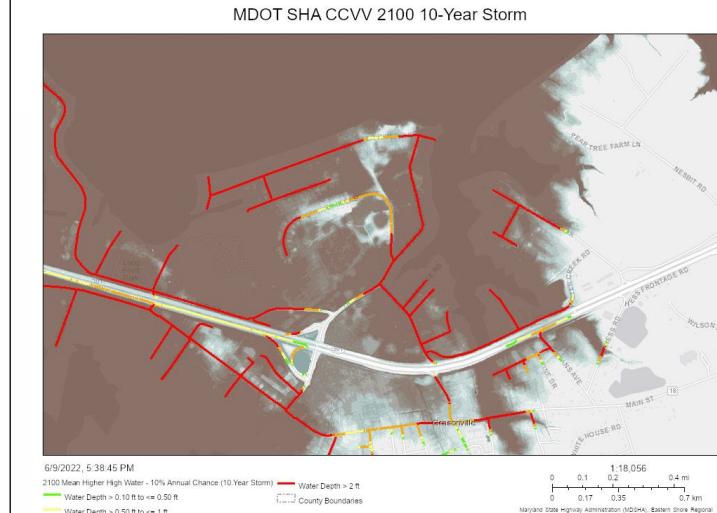
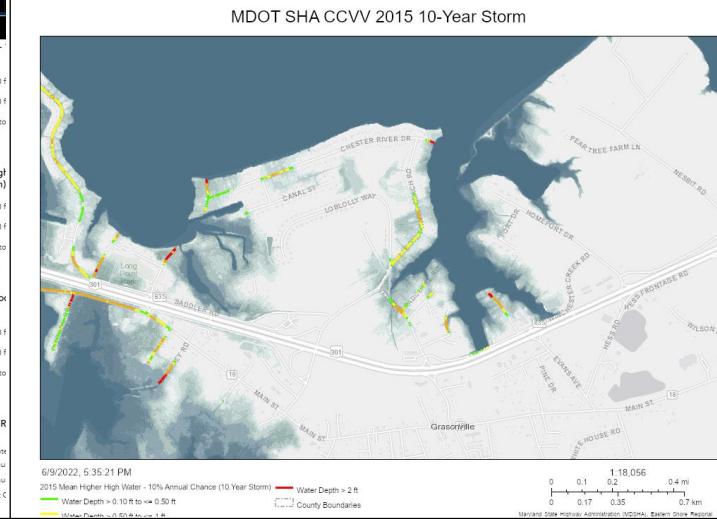
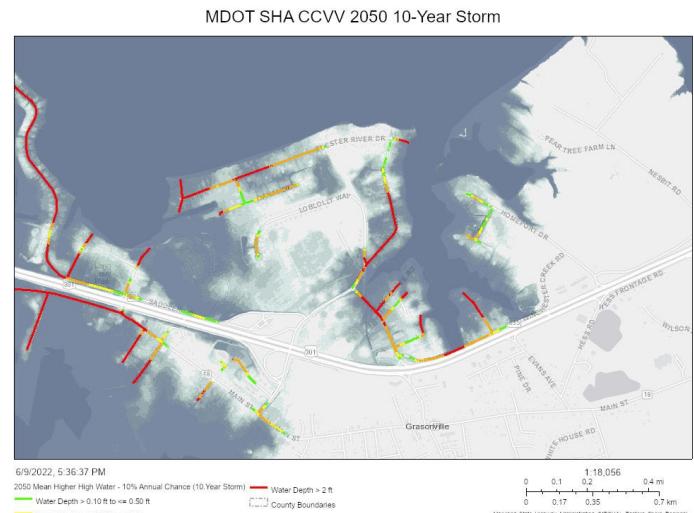
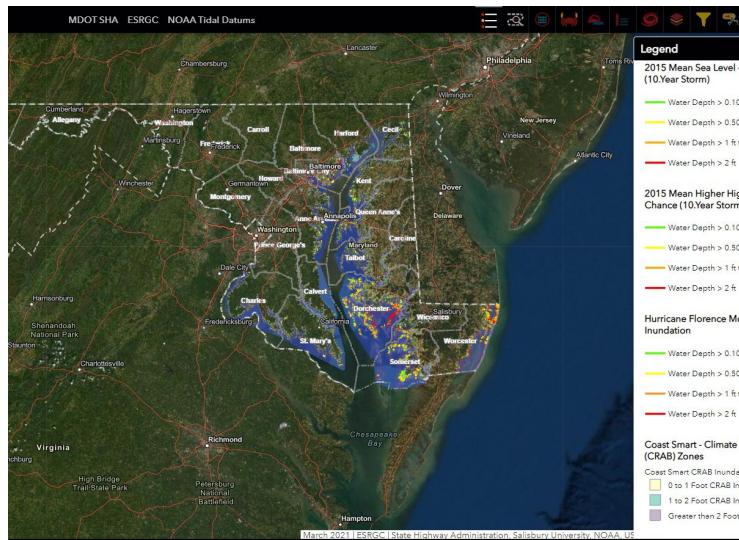
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ASSOCIATION OF CLIMATE CHANGE OFFICERS

Example Collaborations

Resiliency Planning Tools



MDOT SHA Climate Change Vulnerability Viewer



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2100 Mean Higher High Water - 10% Annual Chance (10 Year Storm)

Water Depth > 0.10 ft to < 0.50 ft

Water Depth > 0.50 ft to < 1 ft

Water Depth > 1 ft to < 2 ft

County Boundaries

MDOT SHA CCVV 2100 10-Year Storm

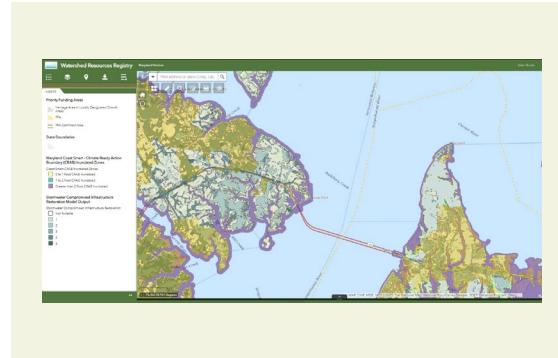
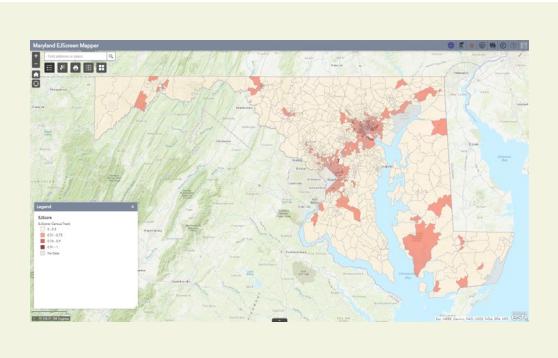
MDOT MTA's Adaptation and Resiliency Toolbox

Toolbox Elements

The image displays the MDOT MTA Adaptation & Resiliency Toolbox website. At the top, there is a navigation bar with links for HOME, STEPS TO RESILIENCE, TOOLS, EQUITY & RESILIENCY, CASE STUDIES, FAQS, and LIBRARY. A search bar is also present. The main content area is titled "Resiliency Planning Tools". It features several tools: Asset Navigation Tool, Resiliency Search Tool, Vulnerability Mapping Tool, Library, Funding Resources, and Case Studies. Each tool has a brief description and a "View Tool" link. The "Asset Navigation Tool" section includes a diagram showing a process flow: "Select Your Mode/Division", "Explore Solutions", and "Identify Next Steps". The "Toolbox Elements" section at the bottom lists the following components: Asset Navigation Tool, Resiliency Search Tool, Vulnerability Mapping Tool, Library, Funding Resources, and Case Studies. The website has a dark green header and a red footer bar.

- 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



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

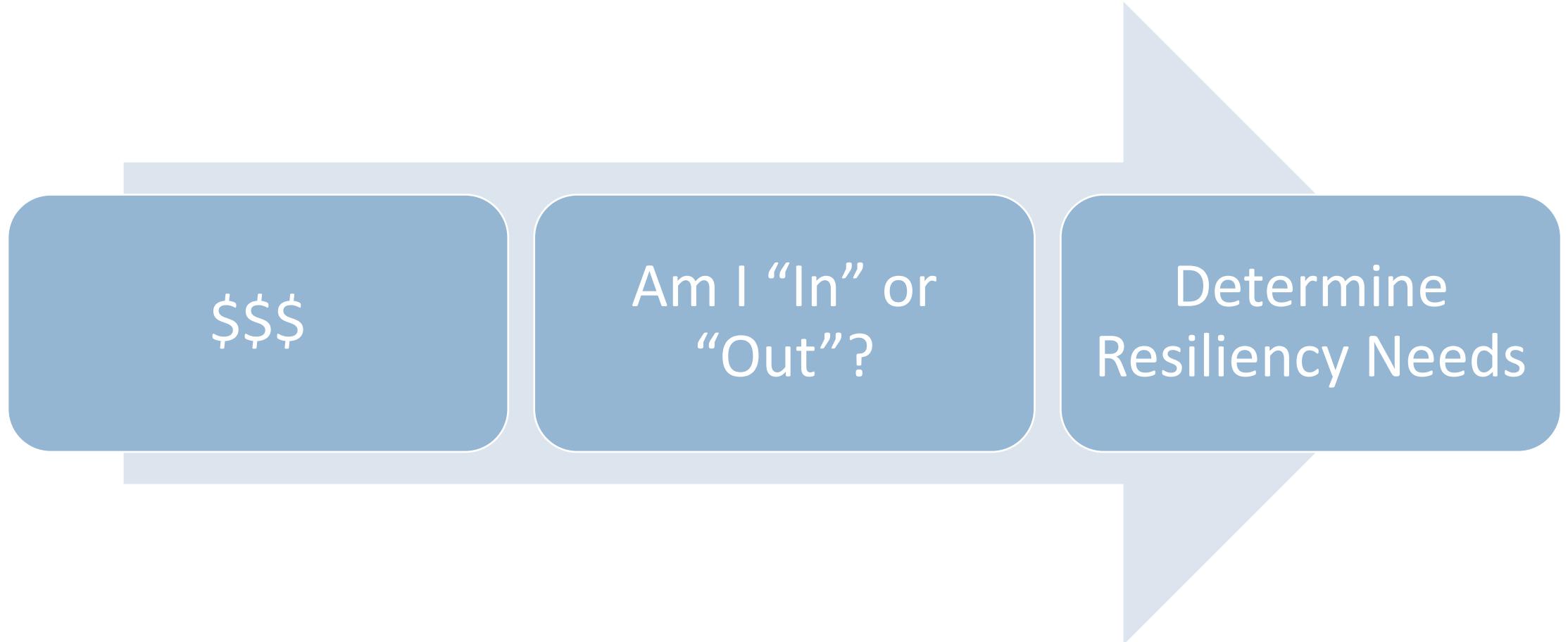
Project Considerations:

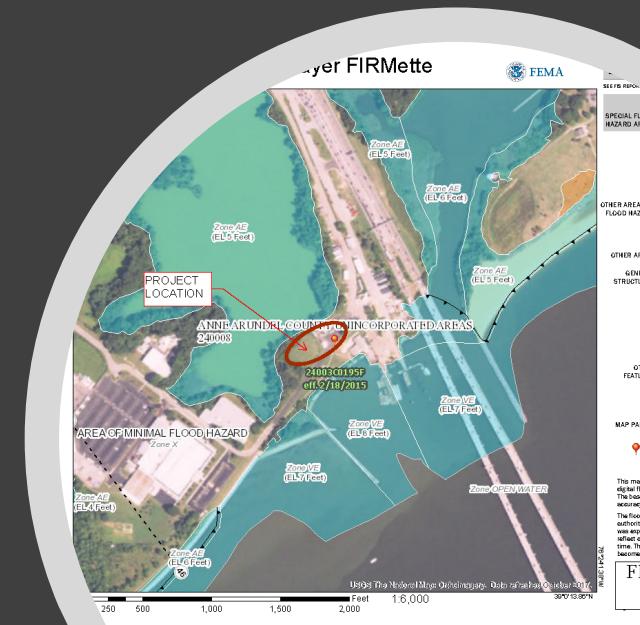
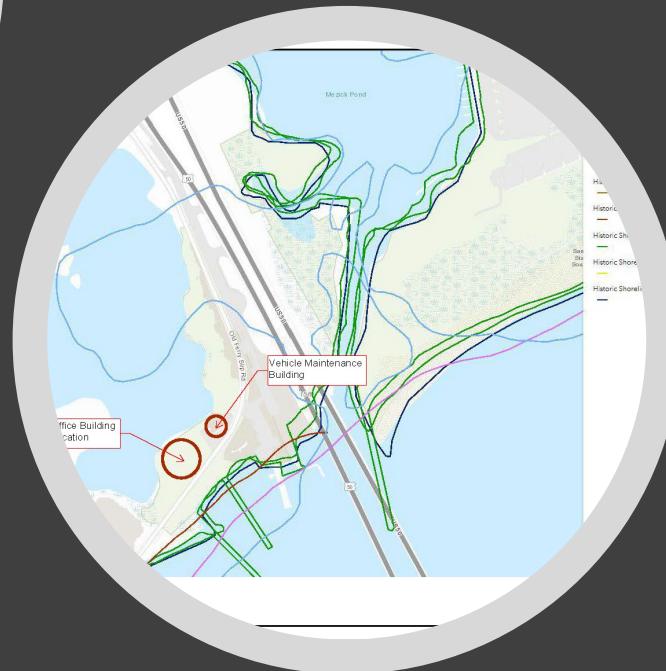
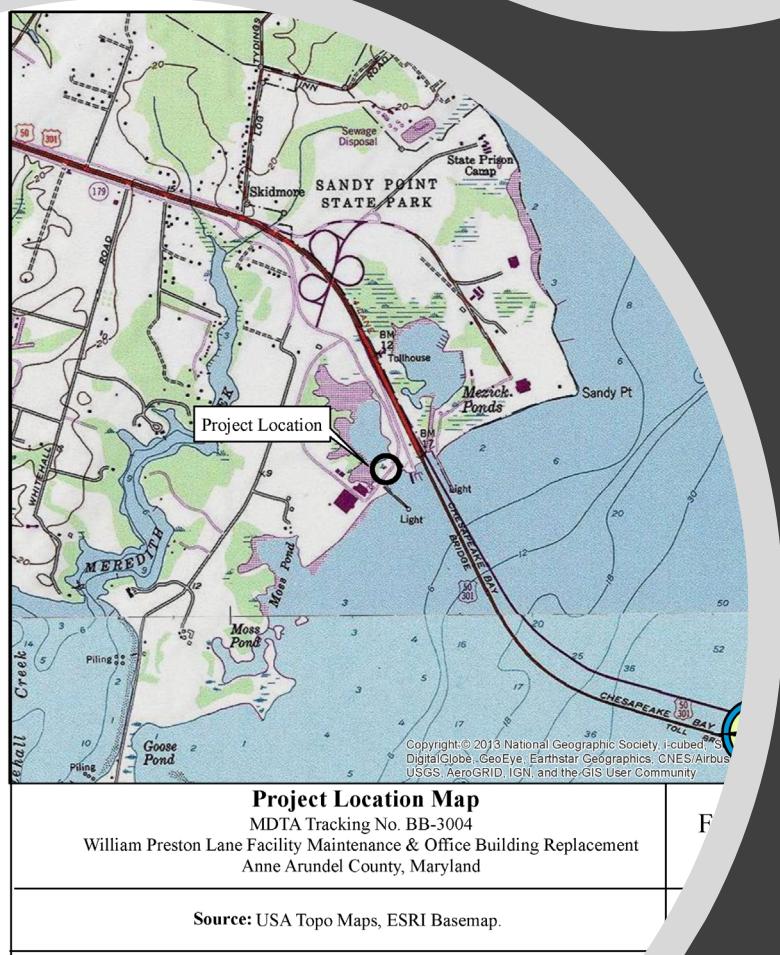
- Replacing an existing vehicle storage building and office building
- New Coast Smart Program Siting and Design Criteria Going into Effect
- Uncertainty about applicability of new requirements
- Need for future resiliency based on location proximate to water

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

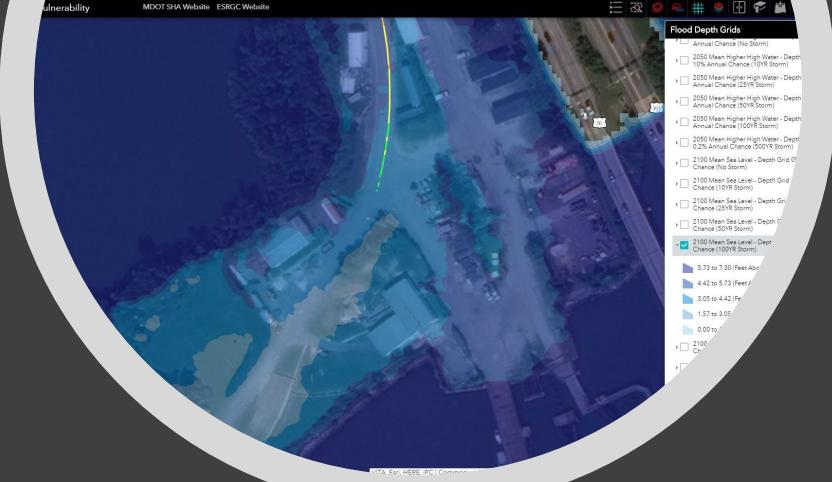
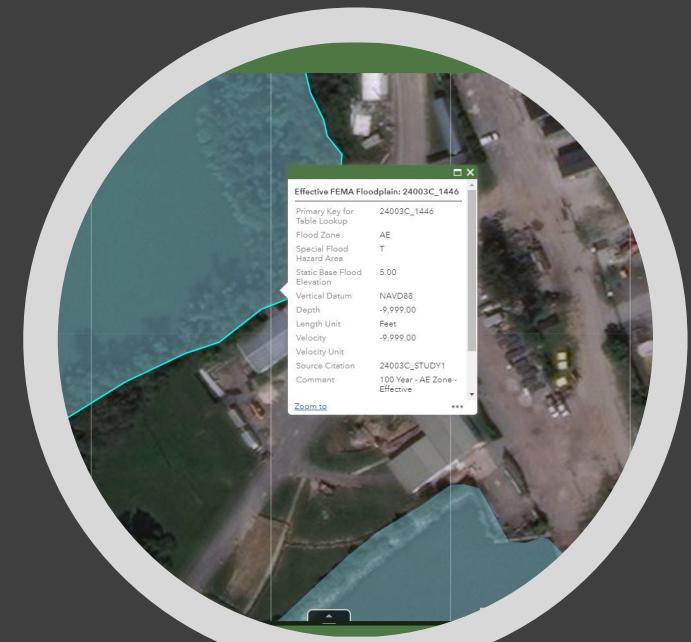
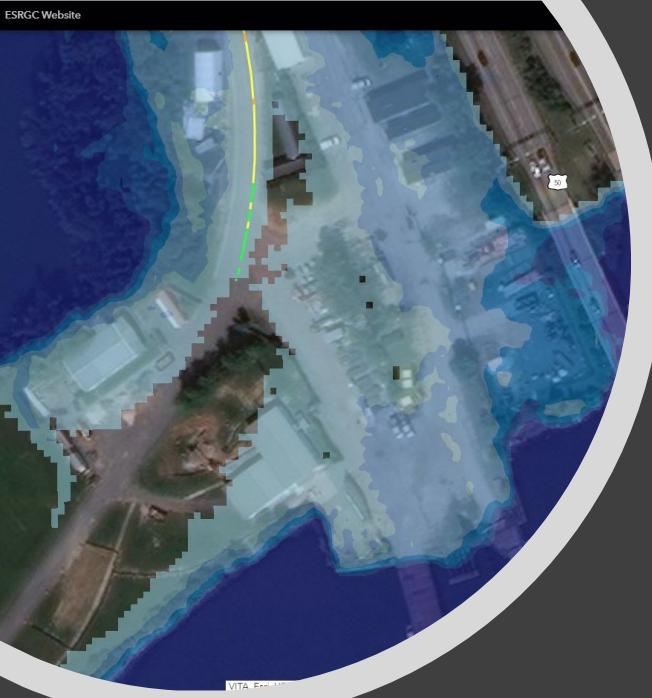


Coast Smart Requirements Over Simplified!





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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