GET STARTED: CLIMATE VULNERABILITY ASSESSMENTS

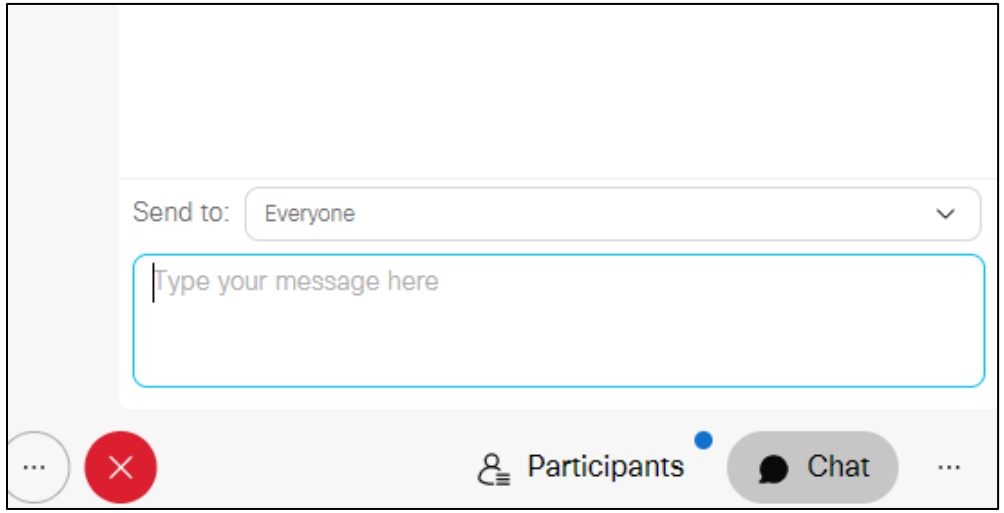
Transportation Resiliency Planning Webinar #2

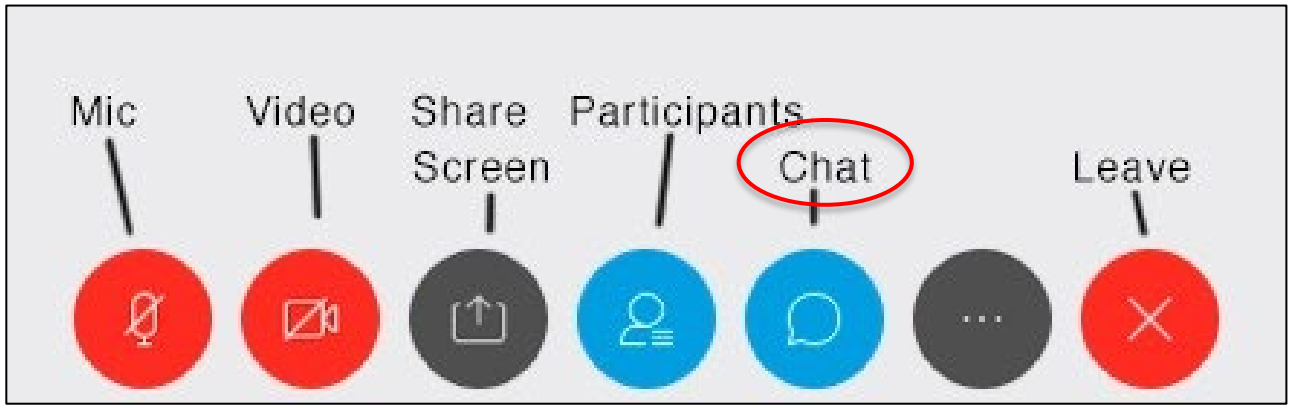
May 13, 2022

National Capital Region
Transportation Planning Board

WebEx Logistics

- Please stay on mute
- Type questions in the chat





Poll

Please go to www.menti.com

Use code: 9365 0916

Or use the link in the chat:

https://www.menti.com/wh3m6gwo4x

What organization are you from?

What is your role?

Project Team

Leo Pineda
Transportation Planner, MWCOG

Stacy Cook
Principal Transportation Planner, MWCOG

Cassandra Bhat
Climate Resilience Director, ICF

Kristina Heggedal
Transportation Manager, ICF

Amanda Vargo
Senior Climate Resilience Analyst, ICF

Sonia Aronson
Climate Resilience Researcher, ICF

AICP Credit

American Institute of Certified Planners (AICP)
Certification Maintenance (CM) Credit Number:

#9247864

Agenda

Overview of Transportation Vulnerability Assessment Approaches

Peer Examples

- Charles County
- MDOT SHA
- Virginia OIPI - ICF presentation
- NVRC

Moderated Discussion

Wrap-Up

Transportation Resiliency Planning Webinar Series Schedule

Webinar 1

- Transportation Resilience in the Region: What's Next?

Webinar 2

- Get Started: Climate Vulnerability Assessments

Webinar 3

- Break Down Barriers: Integrate Climate Resilience into Project Development & Design

Webinar 4

- Break Down Barriers: Integrate Climate Resilience into Planning and Programming

Session 2 Goals and Objectives

Goal

- Increase participant understanding of **different approaches** to conducting a vulnerability assessment and **why these assessments are valuable** to decision makers

Objectives

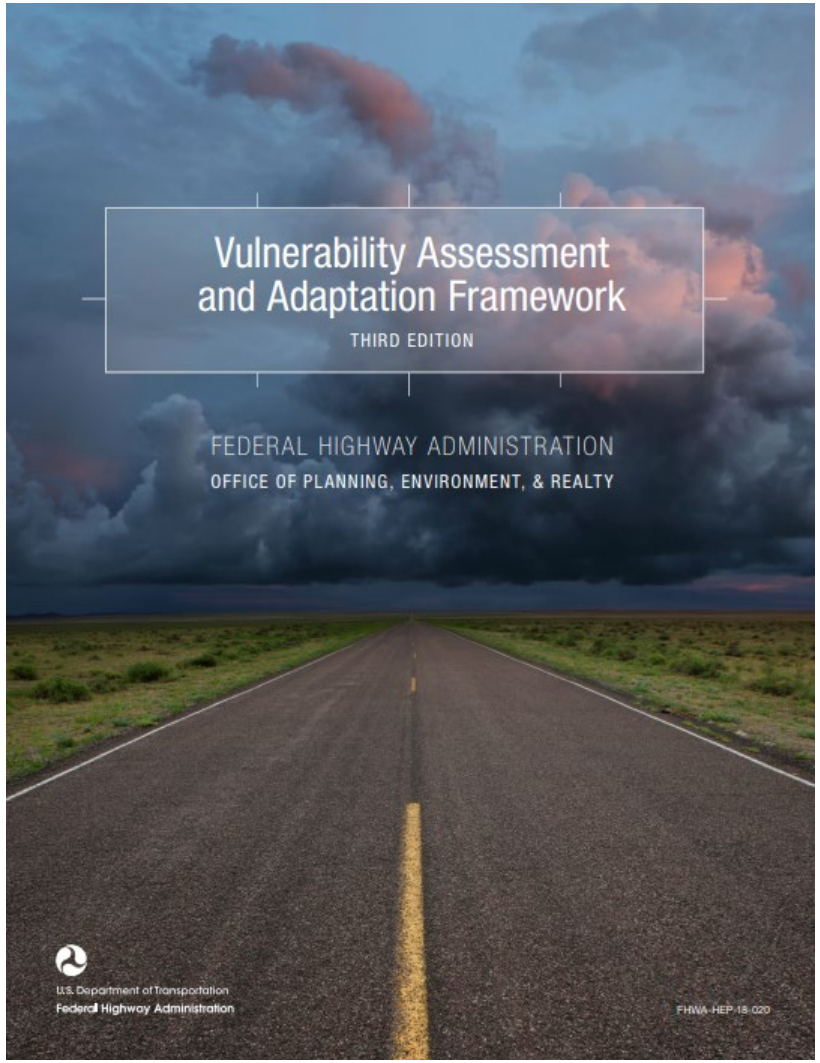
- Understand the **benefits and common challenges** of a vulnerability assessment
- Understand **different approaches** to conducting a vulnerability assessment
- **Understand your role** in conducting or supporting a vulnerability assessment

Overview of Transportation Vulnerability Assessment Approaches

Why conduct a vulnerability assessment?

- **Vulnerability assessments** help agencies understand how climate change and extreme weather events will affect transportation infrastructure and operations.

- Understanding how climate change will affect infrastructure can help agencies **build resilience** – the ability to anticipate, prepare for, and adapt to changing conditions and recover from disruptions.

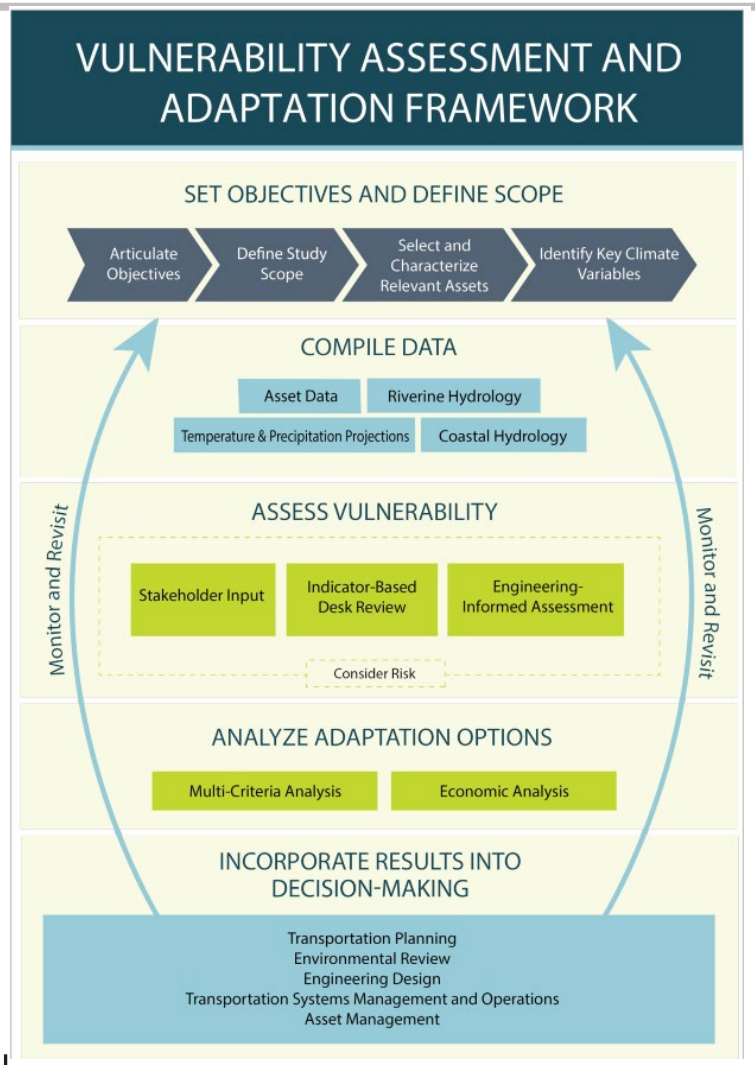


Core components of a vulnerability assessment

Climate change **vulnerability** in the transportation context is a function of a transportation system's exposure, sensitivity, and adaptive capacity to climate affects.

Exposure	Sensitivity	Adaptive capacity
Whether the asset or system is located in an area experiencing direct impacts of climate change, such as temperature and precipitation changes, or indirect impacts, such as sea level rise.	• How the asset or system fares when exposed to an impact.	• The systems' ability to adjust to cope with existing climate variability or future climate impacts.

Steps to conduct a vulnerability assessment



1. Define study scope
2. Obtain asset data
3. Obtain climate data
4. Assess vulnerability

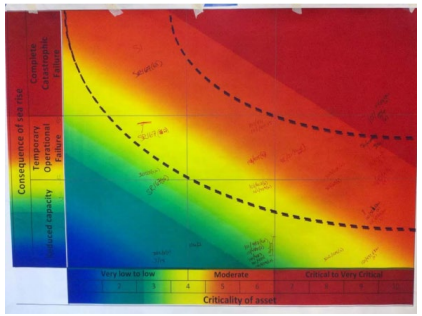
Assess vulnerability

5. Identify, analyze, and prioritize adaptation options
6. Incorporate assessment results in decision making
7. Monitor and revisit

Apply to decision-making

Different approaches

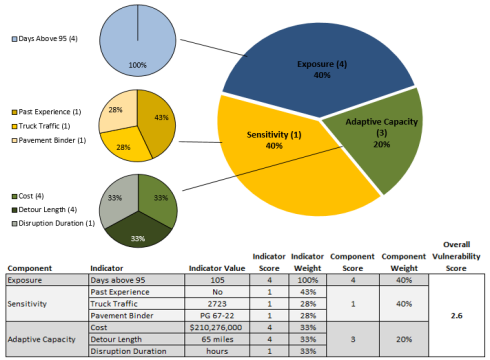
Stakeholder Input



Best for:

- Systems-level analysis
- Qualitative ratings
- Low data availability

Indicator-Based Desk Review

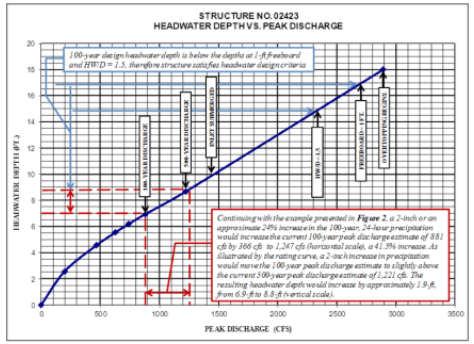


Component	Indicator	Indicator Value	Indicator Score	Indicator Weight	Component Score	Component Weight	Overall Vulnerability Score
Exposure	Days above 95	105	4	100%	4	40%	2.6
Sensitivity	Past Experience	No	1	43%	1	40%	
	Truck Traffic	2723	1	28%			
	Pavement Binder	PG 67-22	1	28%			
Adaptive Capacity	Cost	$210,276,000	4	33%	3	20%	
	Detour Length	65 miles	4	33%			
	Disruption Duration	hours	1	33%			

Best for:

- Systems-level analysis
- Quantitative or qualitative ratings
- Good data availability
- Screening large numbers of assets

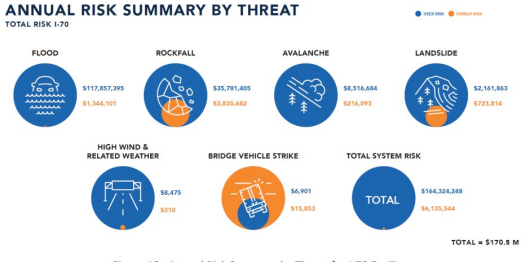
Engineering Assessments



Best for:

- Individual asset analyses
- Evaluating adaptation options

Monetized Risk



Best for:

- Corridor-level analysis
- Informing adaptation solution selection

Stakeholder input approach

Overview

- Institutional knowledge is used to identify and rate vulnerabilities

Methods and Tools

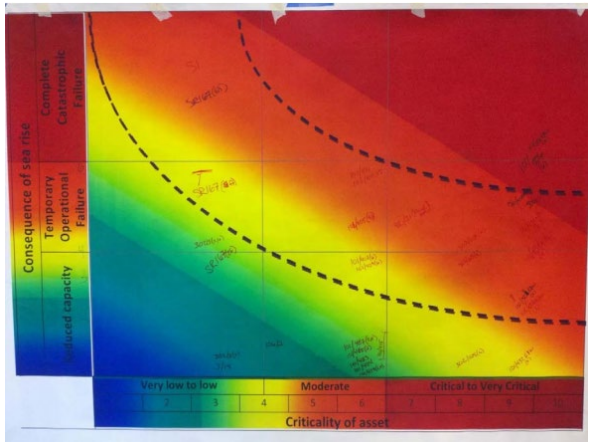
- Interviews with maintenance and operations staff, engineers, and emergency responders
- Working sessions with local experts
- Surveys for assessments with a large scope

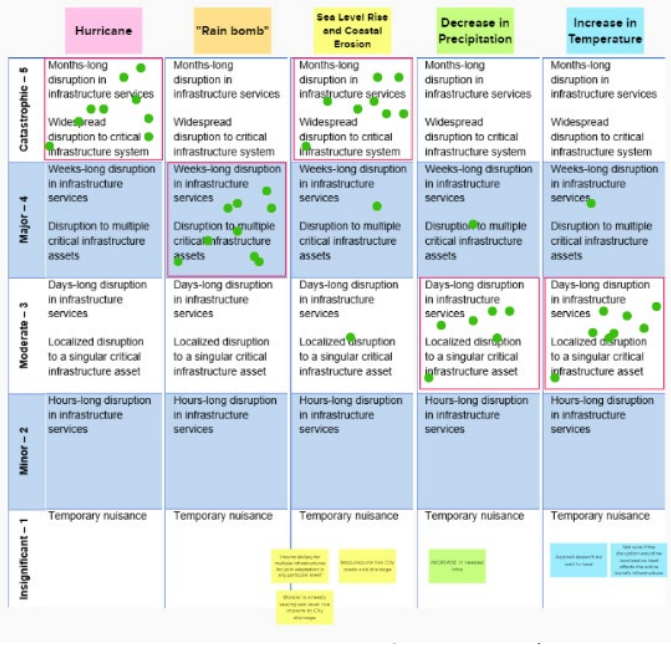
Benefits

- Captures information not present in records or desk-based analysis
- Creates engagement among staff

Challenges

- Results are highly dependent on quality of stakeholder engagement





National Capital Region
Transportation Planning Board

Indicator-based approach

Overview

- Score assets based on available data – indicators of vulnerability components

Methods and Tools

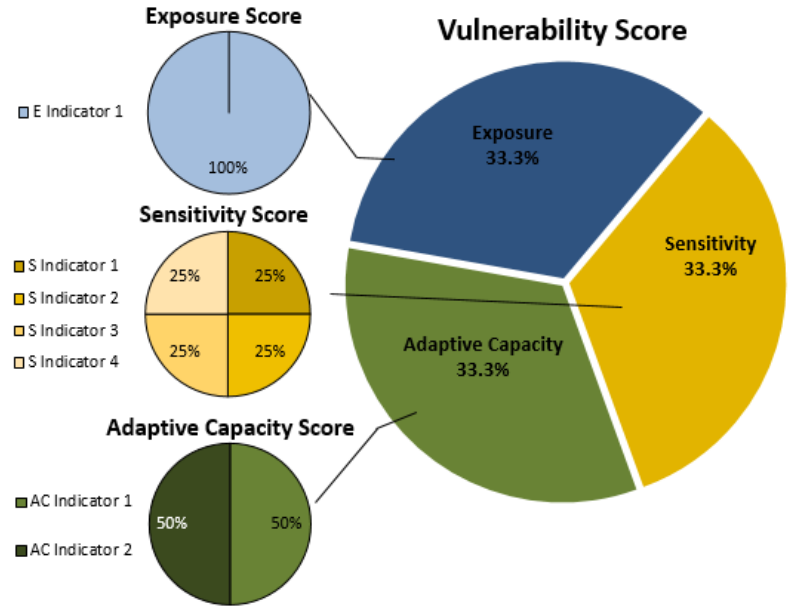
- FHWA Vulnerability Assessment Scoring Tool (VAST)
- DIY spreadsheet
- ArcGIS “model builder”
- Custom software

Benefits

- Useful for screening
- Low-cost
- Abundance of examples

Challenges

- Selecting and scoring indicators
- Tracking down stakeholder input
- Determining how to accurately weight each indicator and exposure score
- Interpreting results



Engineering assessment approach

Overview

- Evaluates risks to a particular transportation asset based on asset specific data

Methods and Tools

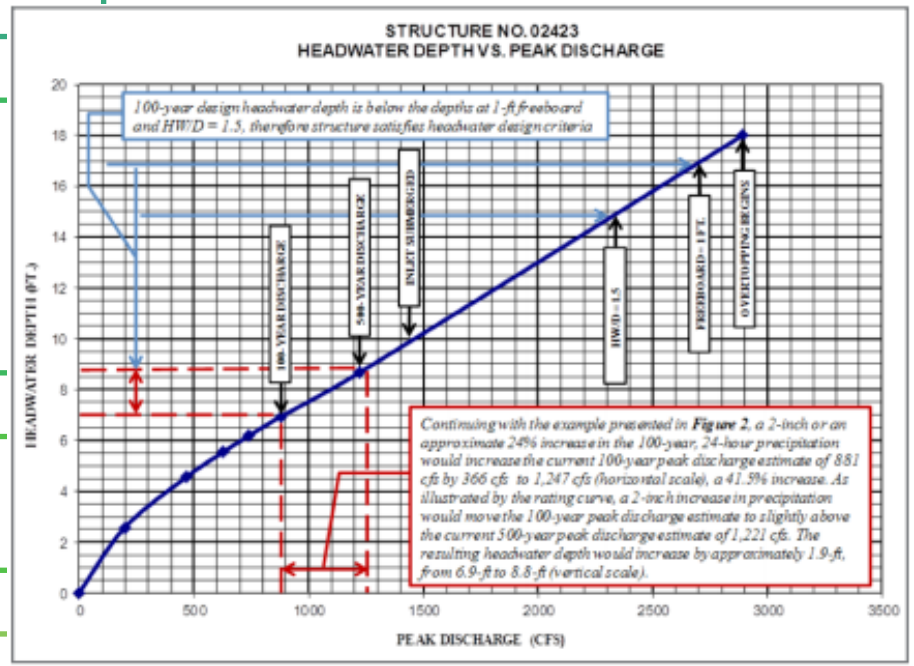
- Understand the asset's design life, function within the system, and location
- Evaluate the asset's performance under projected climate scenarios

Benefits

- Produces asset-level vulnerability analyses

Challenges

- Selection of adaptation measures is dependent on budget and other considerations



Monetized risk approach

Overview

- Risk is a measure of the probability that an asset will experience a particular impact and the consequence of that impact

Methods/Tools

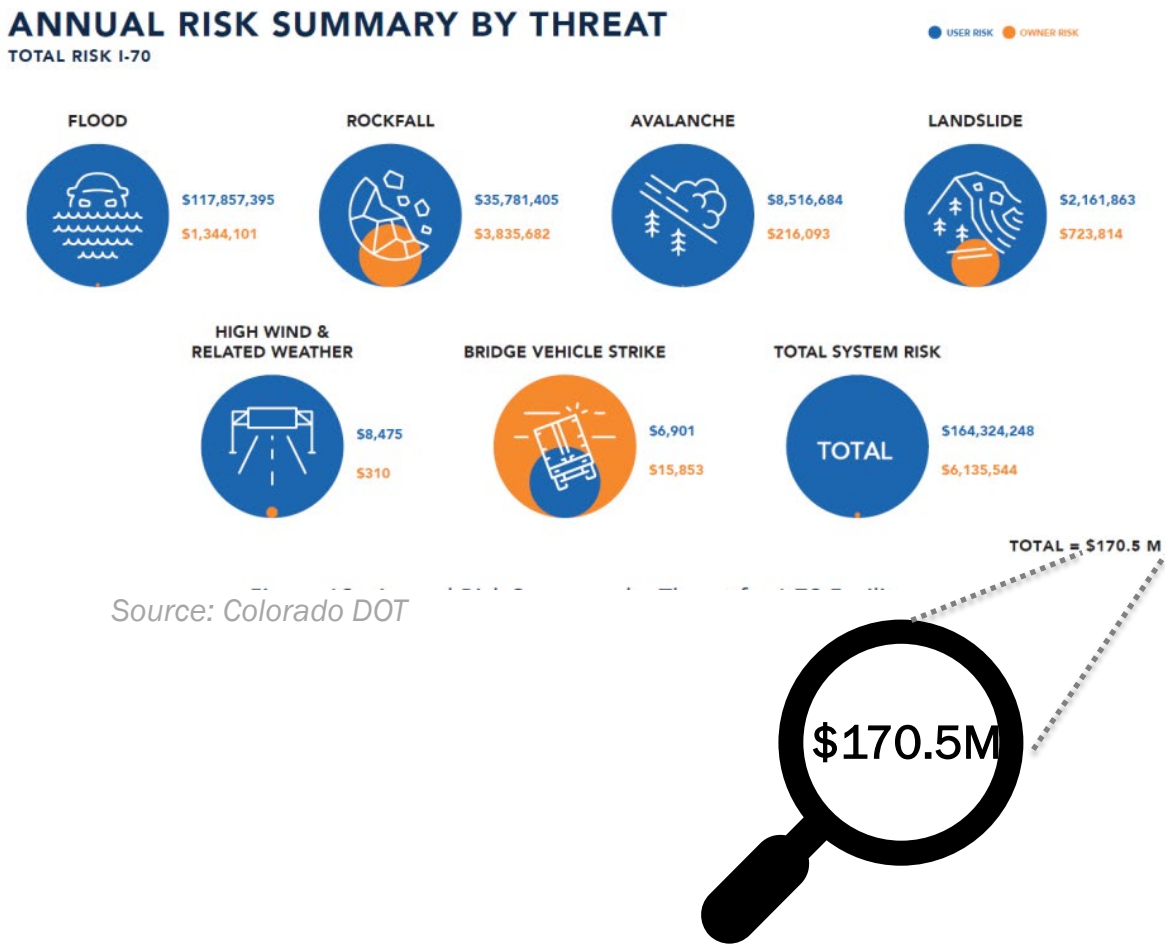
- Agencies consider the level of use, degree of redundancy in the system, and value of an asset

Benefits

- Helps agencies make informed decisions about the costs and benefits of potential adaptation options

Challenges

- Uncertainty in climate projections



Source: Colorado DOT

National Capital Region
Transportation Planning Board

Example Vulnerability Assessments

Indicator based

- Many state and local DOTs or MPOs calculate vulnerability scores for individual assets

Indicator-Based Assessments	Asset Types	Climate Hazards	Vulnerability Components
Pennsylvania DOT (2017)	Roads	Flooding	Vuln = f(E, S, AC)
Vermont Agency of Transportation (2018) (update to 2015)	Roads	Flooding	Risk = Vuln f(E, S) x Criticality
Maryland State Highway Administration (2019) (update to 2015)	Bridges	Sea level change, storm surge, heavy precipitation	V = f(E, S, AC)

Stakeholder input

- Oahu MPO held work sessions with experts to identify the criticality of assets and effects of projected climate change

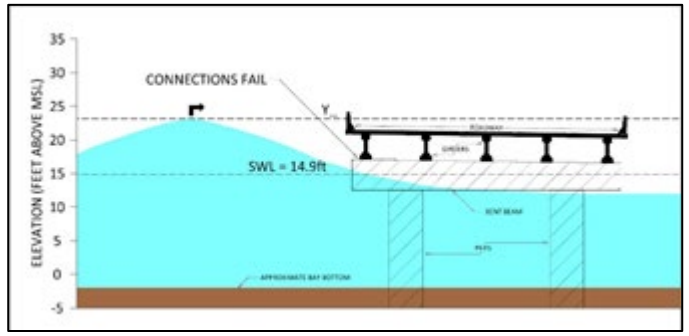
Workshop Attendees

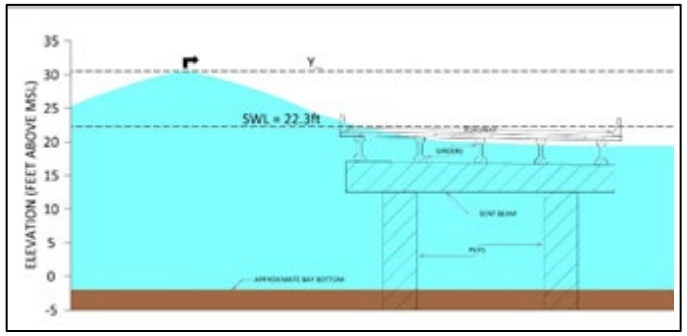
Climate Change Experts	Transportation experts	Others
• University professors • NOAA researchers	• Hawaii DOT • US FHWA • Urban and regional planners • Civil Engineers	• Non-profit groups • Energy providers • NREL • Pacific Disasters Center

Example Vulnerability Assessments

Engineer- Informed

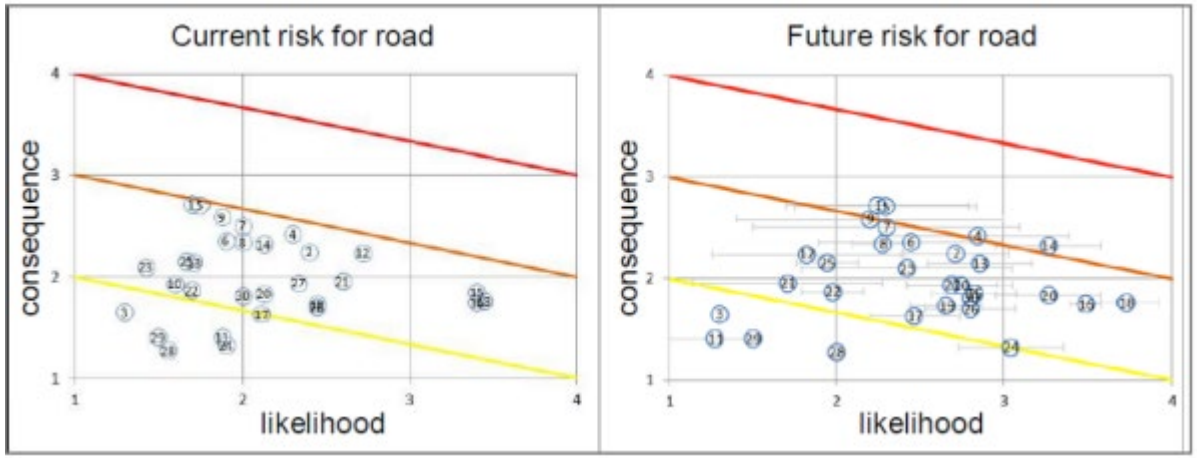
- FHWA investigated bridge performance under a storm scenario in Mobile, AL





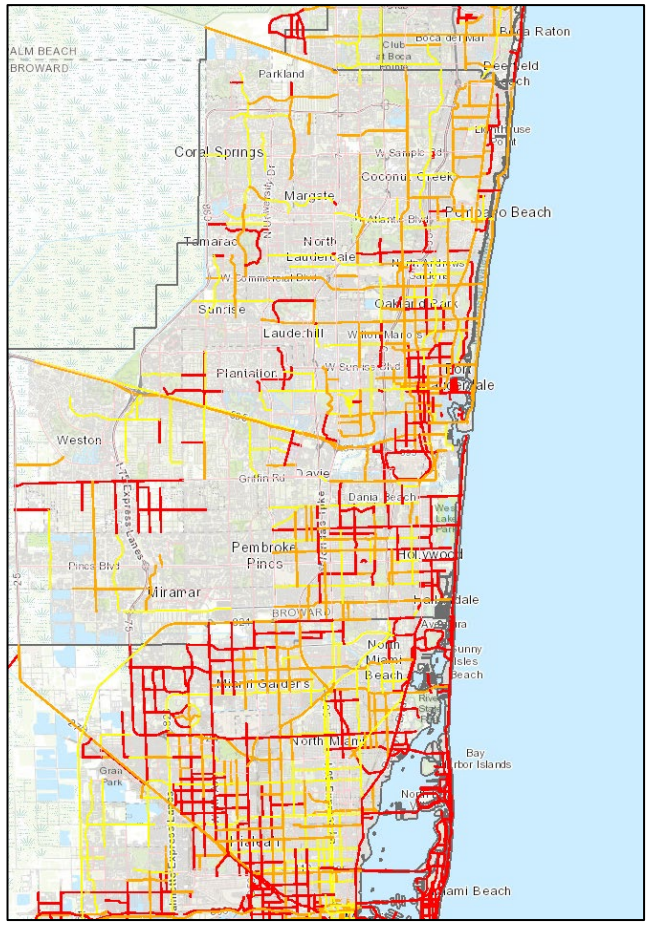
Risk focused

- The Netherlands used an indicator-based approach followed by likelihood and consequence ranking
- MassDOT created the Boston Harbor Flood Risk Model (BH-FIRM) to model the probability of flooding for the highway system

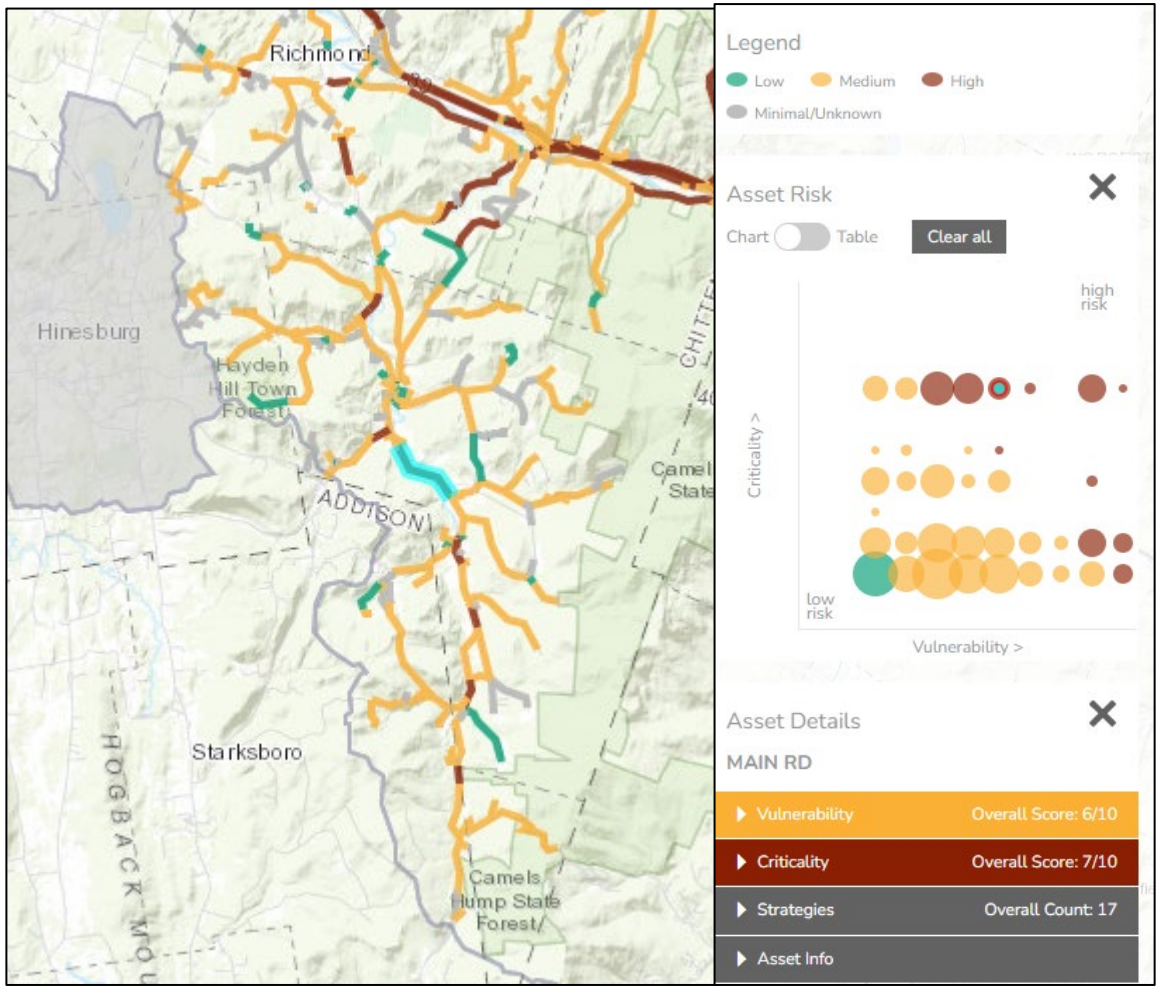


Example Vulnerability Assessments

Florida DOT Sea Level Scenario Sketch Planning Tool



Vermont Transportation Flood Resilience Planning tool



National Capital Region
Transportation Planning Board

Poll

Mentimeter

Please go to www.menti.com

Use code: 9365 0916

Or use the link in the chat:

https://www.menti.com/wh3m6gwo4x

Has your organization conducted a climate vulnerability assessment?

Peer Examples

Peer Examples

Charles County, MD

MARYLAND DEPARTMENT OF TRANSPORTATION

Maryland DOT State Highway Administration (MDSHA)

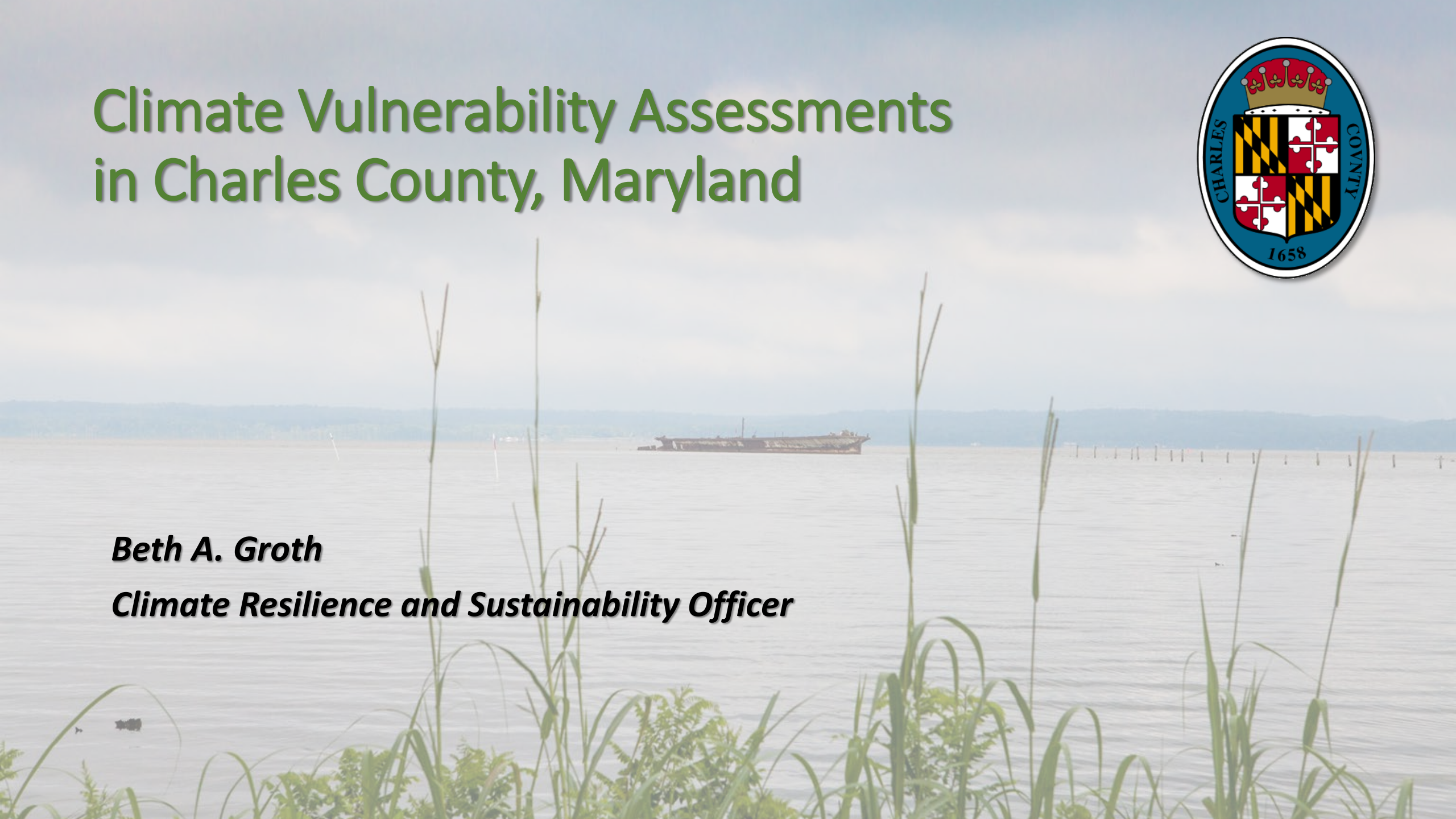
Office of INTERMODAL Planning and Investment

Virginia Office of Intermodal Planning and Investment (OIPI)

nvrc
Northern Virginia Regional Commissio

Northern Virginia Regional Commission (NVRC)

Climate Vulnerability Assessments in Charles County, Maryland



Beth A. Groth

Climate Resilience and Sustainability Officer

Location and Context

Charles County Efforts

- **Climate Resilience Action Strategy**
  - Initiative launched in 2019.
  - Collaborative effort with the University of Maryland and with Anne Arundel and Queen Anne's Counties to develop, implement and finance resilience plans.
  - Considered multiple sectors, including transportation.
- **Nuisance and Urban Flood Plan**
  - House Bill 1350 (2018)/Updated through House Bill 1427 (2019) - required jurisdictions that experience nuisance flooding to adopt a plan to address nuisance flooding by October 2020.
  - Charles County's Plan Adopted in October 2020 as a new chapter in the Hazard Mitigation Plan.
  - Focused on transportation assets.

Climate Resilience Action Strategy

Climate Resilience Action Strategy

- **Climate Resilience Work Group**
  - **County staff from multiple departments**
    - **Planning & Growth Management**
    - **Emergency Services**
    - **Public Works/Utilities**
  - **Health Department**
  - **Board of Education**
  - **MD Natural Resource Conservation Service**

Climate Resilience Action Strategy

- **Assess Risk and Climate Impacts:**
  - ***Identification of Direct Climate Hazards***
    - **Extreme Weather (Rain, Severe Thunderstorms, Tornadoes, etc.)**
    - **Extreme Temperatures (heat waves)**
    - **Urban and Coastal (Nuisance) Flooding**
    - **Sea Level Rise**

Climate Resilience Action Strategy

- **Assess Risk and Climate Impacts:**
  - ***Identification of Indirect Climate Hazards***
    - **Inadequate and aging infrastructure**
    - **Aquifer Capacity**
    - **Development Issues**
    - **Communication**
    - **Public Health**
    - **Agriculture**

Climate Resilience Action Strategy

- **Identification of County Assets:**
  - ***Key Institutions, Facilities, and Infrastructure***
    - **Critical Operations Facilities (Government Building, Cooling Centers)**
    - **Critical Non-Governmental Utility Infrastructure (SMECO, etc.)**
    - **Roads and Associated Stormwater Management Facilities**
    - **Water and Sewer Infrastructure (Water Supply, Wastewater, Reclaimed Water)**
    - **Energy Infrastructure (Power Plants)**
    - **Naval Bases**
    - **Radio and Cell Towers**

Climate Resilience Action Strategy

- **Identification of County Assets:**
  - ***Social and Cultural Assets***
    - **Vulnerable Populations**
    - **Healthcare**
    - **Education System**
    - **Historic and Cultural Resources**
  - ***Environmental and Natural Features***
    - **Natural and Water Resources**
    - **Forests**
    - **Shoreline Communities**
    - **Green Spaces**

Climate Resilience Action Strategy

- **Identify and Prioritize Action Strategies**
  - ***High Priority Example:***
    - **Roads and Associated Stormwater Management Facilities (1)**
      - **Goal: Mitigate roads for current and future flood predictions.**
      - **Strategy: Coordinate investments to mitigate roads for future climate conditions.**
      - **Performance Measure: The number of roads that have been protected against future flooding events.**
      - **Performance Target: Provide mitigation for one flooded road location per fiscal year.**
      - **Possible Actions:**
        - **Targeted coordination with the MD State Highways Administration to work collaboratively on a plan to harden roads to withstand flood events using the Nuisance and Urban Flood Plan as a guide to prioritize actions.**
        - **Prioritize drainage (stormwater management) projects through a planned analysis of countywide projects and prioritization.**
        - **Add flood gauges, for safety, to areas prone to flooding.**
        - **Post-pandemic, review remote teleworking policies.**

Climate Resilience Action Strategy

- **Identify and Prioritize Action Strategies**
  - ***High Priority Example:***
    - **Roads and Associated Stormwater Management Facilities (2)**
      - **Goal: Maintain operation of County-owned roadways susceptible to sea level rise or flooding.**
      - **Strategy: Fortify vulnerable roadways by raising roadways, improving drainage/stormwater management in the public right-of-way and flood-prone areas.**
      - **Performance Measure: A certain percentage of flood and sea level rise prone roads hardened and mitigated; a certain number of gallons of stormwater managed by new projects.**
      - **Performance Target: Set a target of 10% of flood and sea level rise prone roads hardened and mitigated; a certain number of gallons of stormwater managed by new projects.**
      - **Possible Actions:**
        - **Identify sea level rise and flood prone roads.**
        - **Develop priority list for road mitigation.**
        - **Develop priority list for stormwater management improvements.**
        - **Construct improvements beginning with the highest priority.**

Climate Resilience Action Strategy

- **Identify and Prioritize Action Strategies**
  - ***High Priority Example:***
    - **Transportation**
      - **Goal: Ensure that people of all ages and abilities have multi-modal access to key destinations, including commuter locations.**
      - **Strategy: Expand walking and bicycling infrastructure and accommodations throughout the County by first identifying key destinations and then by prioritizing investment in projects that expand multi-modal access to identified key destinations.**
      - **Performance Measure: Amount of sidewalk, bike trails, separated lanes constructed; number of curb ramps improved; number of crosswalks installed; number of VanGo stops that are ADA-accessible.**
      - **Performance Target: Finance at least one bike/pedestrian infrastructure project each fiscal year.**
      - **Possible Actions:**
        - **Finalize a County-wide transportation master plan.**
        - **Complete existing conditions analysis.**
        - **Continue to work with SMECO through ReCharge Program**
        - **Complete Indian Head Rail Trail Connection Feasibility Study.**
        - **Continue working with the Government Alliance on Race and Equity (GARE) to explore ways to improve public transportation (VanGo).**
        - **Research pavement mixes/other engineering topics that could improve resilience of transportation assets.**

Climate Resilience Action Strategy

- **Next Steps**
  - **Climate Action Planning Process**
    - **Phase 1: Government Operations**
      - **Resilience Plan**
      - **Mitigation Plan**
      - **Greenhouse Gas Emissions Inventory**
    - **Phase 2: Community-wide**
      - **Resilience Plan**
      - **Mitigation Plan**

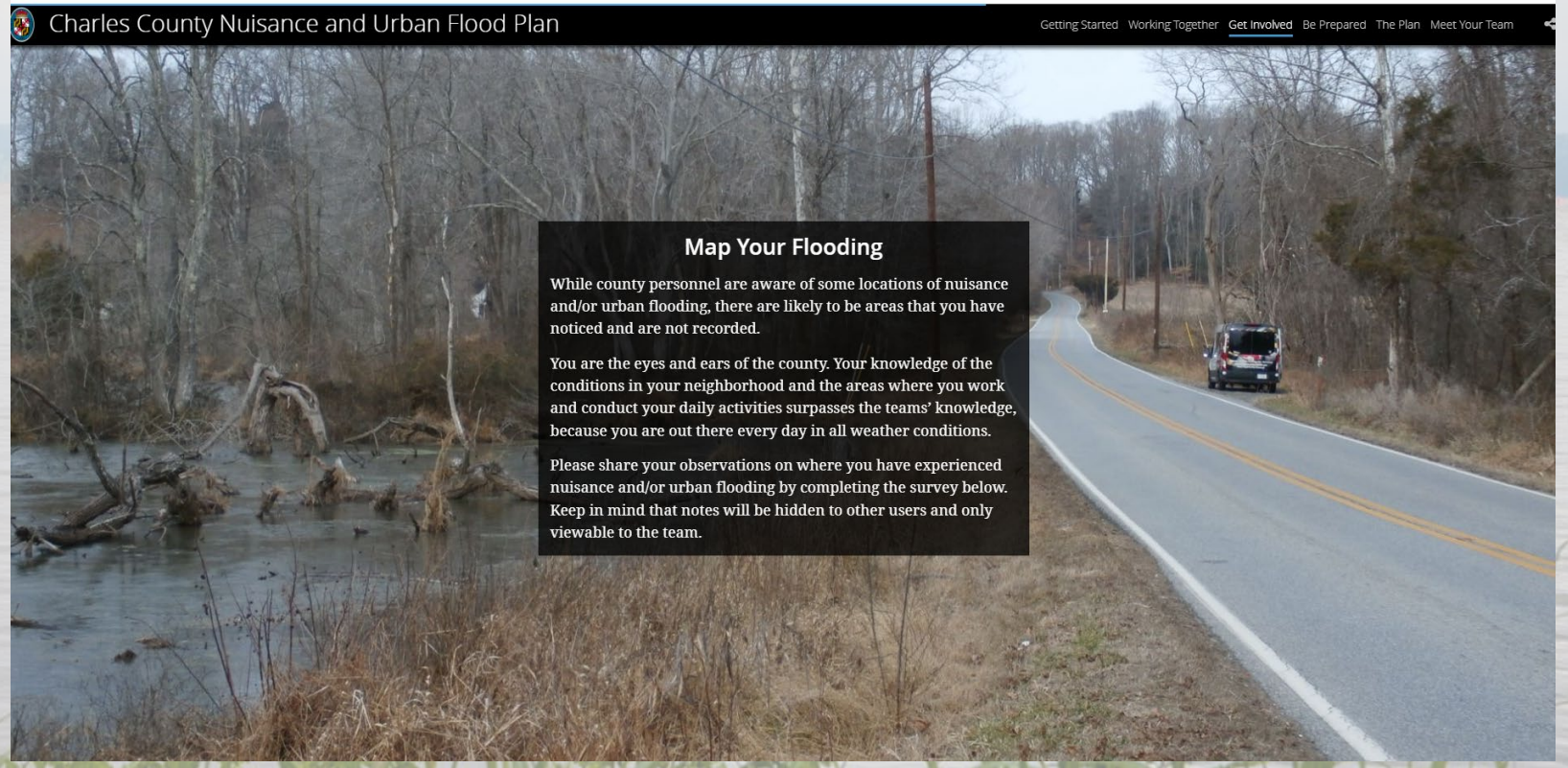
Nuisance and Urban Flood Plan

Nuisance and Urban Flood Plan

- **Stakeholder Group**
- County Departments:
  - Emergency Services
  - Planning and Growth Management
  - Public Works: Roads, Capital Services, & Utilities
- Elected Officials
- Community Stakeholders
- Village of Port Tobacco
- Town of La Plata
- Town of Indian Head
- Port Tobacco River Conservancy
- College of Southern Maryland
- Maryland Emergency Management
- Maryland Department of Transportation
- Board of Education
- Soil Conservation
- Chamber of Commerce
- First Responders

Nuisance and Urban Flood Plan

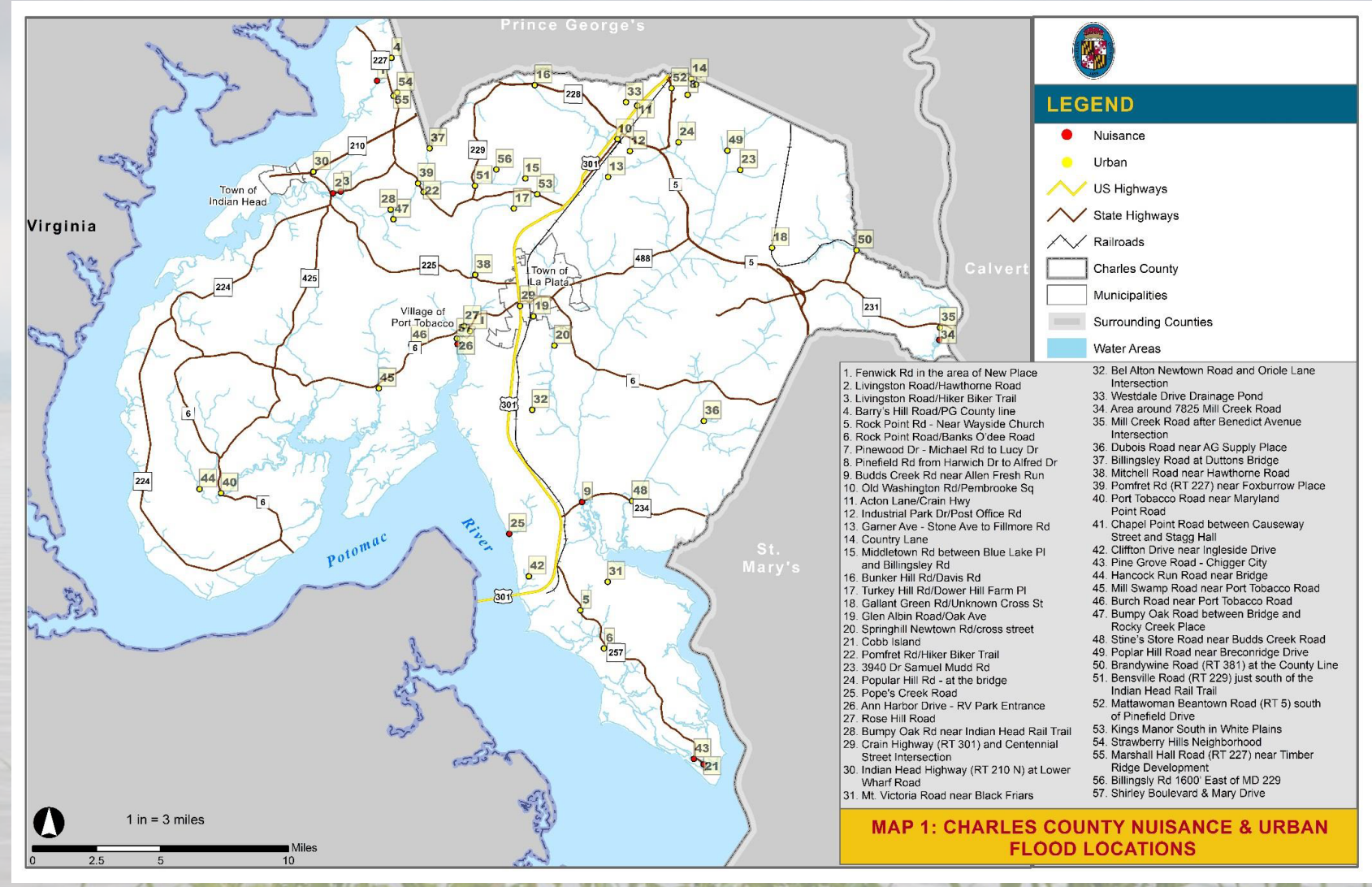
- **Identification of Nuisance and Urban Flood Areas**
  - **Stakeholder Collaboration/Known Issues**
  - **Public Outreach Effort: ArcGIS Storymap**



Nuisance and Urban Flood Plan

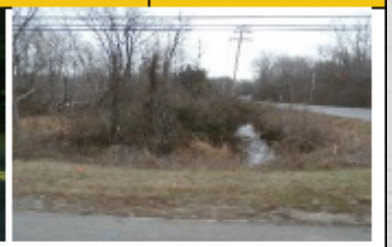
- **Identification of Nuisance and Urban Flood Areas**
  - **57 total flood locations identified:**
    - **9 are tidally influenced and categorized as nuisance flooding.**
    - **6 sites identified as “High” Risk (3 feet or more of flooding).**
    - **3 sites had already been mitigated, leaving 54 sites.**

Nuisance and Urban Flood Plan



Nuisance and Urban Flood Plan

TABLE 1: NUISANCE AND URBAN FLOOD LOCATIONS

Identifier	Location Name	Source of Flooding	Water Level Mark	State/County/ Municipal
1	Fenwick Road in the area of New Place	Nuisance - Pomonkey Creek	2 feet	County
	Description: Located in the northwestern portion of the county, Fenwick Road is in close proximity to Pomonkey Creek and. Mill Swamp is also adjacent to Fenwick Road. Several low points along the roadway allows water to overtop the roadway. Also, the road is at the same level as the creek. High tides heavy rains and flooding can render the road impassable. This area of the road that floods is in a "bowl" and the excessive water is partly is due to upstream developments and a limited outfall Flooding occurs along Fenwick Road between New Place and Ward Place. 			
2	Livingston Road (RT 224) at Hawthorne Road (RT 225)	Nuisance - Tributary #1 to Mattawoman Creek; storm surge, high tide and heavy rain events	1-2 feet	State
	Description: Due to a very low spot on Livingston Road (RT 224), water overtops the roadway frequently. A tributary to the Mattawoman Creek intersects at this site. A wetland is located along the road. Also, a culvert is located at the intersection of Livingston and Hawthorne Roads, which may be blocked by overgrown vegetation. Beaver dam issues are also exacerbating the flood issue. In the past, flooding has caused the entire roadway to close for 2 days.  			

Nuisance and Urban Flood Plan

• Identification of Initiatives, Projects and Actions

- **Preparedness: refers to measures taken to prepare before an emergency occurs and ensure that communities and services are capable of coping with disasters.**
  - **Examples: Community Awareness and Education; Proper Warning System; Mutual Aid; and, Mock Drill, Training Practice.**

- **Response is defined as the actions taken to save lives and prevent further property damage during an emergency situation.**
  - **Examples: Evacuation; Sheltering; Road Barricades; and, Emergency Rescue.**

- **Mitigation is the effort to reduce loss of life and property by minimizing or eliminating the impact of disasters. Mitigation activities take place before and after emergencies.**
  - **Examples: Flood Insurance; Stormwater Conveyance (culverts); Stormwater Upgrades (retention pond); and, Property Acquisition.**

Nuisance and Urban Flood Plan

- **Identification of Initiatives, Projects and Actions**

		MD / LO	PREPAREDNESS	RESPONSE	MITIGATION
22	Pomfret Rd (RT 227) at Indian Head Rail Trail URBAN		ADD SIGNAGE SIGN TYPE: Permanent Sign with Lights	As Needed	Stormwater improvement & protect roadway edges / harden Increase vegetation along trail and roadway Watershed improvement at top or bottom of hill
23	3940 Samuel Mudd Rd URBAN				*Drainage pipe has recently been replaced. Public Works indicated that this should fix the issue; they will continue to monitor

Lessons Learned

- **The risk is real!**
- **Scope is important.**
- **Address uncertainty through redundancy.**
- **Make connections between natural resource protection and resilience.**
- **Focus on collaboration.**

Contact Information

Beth A. Groth

Climate Resilience and Sustainability Officer

Email: GrothB@CharlesCountyMD.gov

Phone: 240-776-6700

Maryland Department Of Transportation

State Highway Administration

MWCOG Transportation Planning Board - Transportation Resiliency Planning Webinar
Climate Vulnerability Assessments

MDOT SHA MD 450 and US 50 Corridor Risk and Resilience Pilot

May 13, 2022

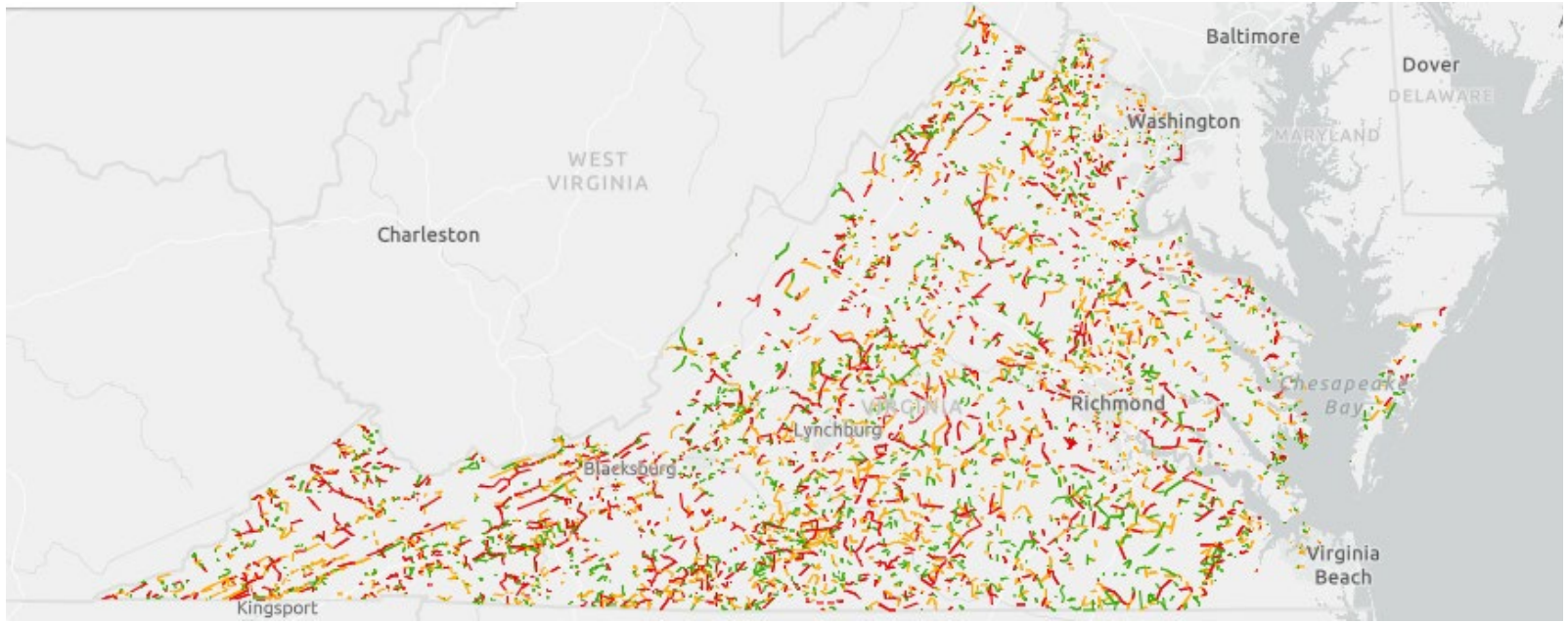
Toria Lassiter
Assistant Division Chief
Office of Planning and Preliminary Engineering

MARYLAND DEPARTMENT OF TRANSPORTATION

VTRANS | VIRGINIA'S TRANSPORTATION PLAN

Virginia Statewide Transportation Climate Vulnerability Assessment

Virginia Office of Intermodal Planning and Investment



Virginia Assessment Overview

Heavier weighting for flood-exposed project needs

Indicator-based flood vulnerability assessment to understand risks

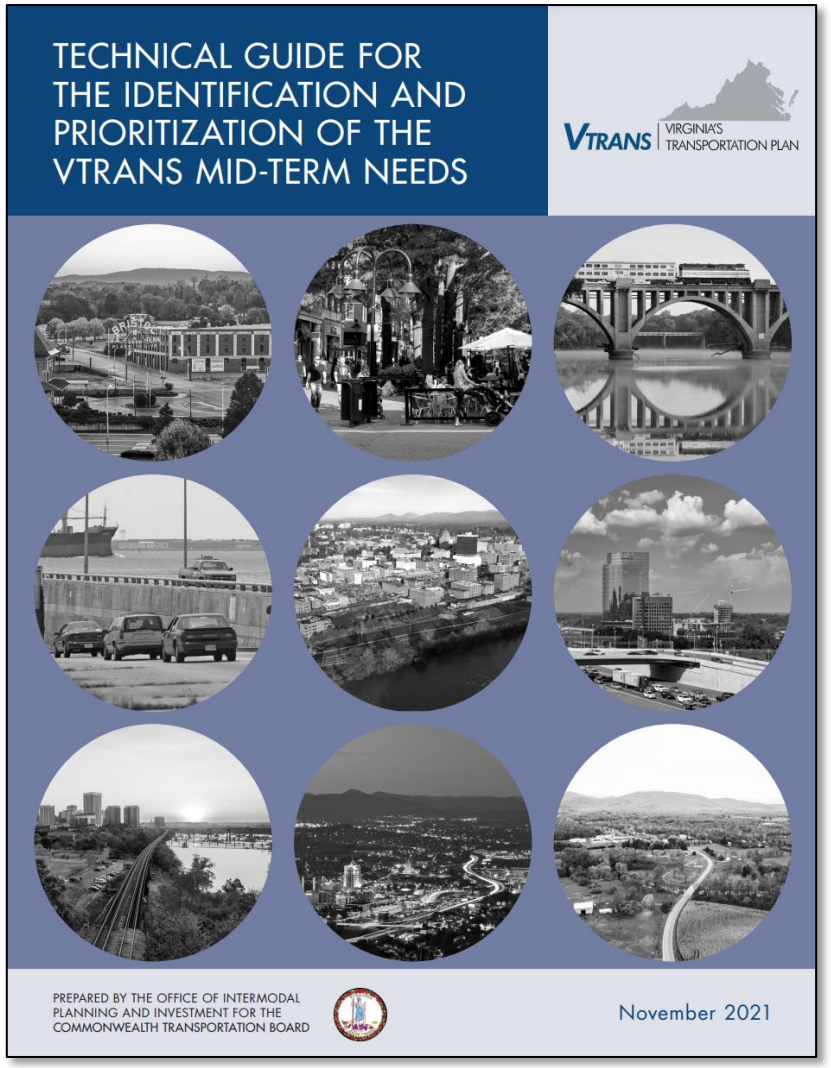
Resilience strategies

Mid-Term Needs and Prioritization

First…

- Determined **project needs**
  - Congestion mitigation
  - Reliability needs

- **Prioritization** of needs and locations



Prioritization Weighting

VTRANS | VIRGINIA'S TRANSPORTATION PLAN

+5%

If exposed to…

- 2+ feet of sea level rise flooding
- 2+ feet of Category 2 hurricane flooding
- History of flooding AND in a 100-yr floodplain

+3.5%

If exposed to…

- 1-2 feet of sea level rise flooding
- 1-2 feet of Category 2 hurricane flooding

+2%

If exposed to…

- Up to 1 foot of sea level rise flooding
- Up to 1 foot of Category 2 hurricane flooding

Long-Term Needs Assessment

Scope of the Assessment

Hazards

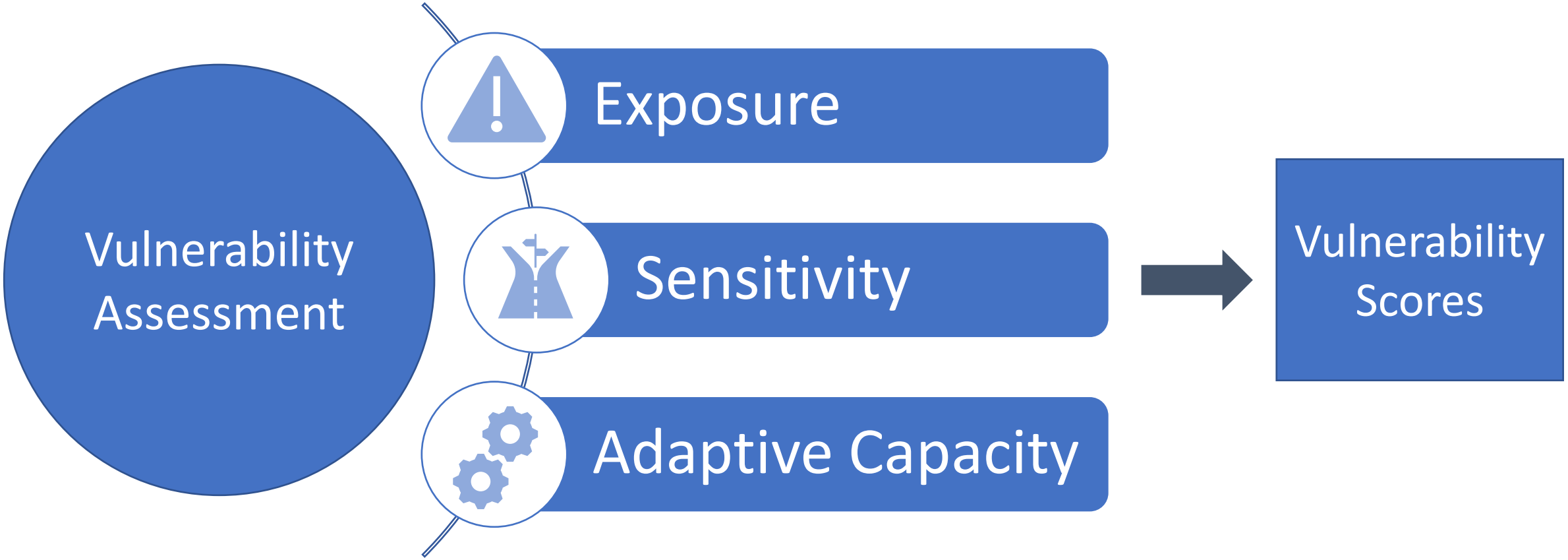
- Sea Level Rise
- Storm Surge
- Inland/Riverine Flooding

Assets

- Roadways
- Structures (bridges + culverts)

3 Hazards ✖ 3 Scenarios = 9 Vulnerability Scores per asset

Virginia OIPI Vulnerability Assessment



Approach: 3 Exposure Scenarios

Hazard	Data Source of Projected Hazard	Scenario 1	Scenario 2	Scenario 3
Sea Level Rise	Virginia Institute of Marine Sciences (VIMS)	Intermediate sea level rise scenario (Year 2040)	Intermediate-High sea level rise scenario (Year 2040)	Extreme sea level rise scenario (Year 2040)
Storm Surge	National Hurricane Center (NHC)	Category 2 hurricane storm surge	Category 3 hurricane storm surge	Category 4 hurricane storm surge
Inland/Riverine Flooding	Federal Emergency Management Agency (FEMA) VDOT	100-year flood zone AND Historical Weather-Related Damages or Closures	500-yr flood zone AND Historical Weather-Related Damages or Closures	FEMA 500-yr flood zone with varying width buffer (10-200ft) based on floodplain width AND Historical Weather-Related Damages or Closures (Appendix F)

Indicator Examples

- Each indicator is assigned scores on a 3-point scale

Indicator	Value	Score
Pavement Condition[1] Assets in poor condition are more likely to be damaged when exposed to flooding events.	Very Poor / Poor	3
	Fair	2
	Good / Excellent	1

Indicator	Value	Score
Inundation from Sea Level Rise[2] Locations with greater projected depths of inundation are likely to be impacted by projected changes in climate sooner, including permanent inundation.	Worst one-third of the impacted directional mileage	3
	Middle one-third of the impacted directional mileage	2
	Bottom one-third of the impacted directional mileage	1
	Not inundated	N/A

Indicator	Value	Score
Roadway Functional Class[1] The transportation system may be less able to absorb impacts to assets of higher functional classification.	Interstate, other freeways or expressways (01, 11, 12) Other principal arterial (02, 14)	3
	Major and minor collector, minor arterial (06, 07, 08, 16, 17)	2
	Local (09, 19)	1

Source: Vtrans Vulnerability Assessment Technical Memo, 2021

Indicator Weighting Example: Roads

Component	Component Weight	Indicator	Indicator Weight by Hazard Type		
			Sea Level Rise	Storm Surge	Inland/Riverine Flooding
Exposure	40%	Inundation from Sea Level Rise OR Storm Surge OR Inland/Riverine Flooding	100.0%	100.0%	100.0%
Sensitivity[2]	20%	Pavement Condition	5.0%	5.0%	5.0%
		Pavement Type	10.0%	10.0%	10.0%
		Historical Weather-Related Damages or Closures	85.0%	85.0%	85.0%
Adaptive Capacity[2]	40%	Functional Class	10.0%	10.0%	10.0%
		Hurricane Evacuation Route	15.0%	50.0%	0.0%
		Annual Average Daily Traffic (AADT)	20.0%	20.0%	20.0%
		Corridors of Statewide Significance (CoSS)	55.0%	20.0%	70.0%
Vulnerability Score	100%				

Source: Vtrans Vulnerability Assessment Technical Memo, 2021

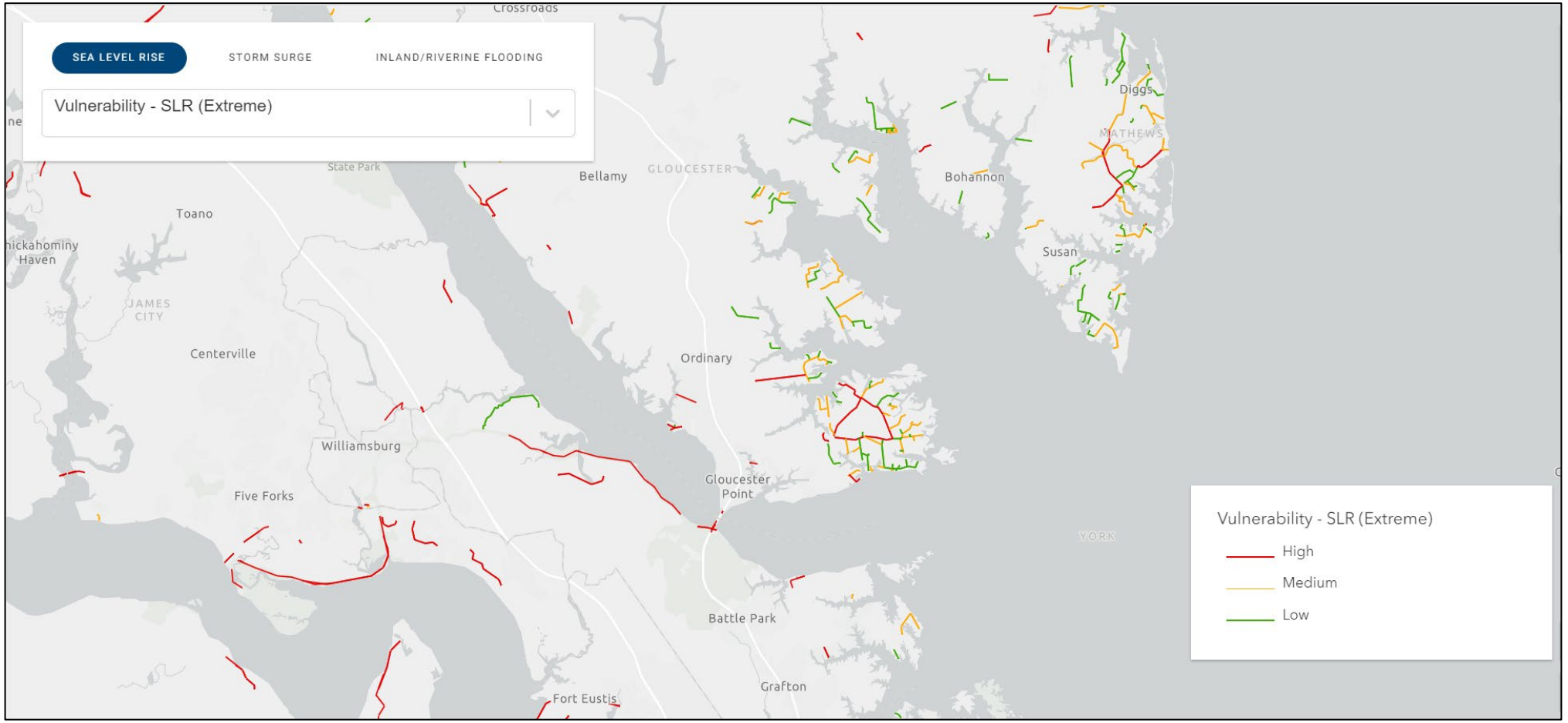
Indicator Weighting Example: Structures

Component	Component Weight	Indicator	Indicator Weight by Hazard Type		
			Sea Level Rise	Storm Surge	Inland/Riverine Flooding
Exposure	40%	If Exposure to Sea Level Rise	100.0%	100.0%	100.0%
Sensitivity[1]	20%	*If Bridge:*			
		–Deck Rating	2.5%	2.5%	2.5%
		–Superstructure Rating	2.5%	2.5%	2.5%
		–Substructure Rating	5.0%	5.0%	5.0%
		If Culvert:			
		–Culvert Rating	10.0%	10.0%	10.0%
		Scour Criticality	20.0%	20.0%	35.0%
		Channel and Channel Protection	0.0%	10.0%	15.0%
		Waterway Adequacy	50.0%	40.0%	20.0%
		Historical Weather-Related Damages or Closures	20.0%	20.0%	20.0%
Adaptive Capacity[1]	40%	Hurricane Evacuation Route	15.0%	50.0%	0.0%
		Navigable Waterway	25.0%	10.0%	0.0%
		Importance Factor	60.0%	40.0%	100.0%
Vulnerability Score[1]	100%				

Source: Vtrans Vulnerability Assessment Technical Memo, 2021

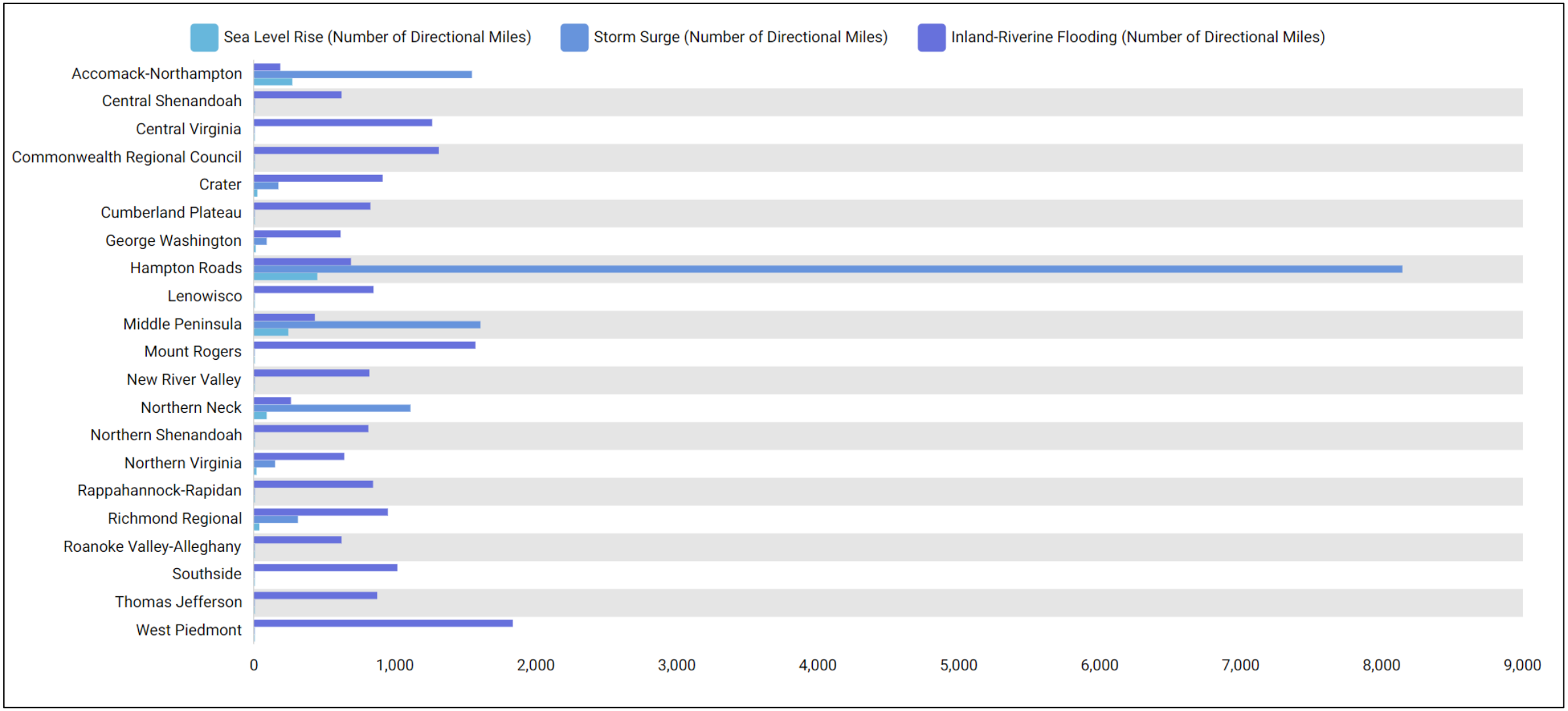
Vulnerability Assessment Findings

- Interactive map showing roadways and the 3 scenarios developed for each of the 3 hazards



Source: Vtrans Web-Page on Megatrend 1: Climate, of the Risk & Opportunity Register

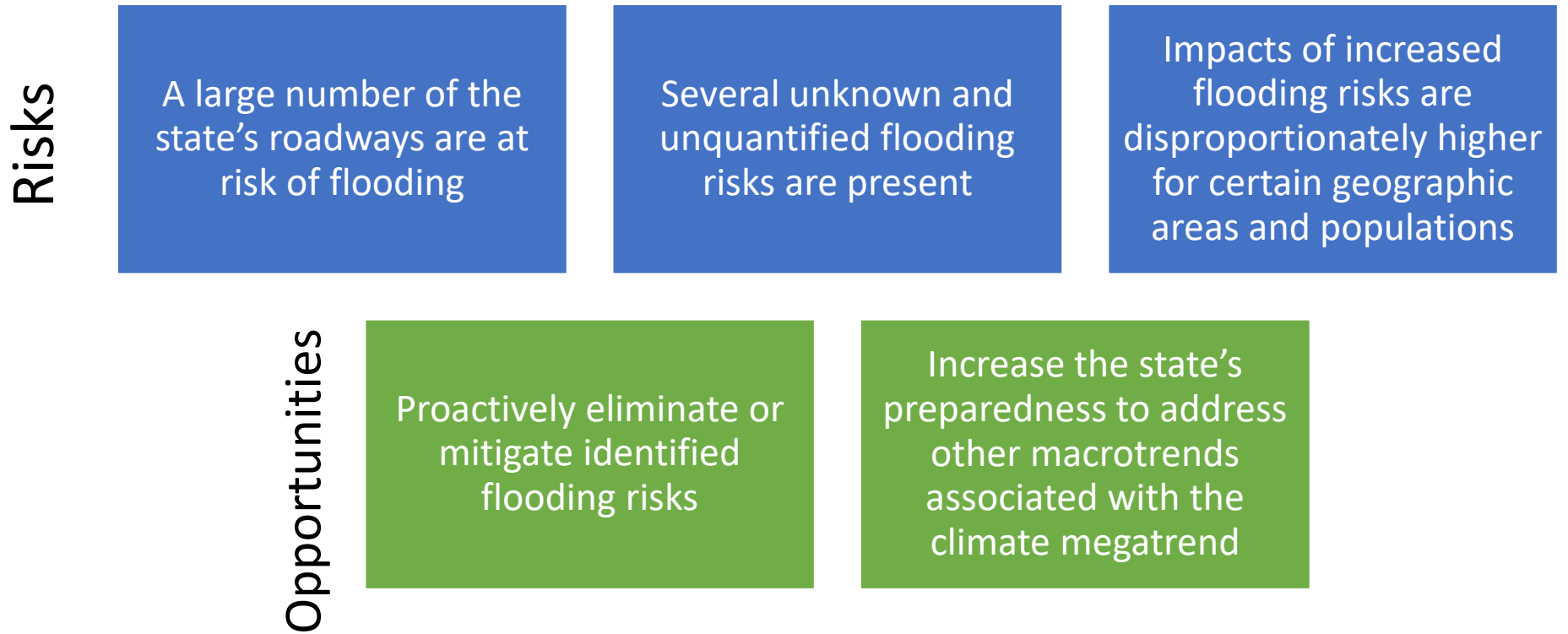
Vulnerability Assessment Findings



Source: Vtrans Web-Page on Megatrend 1: Climate, of the Risk & Opportunity Register

Risk & Opportunity Register: Climate

VTRANS | VIRGINIA'S TRANSPORTATION PLAN



Strategic Actions

VTRANS | VIRGINIA'S TRANSPORTATION PLAN

1

Collect data to accurately **assess flooding risks for roadways** that can be used to **identify funding needs** and **prioritize investment**

2

Develop **policies** to ensure flooding **risks are reflected in transportation asset life cycle and/or transportation project planning processes**

3

Collaborate with state/regional agencies to identify solutions that **facilitate prioritization** and **support the allocation of state resources** to address flooding risks

Northern Virginia Regional Commission

Chris Landgraf
13 May 2022

nvrc
Northern Virginia Regional Commission

novaregion.org / @novaregion

Resilience Risks and Resilience Impacts

Military Installation Resilience (MIR) is defined as the capability of a military installation to **avoid**, **prepare** for, **minimize** the effect of, **adapt** to, and **recover** from extreme weather events, or from anticipated or unanticipated changes in environmental conditions, that do, or have the potential to, adversely affect the military installation or essential **transportation**, **logistical**, or other necessary resources outside of the military installation that are **necessary** in order to **maintain, improve, or rapidly reestablish installation mission assurance and mission-essential functions**.

The Department of Defense Office of Local Defense Community Cooperation (OLDCC) has provided grant funds to NVRC to work with communities to develop strategies to protect resources necessary to enhance resilience at three military installations: Joint Base Myer-Henderson Hall, Fort Belvoir, and Marine Corps Base Quantico.

Key elements of the program are **Resilience Risks** and **Resilience Impacts**.

nvrc
Northern Virginia Regional Commission

Military Installation Resilience

Resilience Risks:

- Flooding (Regional Issue) & Tidal Surge (Fort Belvoir and Quantico Issue)
- Wind (Regional Issue)
- Drought (Low Priority Regional Issue)
- Wildfire (Low Priority Installation Issue)
- Earthquake (Low Priority Regional Issue)

Resilience Impacts: (Regional and Installation Issues)

- Water Availability
- Stormwater
- Wastewater
- Installation Energy
- Operational Energy (logistics infrastructure)
- Transportation (Logistics)
- Installation Access
- Communications

nvrc
Northern Virginia Regional Commission

OLDCC MIRR Goals

Form a Policy Committee and Technical Review Committee that are representative of the three bases and the community.

Gather Data and Documents to include the GIS Data layers for compatible use analysis and/or map production to be provided to OLDCC in the Esri File Geodatabase format (*.gdb) or Esri Shapefile format (*.shp). Data will be readable within standard Geographic Information Systems (GIS) software (e.g., Esri's ArcMap, etc.), and it will be limited to the Northern Virginia area around the three bases. The three military bases and the community will confirm that all geospatial data are publicly releasable prior to delivery. All geospatial data will include metadata.

Measures of progress are:
1) the outcomes arising from your engagement with the military installation and the number of interactions that occurred;
2) any deliverables from the project and their benefits for reducing impairments to the local mission or improvements to the resilience of the installation; and,
3) actions from the project that will be or have been carried out regardless of whether Federal funds are supporting it.

Complete Military Installation Resilience Review Study with:
- Executive Summary with high level summary recommendations
- Supporting documents
- Presentations on final report

nvrc
Northern Virginia Regional Commission

Meetings with Counties and Installations

NVRC personnel have met with County and Installation staff to discuss the goals of the grant:

Joint Base Myer-Henderson Hall	October 15 and 20, 2021
Fort Belvoir	October 18 and 26, 2021
Arlington County	November 1, 2021
Marine Corps Base Quantico	November 3 and 30, 2021
Fairfax County	November 10, 2021
Prince William County	November 12, 2021
Stafford County	November 16, 2021

A formal kick-off meeting with NVRC, the Counties, the Installations, and OLDCC was held 27 Jan 2022.

Virtual and in-person site visits, Technical Review Committee and Policy Committee meetings, and Workshops will be held monthly or bi-monthly until January 2023. The final project report is due March 2023.

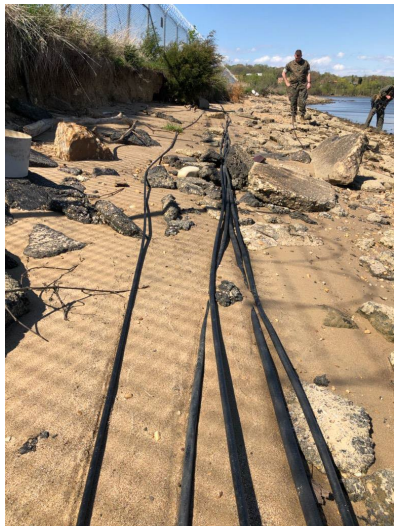
nvrc
Northern Virginia Regional Commission

Resilience Projects Identified at Installations

Fort Belvoir
Joint Base Myer Henderson Hall
Marine Corps Base Quantico

Energy Security, Flooding, Shoreline Erosion
Ingress/Egress, Failing Infrastructure, Stormwater Flooding
Flooding, Shoreline Erosion, Utility Redundancy

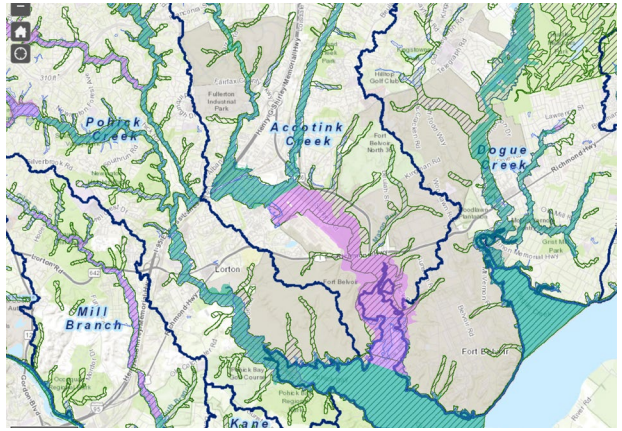
Main Gate Flooding at Quantico



Shoreline Erosion at Quantico

Road Flooding at Belvoir

Sea-level Rise Flooding at Belvoir



Flooding at JBMHH 2019

nvrc
Northern Virginia Regional Commission

novaregion.org / @novaregion

Workshops and Technical Review Committee Meetings

Workshop 1 held 23-24 Mar identified and ranked Climate Threats and Hazards:

High Priority Hazards
- High Temperatures
- Energy Demand
- Coastal/Tidal Flooding
- Pluvial Flooding
- Fluvial/Inland Flooding

Medium Priority Hazards
- Wind
- Winter Weather

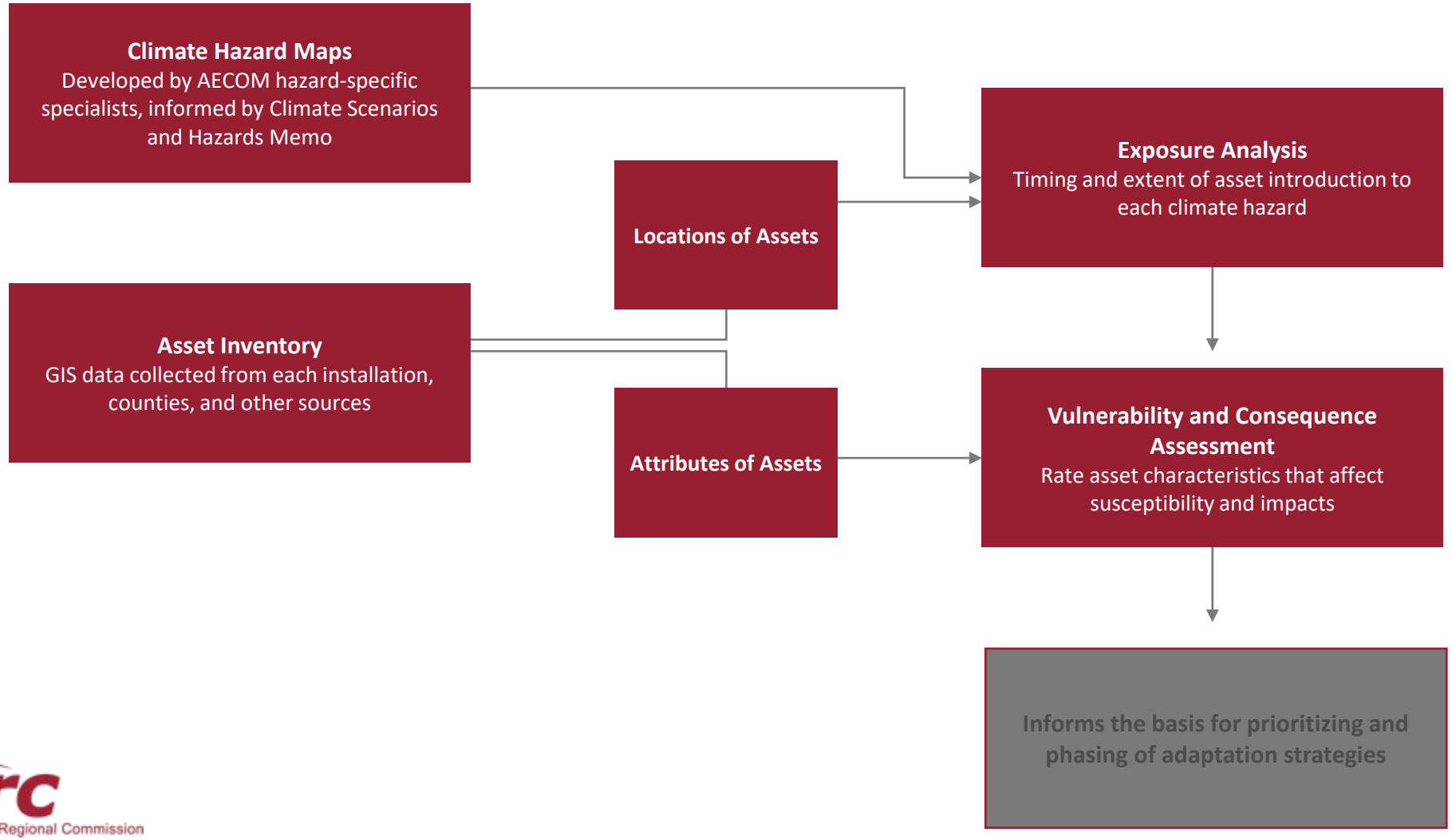
Low Priority Hazards
- Drought
- Wildfire

Technical Review Committee meetings were held 3-5 May. Topics for discussion were:
- Climate scenario and hazard recap
- Review vulnerability assessment methodology and criteria
- Preview climate mapping

Policy Committee Meeting Update 19 May 2022
Workshop 2 scheduled for 14-16 June 2022

nvrc
Northern Virginia Regional Commission

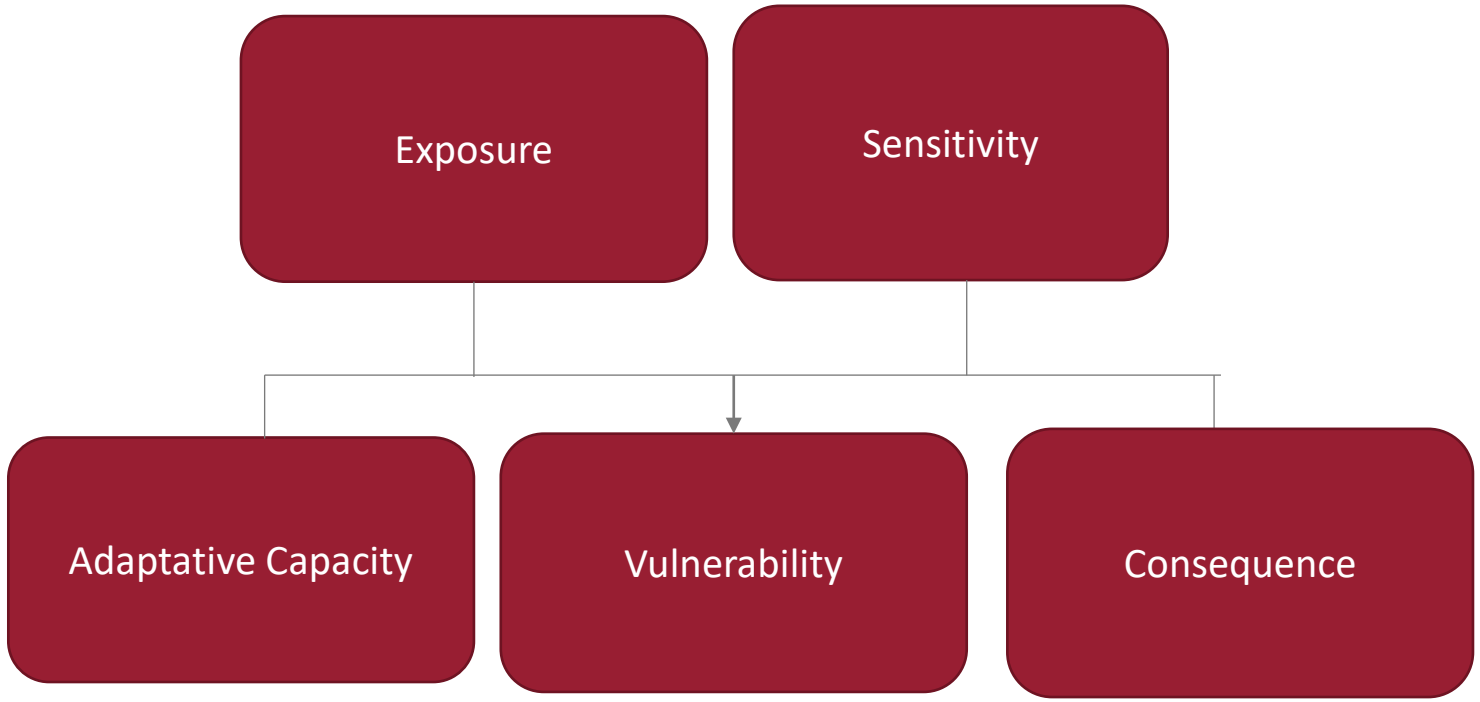
Vulnerability Assessment Methodology



nvrc
Northern Virginia Regional Commission

novaregion.org / @novaregion

Vulnerability Assessment Methodology



Informs the basis for prioritizing and phasing of adaptation strategies

nvrc
Northern Virginia Regional Commission

Next Steps

- Initiate exposure analysis for assets
- Proceed with vulnerability analysis and application of sensitivity, adaptive capacity, and consequence ratings for assets
- Prepare for Workshop #2
  - Target week: June 14-16, 2022
  - One day dedicated to each installation/county

MIRR POC and Questions

Chris Landgraf
NVRC Program Manager
Military Installation Resilience
(703) 642-4641

Northern Virginia Regional Commission

novaregion.org / @novaregion

Moderated Discussion

Wrap-Up

Michael Neibauer, Washington Business Journal

Poll

Mentimeter

Please go to www.menti.com

Use code: 9365 0916

Or use the link in the chat:

https://www.menti.com/wh3m6gwo4x

What was the most valuable thing you took away from today's session?

Webinar 3: Break Down Barriers: Integrate Climate Resilience into Project Development & Design

Friday June 10th
2 to 3:30 pm

Goal:

- Illustrate the value of and process for **integrating resilience** into **project development and design**

Learning Objectives:

- **Identify opportunities** for integrating resilience into project development and design
- **Increase familiarity** with FHWA Synthesis of Approaches for Addressing Resilience in Project Development
- **Gain knowledge** and **lessons learned** from peer organizations

Thank You!

National Capital Region
Transportation Planning Board