BREAK DOWN BARRIERS: INTEGRATE CLIMATE RESILIENCE INTO PROJECT DEVELOPMENT & DESIGN

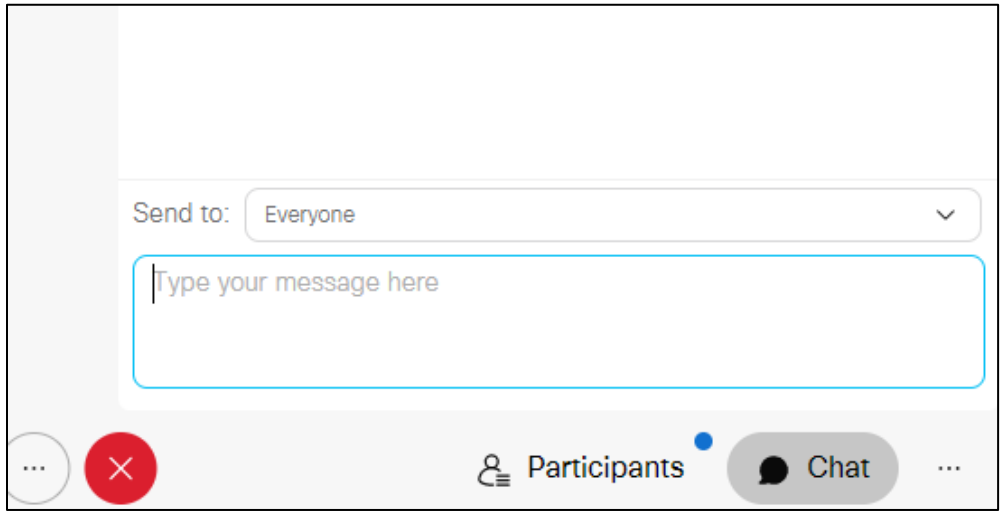
Transportation Resiliency Planning Webinar #3

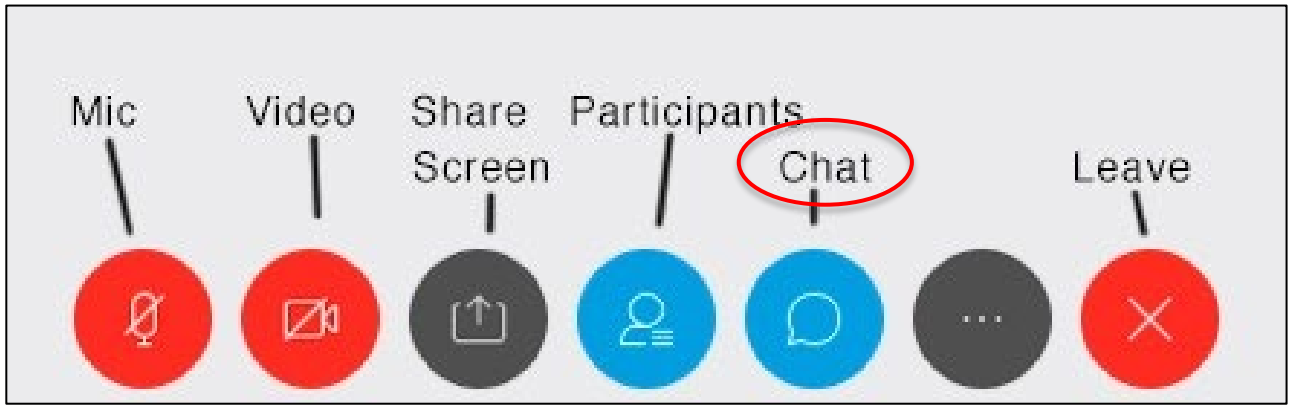
June 10, 2022

National Capital Region
Transportation Planning Board

WebEx Logistics

- Please stay on mute
- Type questions in the chat





Project Team

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AICP Credit

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

#9249526

Agenda

Overview of Addressing Resilience in Project Development

Peer Examples

- Delaware DOT Resilience Projects
- City of Alexandria Flood Mitigation
- Maryland Coast Smart Construction Program

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 3 Goals and Objectives

Goal

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

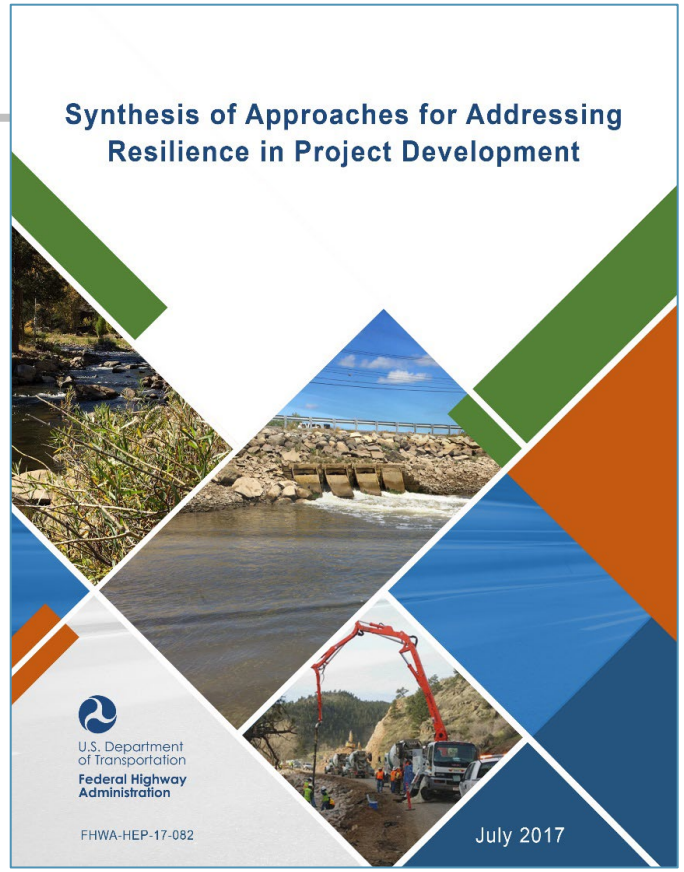
Objectives

- **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

Background: Approaches for Addressing Resilience in Project Development

FHWA's Synthesis of Approaches for Addressing Resilience in Project Development

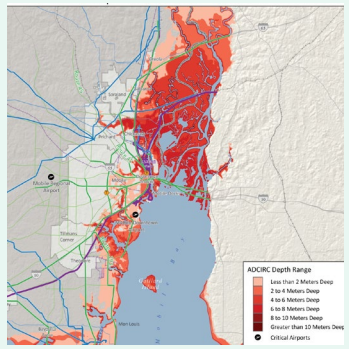
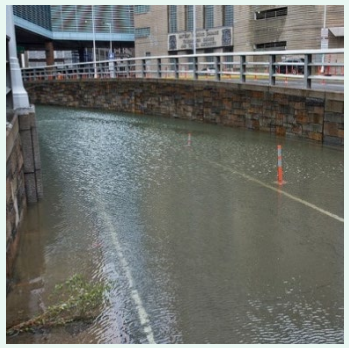
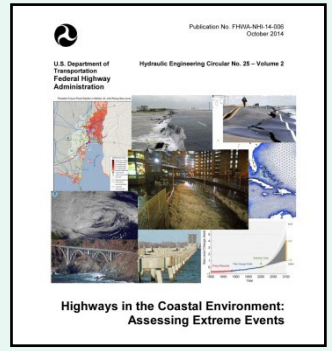
- Why, where, and how to integrate climate into project development
- How-to information in climate science and economics
- Lessons learned, climate sensitivities, FHWA guidance, adaptation options for:
  - Coastal Hydraulics
  - Riverine Flooding
  - Pavement and Soils
  - Mechanical and Electrical Systems



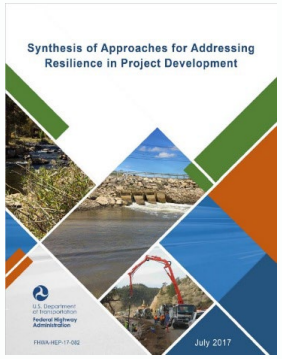
Available at:
https://www.fhwa.dot.gov/environment/sustainability/resilience/ongoing_and_current_research/teacr/synthesis/index.cfm

Lessons Learned from Case Studies and Pilots

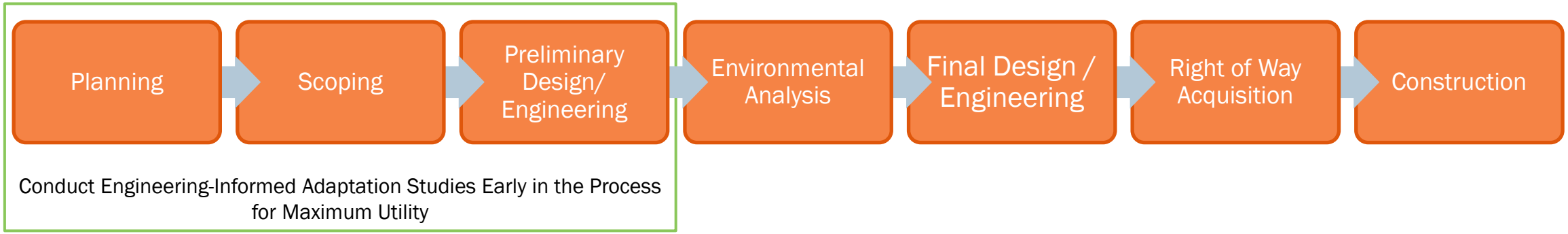
Research/Guidance

Gulf Coast Phase 2 Study	Engineering-focused Pilots	Hurricane Sandy Project	TEACR Engineering Assessments	Guidance (HEC-25 & 17)
				

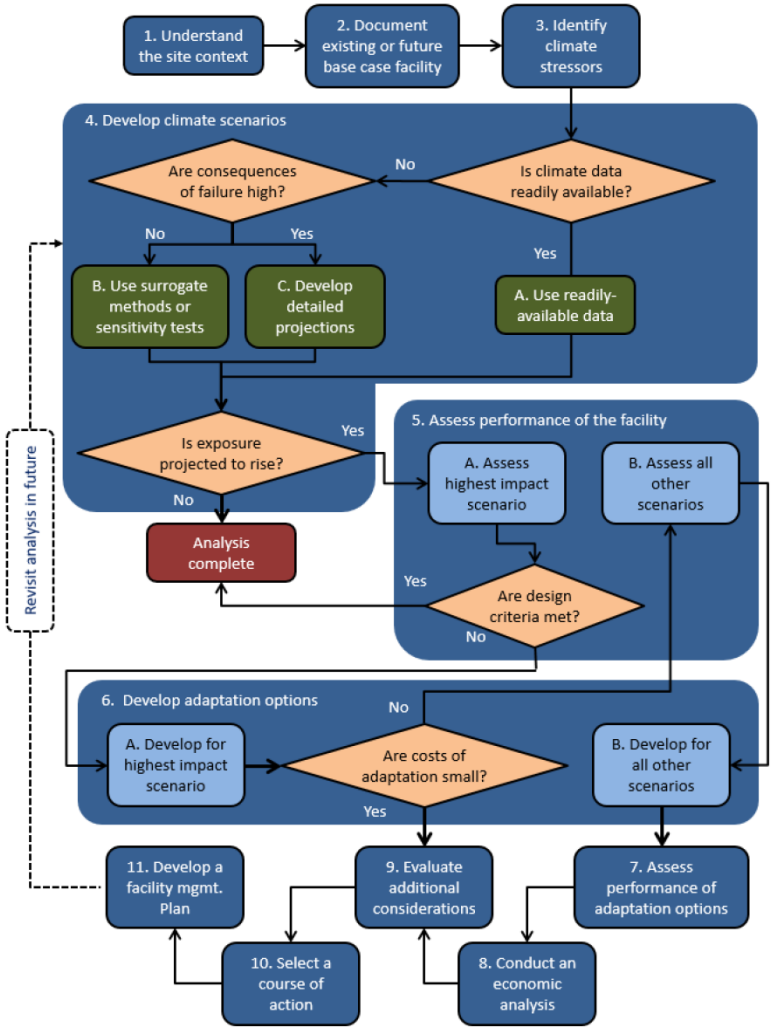
Synthesis Report



Integrating Climate Considerations



Adaptation Decision-making Assessment Process



- Permafrost Melt - Pavement (AK)
- Slope Stability (VA)
- Ground Settlement - Pavement (TX)
- Sea Level Rise - Economics (ME)
- Freeze-Thaw - Pavement (ME)
- Sea Level Rise (SLR) & Waves - Roadway Overwashing (FL)
- SLR & Storm Surge - Coastal Bridge (AL)
- SLR- Living Shoreline (NY)
- Wildfire & Precipitation - Culvert (CO)

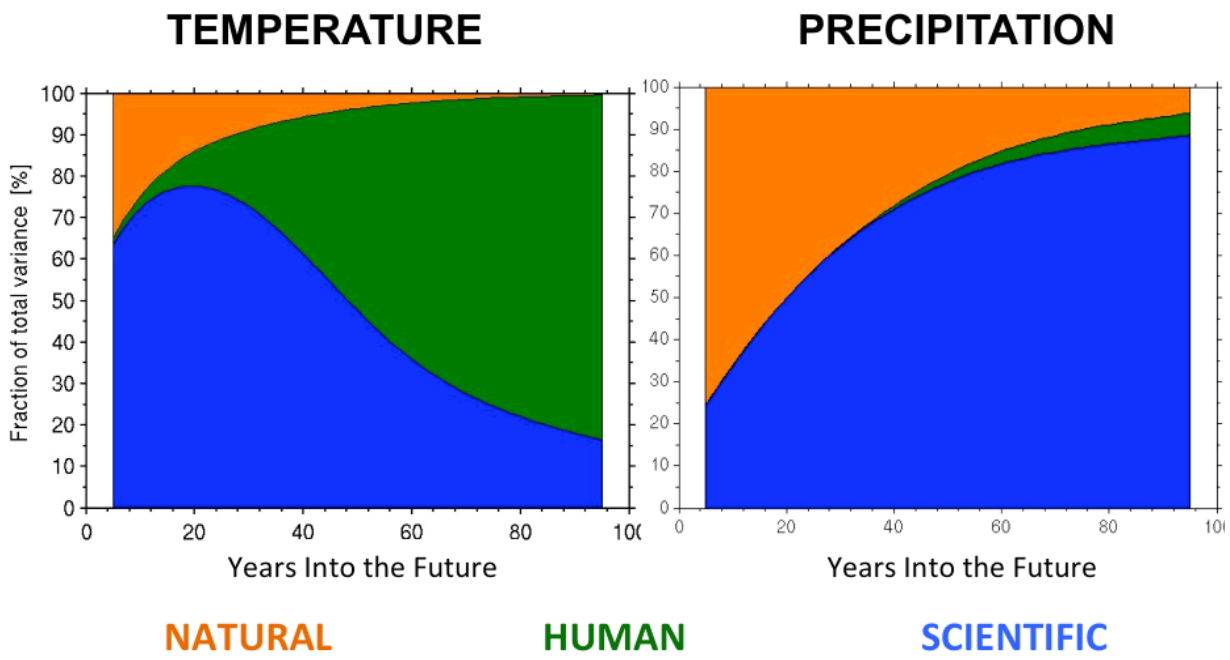
Using Climate Information

- When possible, use publicly available sources of climate projections.
- FHWA's CMIP Climate Data Processing Tool allows users to obtain data for emissions scenarios and climate models at high resolution.

Climate Change Variable	Derived Variable	Purpose of Derived Variable	Case Studies	Included in CMIP Tool?
Temperature	Annual maximum temperature (hottest day of the year)	To evaluate extreme heat impacts on the electrical and mechanical components of a bridge, on rail infrastructure, and on construction windows.	*TEACR Pavement Freeze-Thaw* *TEACR Pavement Shrink-Swell* *Sandy: Loop Parkway Bridge* *Sandy: Metro-North Railroad* *Gulf Coast 2 (GC2) Rail* *ADOT Pilot*	✓
	Annual minimum temperature (coldest day of the year)	To help estimate freeze-thaw conditions or evaluation potential of materials to shrink and swell.	*TEACR Pavement Freeze-Thaw* *TEACR Pavement Shrink-Swell* *GC2 Pavement* *GC2 Rail*	✓
	Annual average temperature	To evaluate changes in temperature on transportation infrastructure.	*TEACR Pavement Freeze-Thaw* *TEACR Pavement Shrink-Swell* *Sandy: Metro-North Railroad* *CAMPO Pilot*	✓

Climate Data Uncertainty

Putting it in context: Engineers frequently rely on other models with uncertainty (e.g., traffic, demographics, land use changes).



Source: Kotamarthi et al., 2016

Overarching Lessons Learned

1. Conduct Scoping Asset-Level Adaptation Assessments
2. Apply Climate Science and Manage Uncertainty
3. Integrate Climate and Weather Risks into Asset Management
4. Break Down Silos
5. Select and Implement Adaptation Measures
6. Understand Conservatism in Design Assumptions
7. Consider the Bigger Picture

Coastal Hydraulics

Coastal Climate Change Adaptation Measures.
Source: SCE (left); FDOT (right)

Sensitivity to Climate Change

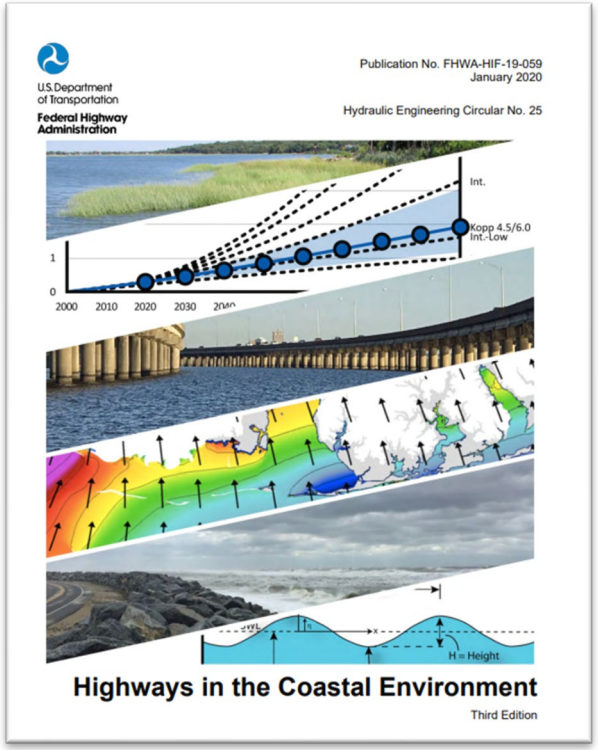
- Extreme water levels due to sea level rise and storm surge can damage coastal assets by:
  - Wave attack
  - Overwashing/overtopping
  - Shoreline erosion/recession
  - Wave runup
  - Waves on surge.

Existing FHWA Guidance

- HEC 25: Highways in the Coastal Environment, 3rd Edition

HEC-25: Highways in the Coastal Environment

- Tools and guidance for transportation infrastructure exposed to coastal change.
- Explanation of coastal science concepts and common design issues.
- Specific methods to assess vulnerability to future extreme events, including sea level rise.
- How to account for uncertainty in sea level rise projections in planning and design.



FHWA Guidance available at:
https://www.fhwa.dot.gov/engineering/hydraulics/pubs/hif19059.pdf

Coastal Hydraulics – Lessons Learned

Impacts on Infrastructure:

- Sea level rise will make coastal transportation more vulnerable.
- Different structures are inherently more or less sensitive to sea level rise.

Conducting Vulnerability Assessments:

- The Saffir-Simpson hurricane category scale is not appropriate.
- Effect of sea level rise on storm surge can be non-linear.
- Original modeling of storm surge and waves is appropriate for major coastal projects.
- Involve coastal engineers in assessments of coastal assets.

Coastal Hydraulics – Lessons Learned

Developing Adaptation Measures:

- Today's extreme weather resilience strategies will apply
- Helps with today's extreme events and future sea level rise.
- Countermeasures and retrofits common for bridges vulnerable to coastal storms may not be effective.
- Consider nature-based solutions

See FHWA's Nature Based Solutions for Coastal Highway Resilience: An Implementation Guide
https://www.fhwa.dot.gov/environment/sustainability/resilience/ongoing_and_current_research/green_infrastructure/implementation_guide/

Coastal Hydraulics – Adaptation Strategies

Manage and maintain	Increase redundancy	Protect	Accommodate	Relocate
• Reroute traffic during extreme events • Maintain existing protection systems	• Build an alternative route	• Install revetment/seawall • Install living shoreline • Periodic beach nourishment	• Install flood gates at tunnel entrances • Modify revetment to prevent wave damage • Build coast-parallel roads at lower elevations • Build bridges at higher elevations	• Abandon local coast-parallel road • Relocate asset to avoid wave damage

Riverine Flooding

Source: Iowa DOT

Source: US Forest Service

Sensitivity to Climate Change

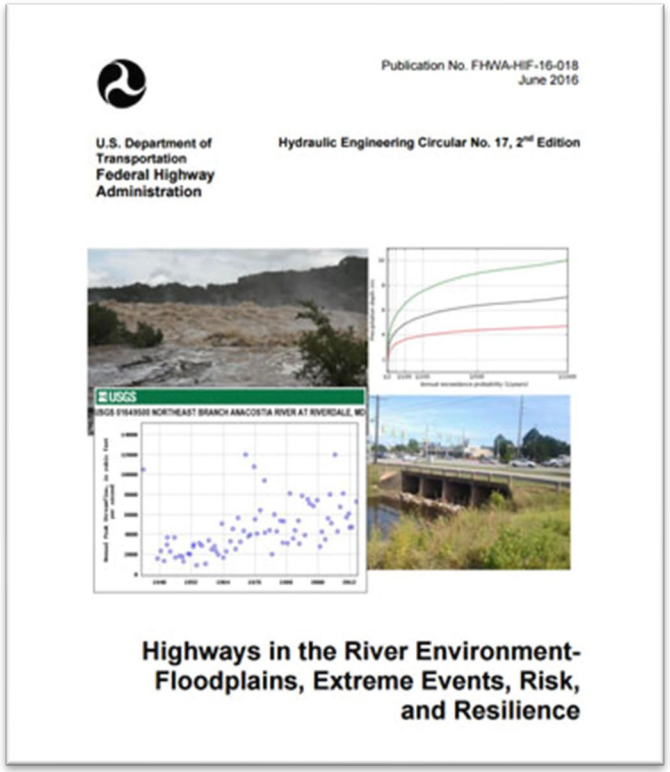
- Overtopping and flooding of travel lanes.
- Washouts and erosion.
- Destabilization of stream conditions and channel bed aggradation.

Existing FHWA Guidance

- HEC 17, Highways in the River Environment – Floodplains, Extreme Events, Risk, and Resilience.

HEC-17: Highways in the River Environment – Floodplains, Extreme Events, Risk, and Resilience

- Technical guidance and methods for assessing transportation system vulnerability to extreme events.
- Quantify exposure considering changing land uses and climate change.
- Overview of rainfall/runoff and statistical models used in hydrologic design.
- 5-level analysis framework for addressing climate change.



FHWA Guidance available at:
https://www.fhwa.dot.gov/engineering/hydraulics/pubs/hif16018.pdf

Riverine Flooding: Lessons Learned

- Use of Future Precipitation Projections
- Use of Historical Data
- Use of Rainfall/Runoff Models
- Understand the resiliency of existing facilities
- Wildfire impacts and adaptation

Riverine Flooding – Adaptation Strategies

Increase peak flow capacity

- Replace a culvert with a bridge
- Replace existing culverts with larger culverts
- Retrofit facility to increase the number of culvert cells

Watershed restoration/repair

- Implement regional drainage area management
- Implement dispersed stormwater and debris controls throughout watershed
- Implement stream restoration and floodplain enhancement

Protect

- Retrofit existing flood control infrastructure
- Harden roadway embankments

Relocate/raise the roadway

- Elevate the roadway or bridge above the projected flood elevations

Pavement and Soils

Source: Virginia DOT

Source: TEACR Pavement Shrink-Swell Study

Sensitivity to Climate Change

- Pavement rutting, cracking, and punchouts from extreme temperatures.
- Distress accumulation and smoothness deterioration of pavements from changes in the depth of frost penetration, freeze-thaw cycles, wet-dry cycles, and ground water table levels.
- Permafrost thaw will affect the engineering properties of soil supporting the roadway infrastructure.
- Accelerated rock slope weathering and decreased slope stability.

Existing FHWA Guidance

- TechBrief on Climate Change Adaptation for Pavements

FHWA Guidance available at:
https://www.fhwa.dot.gov/pavement/sustainability/hif15015.pdf

Pavement and Soils: Lessons Learned

Impacts on Pavement

- Could have state-wide impacts.
- Affect the entire pavement system.
- Designs must account for climate uncertainty.
- Climate change will affect seasonal truckload restrictions.
- Workarounds are frequently developed to integrate climate model data with pavement design tools.

Impacts on Landslides

- Soil stability analysis can be performed without detailed climate data.
- Consider freeze-thaw projections and timing to determine if climate change will increase weathering.

Pavement and Soils – Adaptation Strategies

For pavement

- Adjust mix design.
- Adjust the pavement structural design.
- Modify specifications.

For soils

- Stabilize the slopes.
- Install protective structures.
- Avoid slide areas.

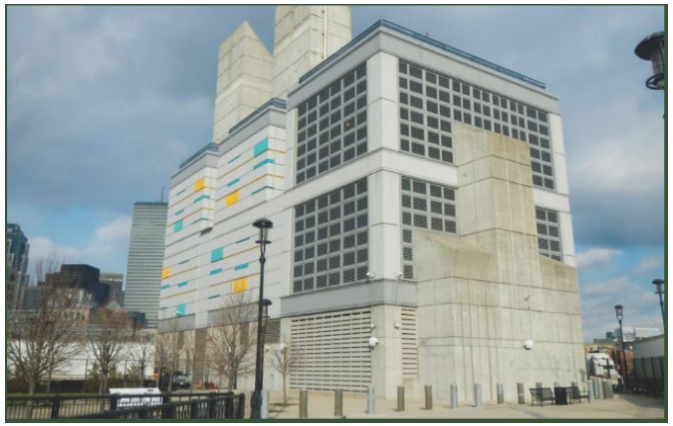
For permafrost thaw

- Prevent/delay thawing.
- Enhance maintenance.

Underdrain installation. Source: Ohio Department of Transportation

Mechanical and Electrical Systems

Source: FHWA



Source: MassDOT

Sensitivity to Climate Change

- Flooding can damage electrical components.
- Salt water can corrode mechanical and electrical systems.
- Mechanical systems subjected to very high temperatures can thermally expand, causing mechanisms to lock up or otherwise fail.
- Extreme heat can lead to electrical equipment failure.

Mechanical and Electrical Systems – Lessons Learned

Flooding:

- Water enters systems through many paths.
- Visuals of sea level rise and storm surge scenarios overlaid on as-built drawings help communicate exposure.

Increased Temperatures:

- Key temperature thresholds can be selected using experience, professional judgment, and climate change scenarios.

Mechanical and Electrical Systems – Adaptation Strategies

Dry floodproof	Wet floodproof	Relocate outside of the projected flood area	Minimize operational disruptions	Cool with air conditioning
• Improve weatherproofing of mechanical and electrical rooms • Enhance sea walls • Install flood gates	• Elevate mechanical and electrical equipment • Increase pump capacity and install dedicated generators	• Replace bascule bridge with high-level span	• Install a manual hand crank to open bascule bridge • Install a back-up electric generation system • Temporarily disconnect back-up generators to avoid short-circuiting the system	• Install HVAC equipment in electrical room

Poll

Mentimeter

Please go to www.menti.com

Use code: 9254 7453

Or use the link in the chat:
https://www.menti.com/h2ntqjpxnf

What organization are you from?

What is your role?

What challenges have you faced integrating resilience into project development and design?

Any successes you want to share with participants?

Peer Examples

Peer Examples

Delaware DOT

City of Alexandria

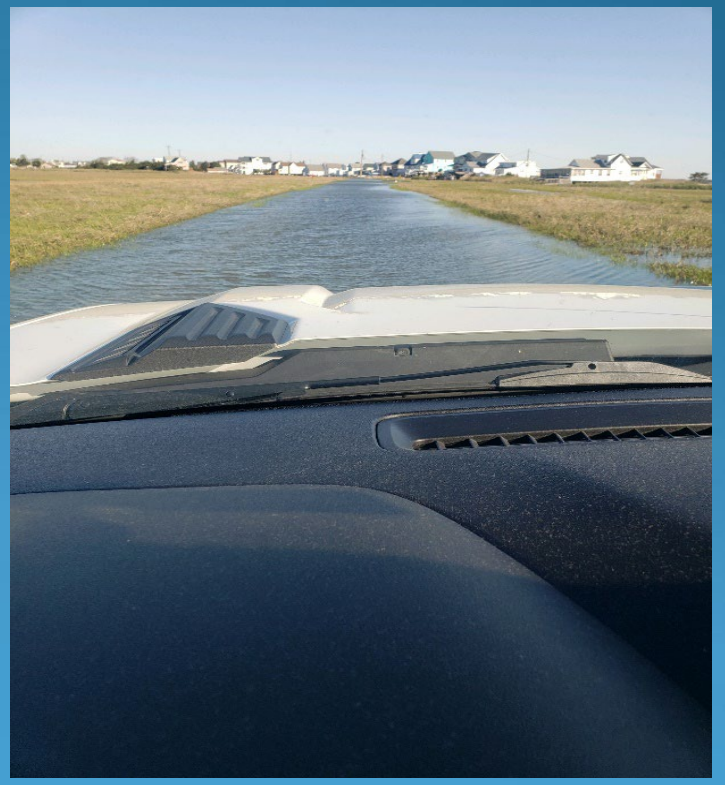
*Maryland Coast Smart Construction Program

Transportation Planning Board

June 10, 2022

Division of Transportation
Resiliency & Sustainability

Jim Pappas, P.E.
Director



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

- **Projects/Initiatives**
  - Planning
    - State EV Infrastructure Implementation Plan
    - SR 1, Dewey Beach to Fenwick Island
    - SR 299, east of Odessa
    - Pilottown Road, Lewes
    - Port Mahon Road
    - Woodland Beach Road
  - Design
    - South Bowers Road
    - Water on Road warning signage

DelDOT Sustainability & Resiliency Basemap - Pennoni Work Space

Equity & Green Infrastructure

EJ Neighborhoods (Delaware Greenways)

Designation

- Moderate
- Significant

NHPD Properties 2022

Properties

- LIHTC
- Section 8
- USDA
- Public Housing
- Other HUD
- Multiple

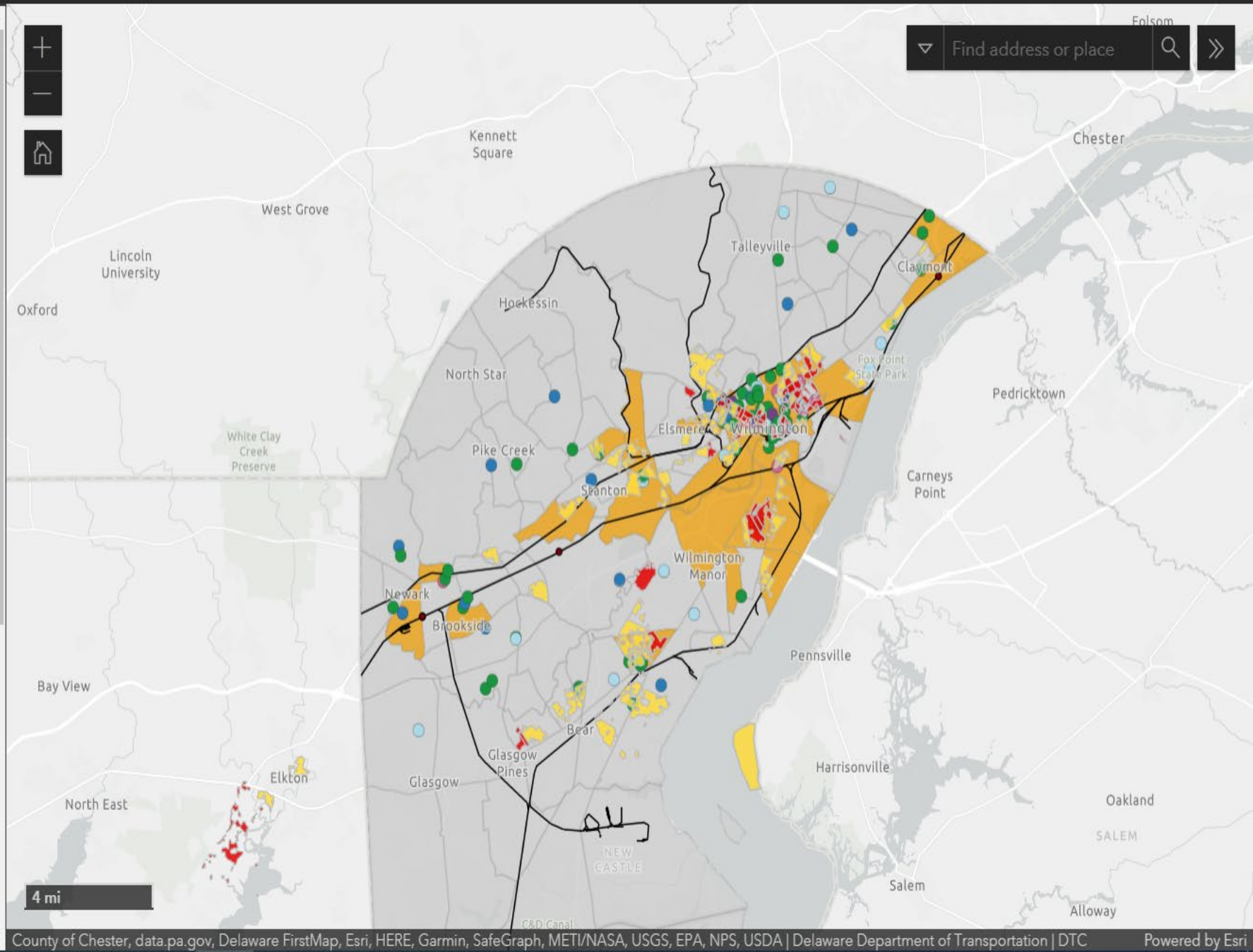
Transit

DART Connect Interactive Map WFL1 - Between Towns Connection

SymbolID

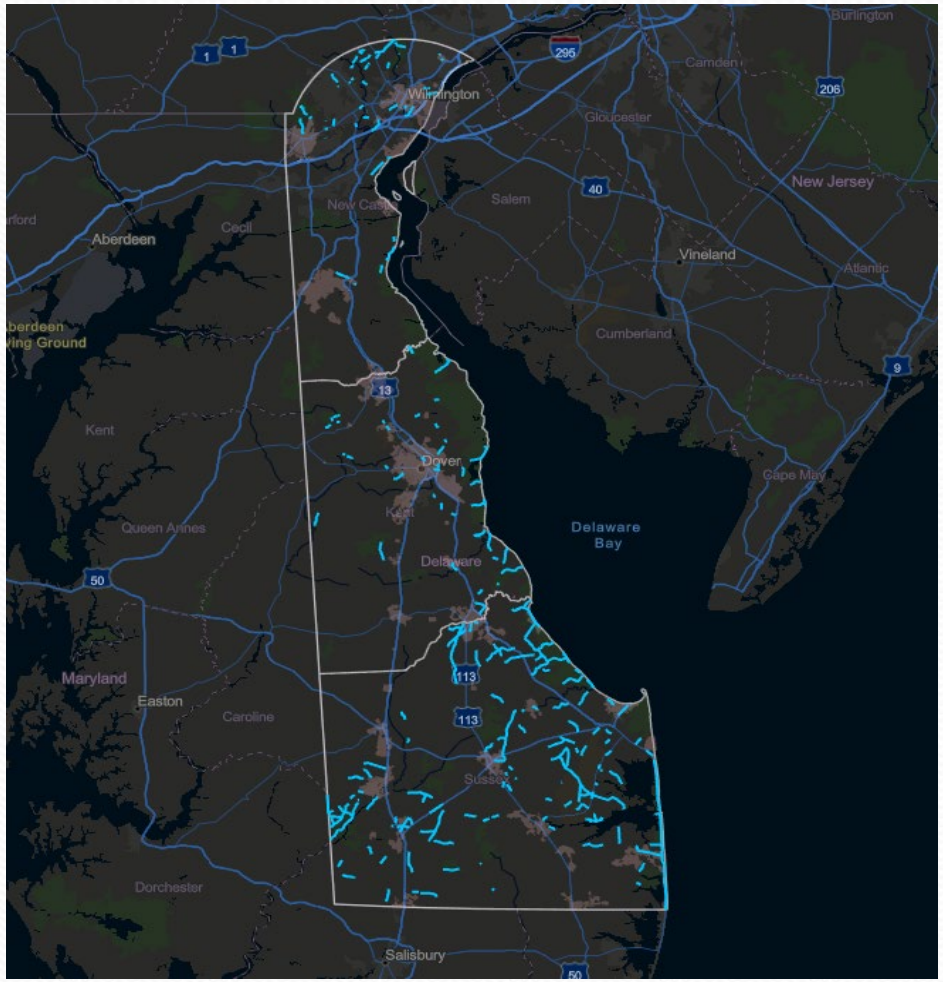
- Between Towns Connection

DE Multimodal - Transit - Train Stations



Roadway Flooding Challenges

- Due to the low-lying topography of the state, creating resilient infrastructure in the face of roadway flooding becomes a challenge. We have been and continues to be challenged by the effects of sea level rise and frequently flooded roadways across the state.



Roadway Flooding

Sussex County Frequently Flooded Roadways - By Road Rating

COMMENTS

- <Null>
- Level 1 (Good)
- Level 2 (Fair)
- Level 3 (Poor)
- Level 4 (Very Poor)
- <all other values>

Sea Level Rise Inundation

Sea Level Rise Inundation - 2ft Above MHHW

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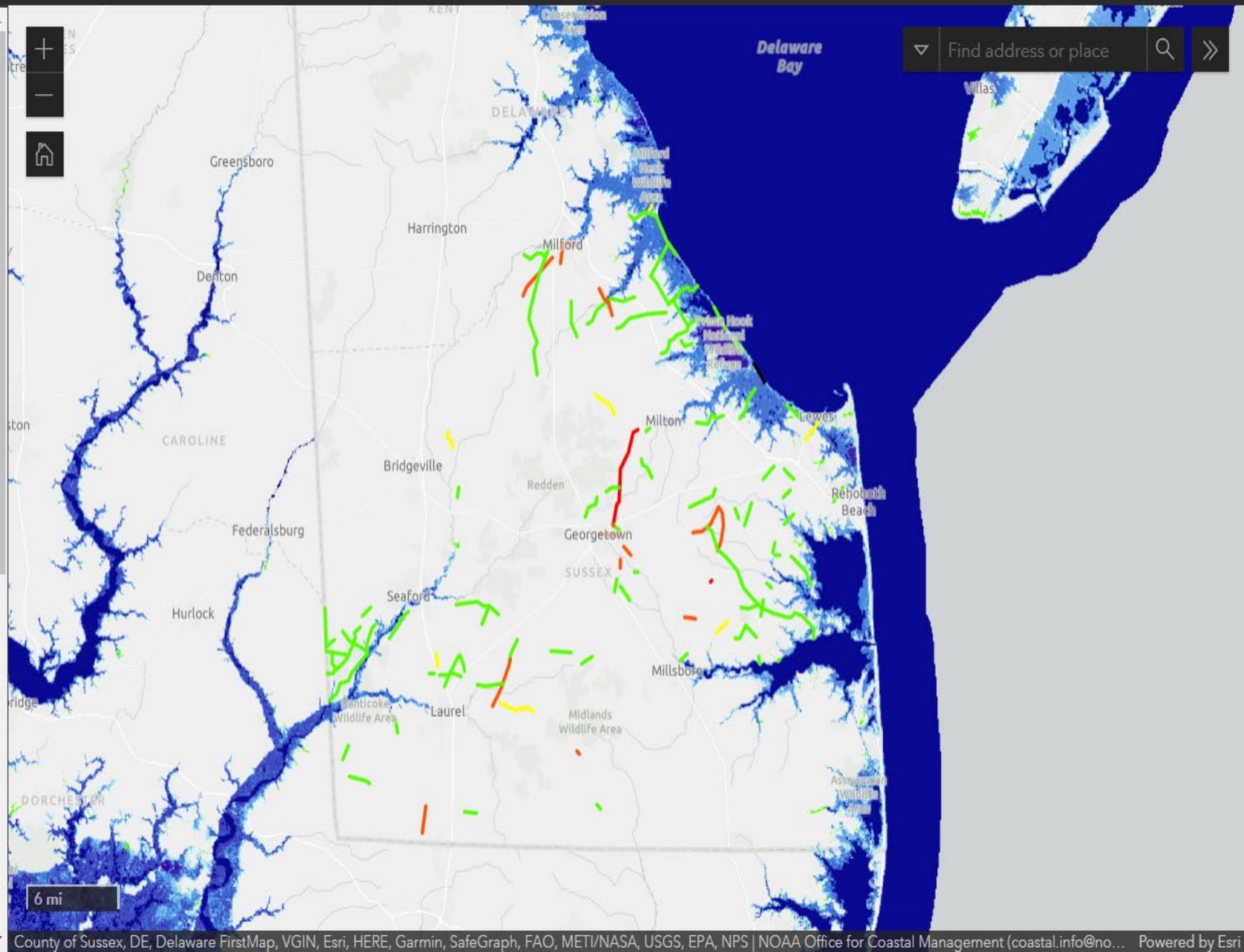
Census_States_Generalized

No_Data

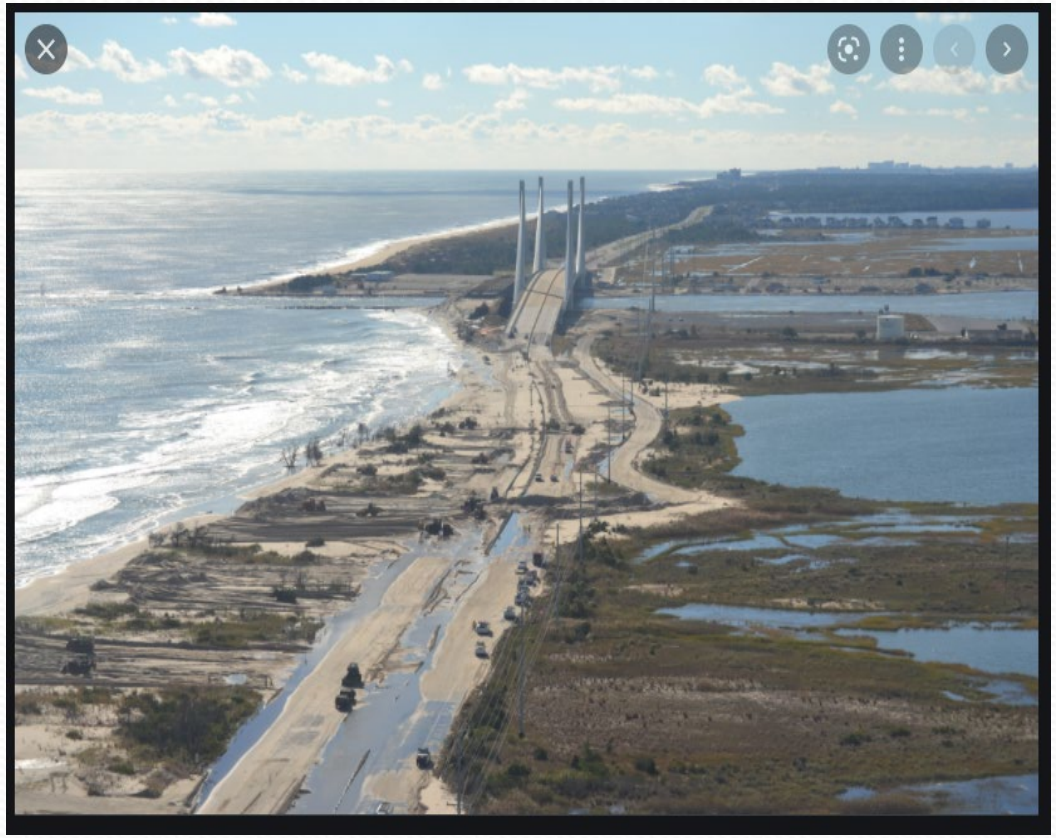
NJDEPA_AreasNotMapped_webmerc

wa_problemarea



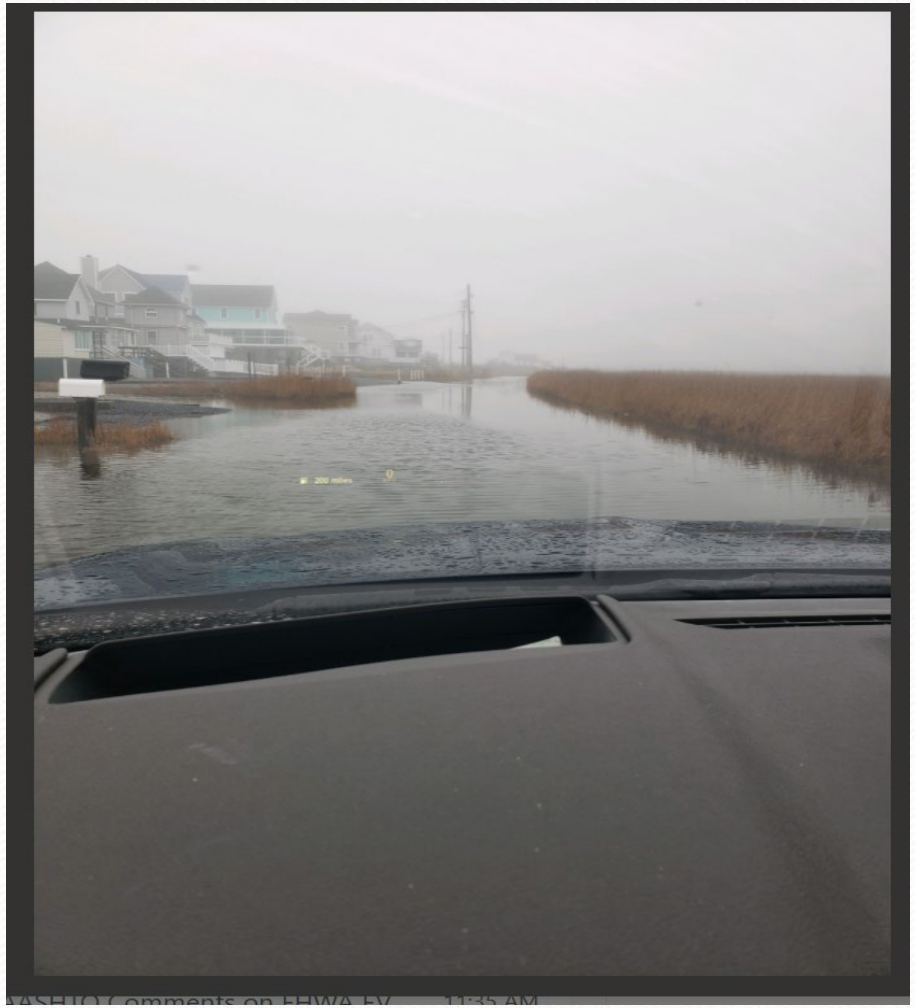
SR 1, Dewey Beach to Fenwick Island

- Critical corridor for the state
- FEMA Planning Study Grant
- Engaged with AECOM for the study
- Data gathering, model generation on going
- Extensive public engagement planned – communities, businesses, legislators
- Deliverable – resilient transportation options for corridor

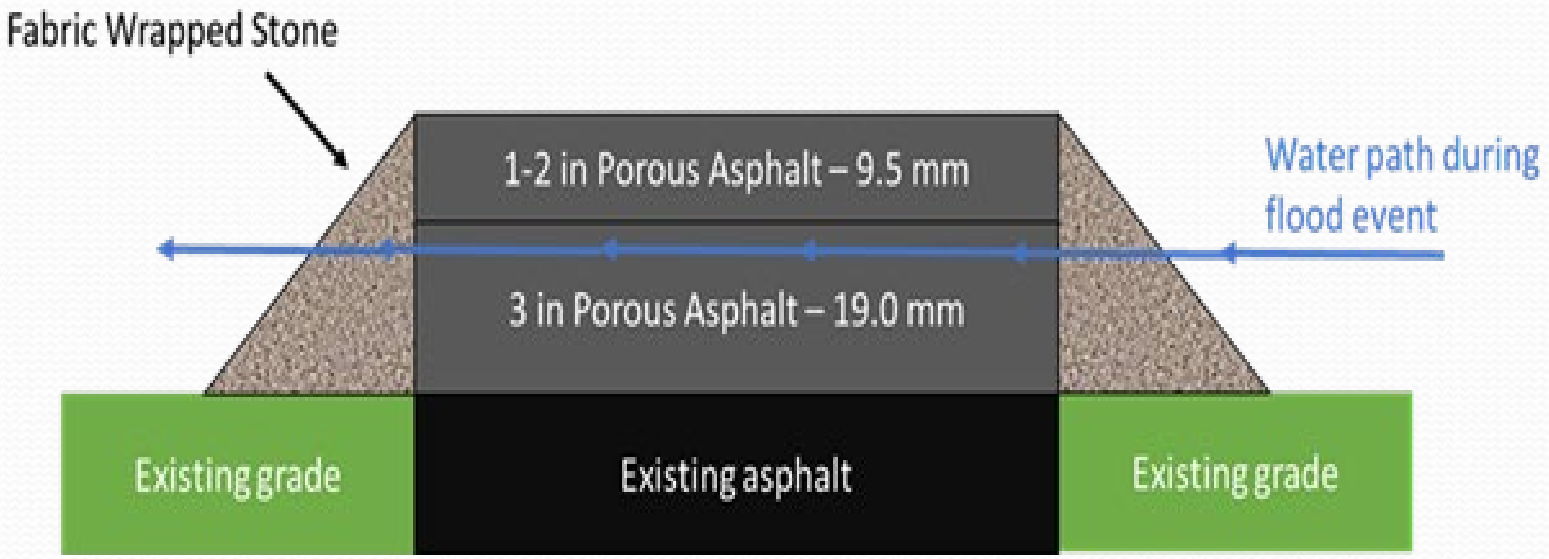


New/Innovative Roadway Elevation Options

- South Bowers Road
  - Small, local, one-way-in, one-way out roadway to beach community
  - Significant roadway overtopping at times
  - Short-term solution is to elevate roadway … by how much?
    - Encroaching wetlands along roadway; limited construction area
    - Build on existing roadway footprint
    - Roadway settlement concerns with additional overlay

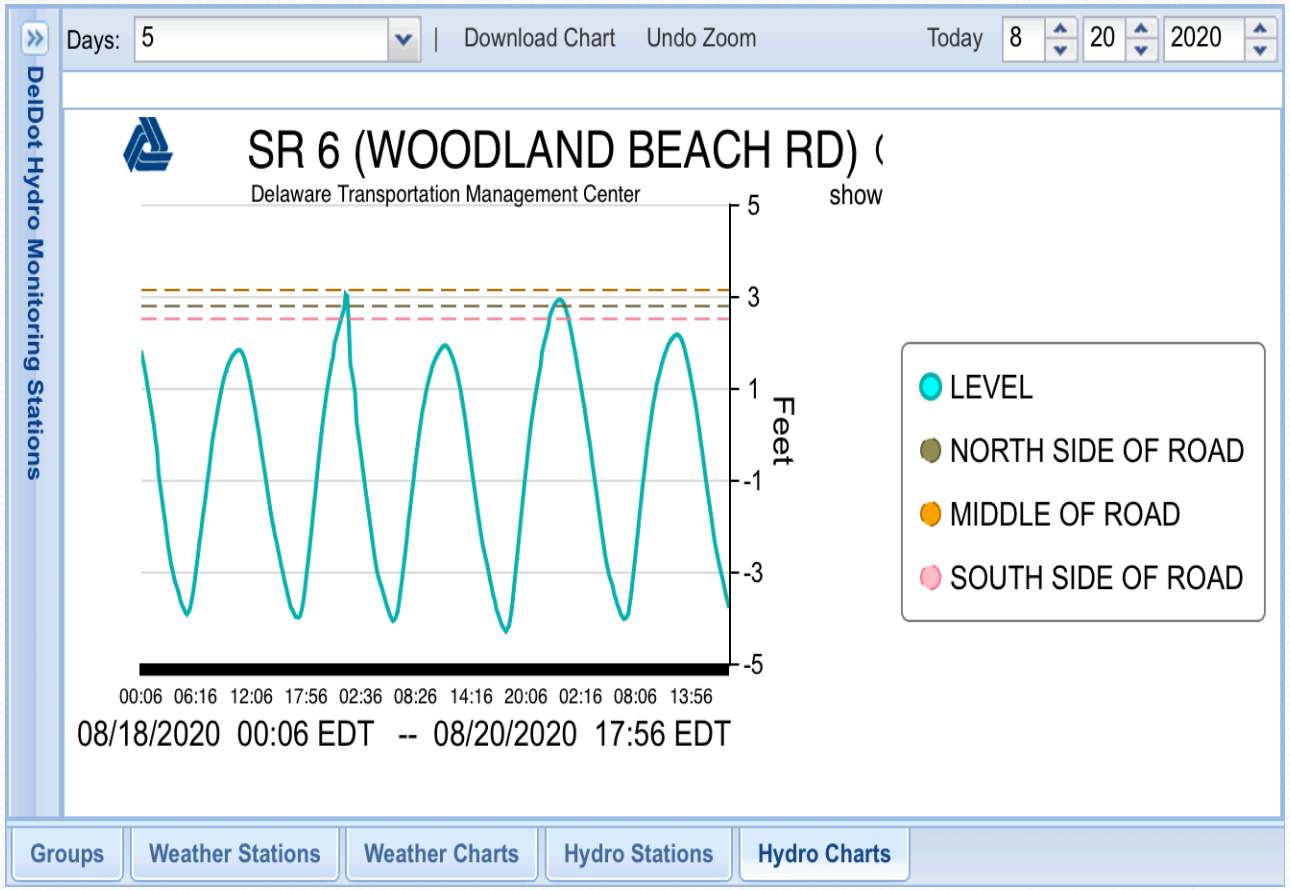


South Bowers Road - Pavement Section



Warning Signage

- Long-Term Maintenance
  - Pre-staged barricades/signs/gates
  - Monitoring of water elevations
- Notification
  - Dynamic messages
  - Electronic messaging (texts, apps, Facebook, Twitter)
  - Virtual messages boards



Possible Mitigation Options

- Tolerate
- Relocation/Realignment
- Elevate
- Harden
- New, innovative solutions
- Abandon
- Buy-outs

Prioritization Process

- Need to develop prioritization process of locations to address changing climate challenges across the state
- We have Decision Lens for CTP process; resiliency and mitigation projects need separate process
- Can we use Decision Lens tool with specific resiliency and sustainability input parameters?

Strategic Thinking

- No “one size fits all” solution
- Careful considerations – data, review, planning, operations, investment, etc.
- More future strategies/future case studies – innovative solutions
- Stakeholder input ensuring equity
  - Public
  - Other governmental agencies
  - Non-governmental organizations
  - Subject matter experts
  - University researchers

Transportation Resilience & Sustainability

- **Summary - Items of DelDOT interest:**
  - Integrate and include social and transportation equity in all decision-making associated with planning transportation opportunities
  - Zero-emission transportation
  - Alternative energy (solar in the ROW)
  - Green infrastructure
    - Wetland sites
    - Pollinator sites
    - Living shorelines
  - Infrastructure flooding challenges
    - Prioritization process
    - Innovative pavement solutions

Transportation Resiliency and Sustainability

Mission:

To provide the citizens of Delaware with the most resilient and sustainable transportation infrastructure through effective project planning, design, construction, and maintenance along with the incorporation of innovative solutions such as alternative energy and electrification of our infrastructure to address the challenges associated with climate change.

Goals:

- To centralize our efforts to improve the resiliency of our transportation network and focus on sustainability.
- To examine the impacts climate change and sea-level rise are having on our transportation infrastructure, incorporating resiliency and sustainability measures in the planning, design, construction, and maintenance of our projects.
- To implement the electrification of our infrastructure and fleet; incorporating the use of alternative energy, such as solar; and minimizing the environmental impacts caused by our transportation system. As part of the Climate Action Plan for Delaware and in recognition that transportation is the largest in-state source of greenhouse gas emissions, expand the use of renewable energy and reducing emissions in our transit fleet."
- To contribute to the net reduction of Delaware's greenhouse gas emissions from the 2005 levels by 28% by 2025.

Challenge:

Due to the low-lying topography of the state, creating resilient infrastructure in the face of roadway flooding

Transportation Resiliency and Sustainability

Contact Us

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DelDOT Resiliency & Sustainability

Sustainable transportation considerations and solutions are focused on striking a balance between economic, social, and environmental principles in a manner that supports the ongoing planning, development, operation, and maintenance of an 'enduring' transportation system.

MISSION

To provide the citizens of Delaware with the most resilient and sustainable transportation infrastructure through effective project planning, design, construction, and maintenance along with incorporation of innovative solutions such as alternative energy and electrification of our infrastructure to address the challenges associated with climate change and sea level rise.

CHALLENGE

Due to the low-lying topography of the state, creating resilient infrastructure in the face of roadway flooding becomes a challenge. DelDOT has been and continues to be challenged by the effects of sea level rise (SLR) and frequently flooded roadways. It has been estimated the state has $1 billion of infrastructure at risk associated with these challenges.

STRATEGIES

With so many factors, there can be no 'one size fits all' solution. DelDOT currently makes decisions about SLR on a case-by-case basis, with careful considerations and unique strategies.

DelDOT is actively developing policies on how to spend our capital to protect and maintain assets affected by SLR. DelDOT's guidance and direction will be in line with Statewide policies to ensure a consistent approach.

INITIATIVES

Impacts of Climate Change and Sea Level Rise
- Design, Construction, Maintenance
- Drainage
- Flood Matrix

Electrification of Infrastructure and Fleet
- EV Charging
- Electric Buses and Fleet

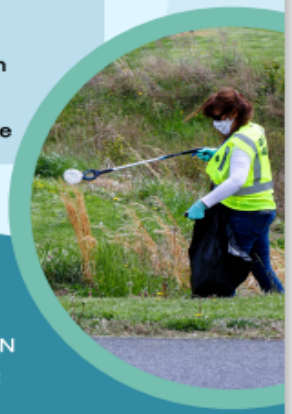
Use of Alternative Energy
- Solar Propane Conversion
- Exploring Hydrogen

Quality of Life
- Keep DE Litter Free
- Pollinators

COORDINATION

The Division of Transportation Resiliency and Sustainability recognizes the value of interagency coordination as well as cross-governmental and non-governmental organizations to develop positive, equitable solutions to address climate change and improve the resiliency of our transportation network.

Growing List of Partnerships to include:
- Delaware Department of Natural Resources and Environmental Control (DNREC)
- Delaware Office of State Planning Coordination
- University of Delaware
- Wilmington Area Planning Council Organization (WILMAPCO)
- Dover/Kent County Metropolitan Planning Organization
- Sussex County Council
- Delaware Center for Inland Bays
- Delaware Resilient and Sustainable Communities League



TO LEARN MORE ABOUT TRANSPORTATION'S ROLE IN DELAWARE'S CLIMATE ACTION PLAN, PLEASE VISIT:
WWW.DECLIMATEPLAN.ORG

Thank you for your time and attention

Jim Pappas

james.pappas@delaware.gov

A Holistic Approach to Flood Mitigation

Daniel Medina, PhD, PE
Stormwater Program Manager

National Capital Region Transportation Planning Board

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

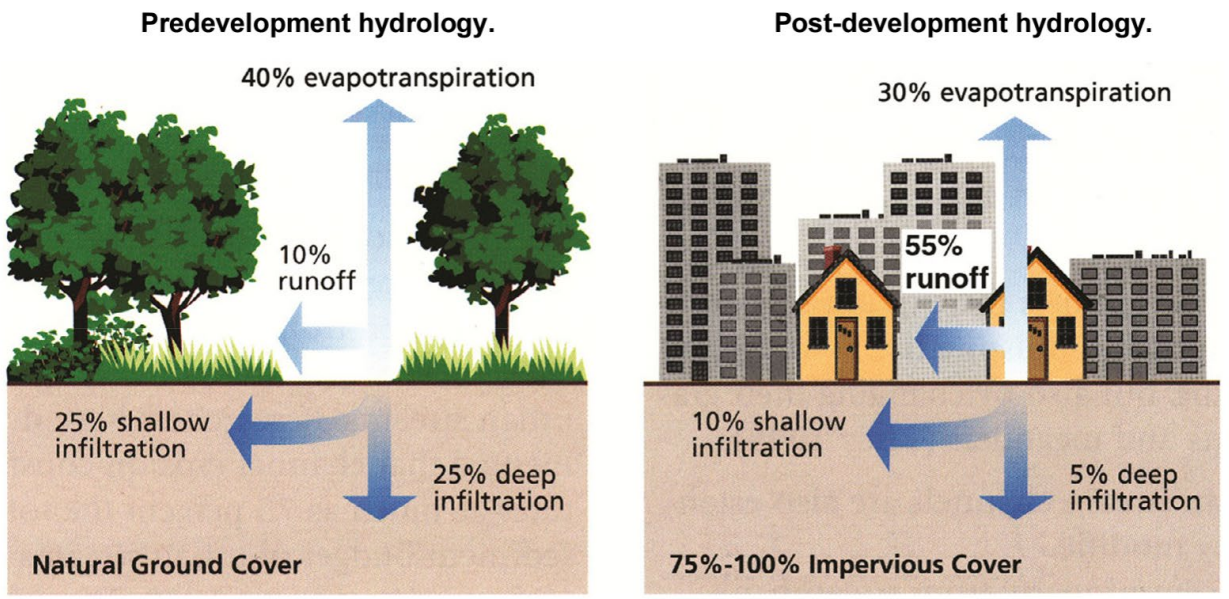
June 10, 2022

Outline

- Causes of flooding in Alexandria
- Approach to climate change
- Alexandria’s holistic approach

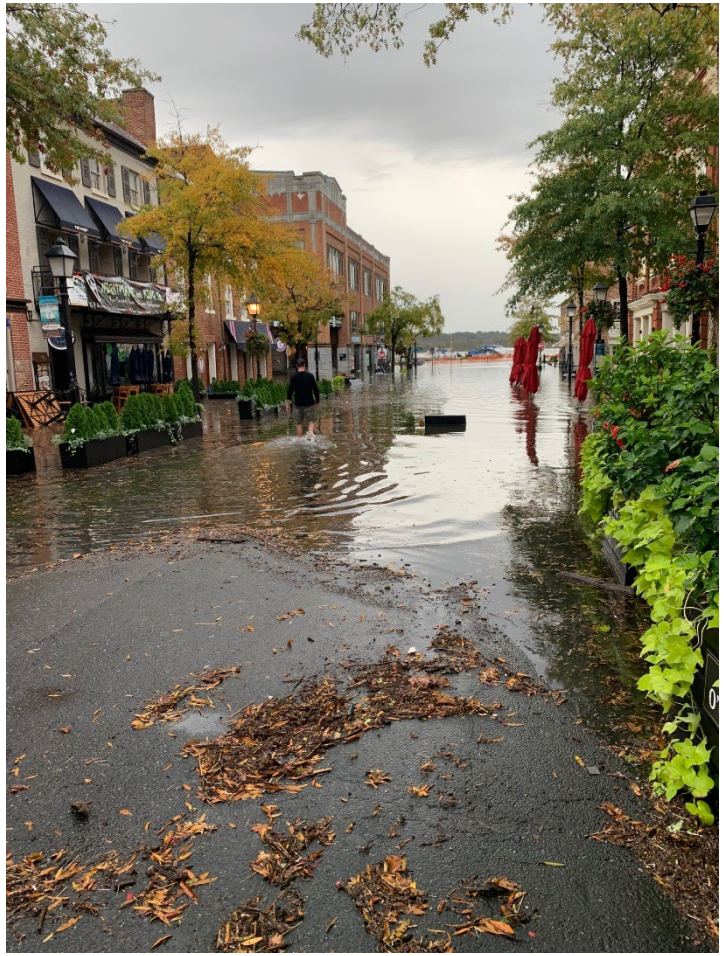
Causes of Flooding in Alexandria

- Existing impervious areas
- Future imperviousness
  - New development
  - Re-development
- Inadequate drainage
- Encroachment in flow paths
- Soil compaction
- Lawns



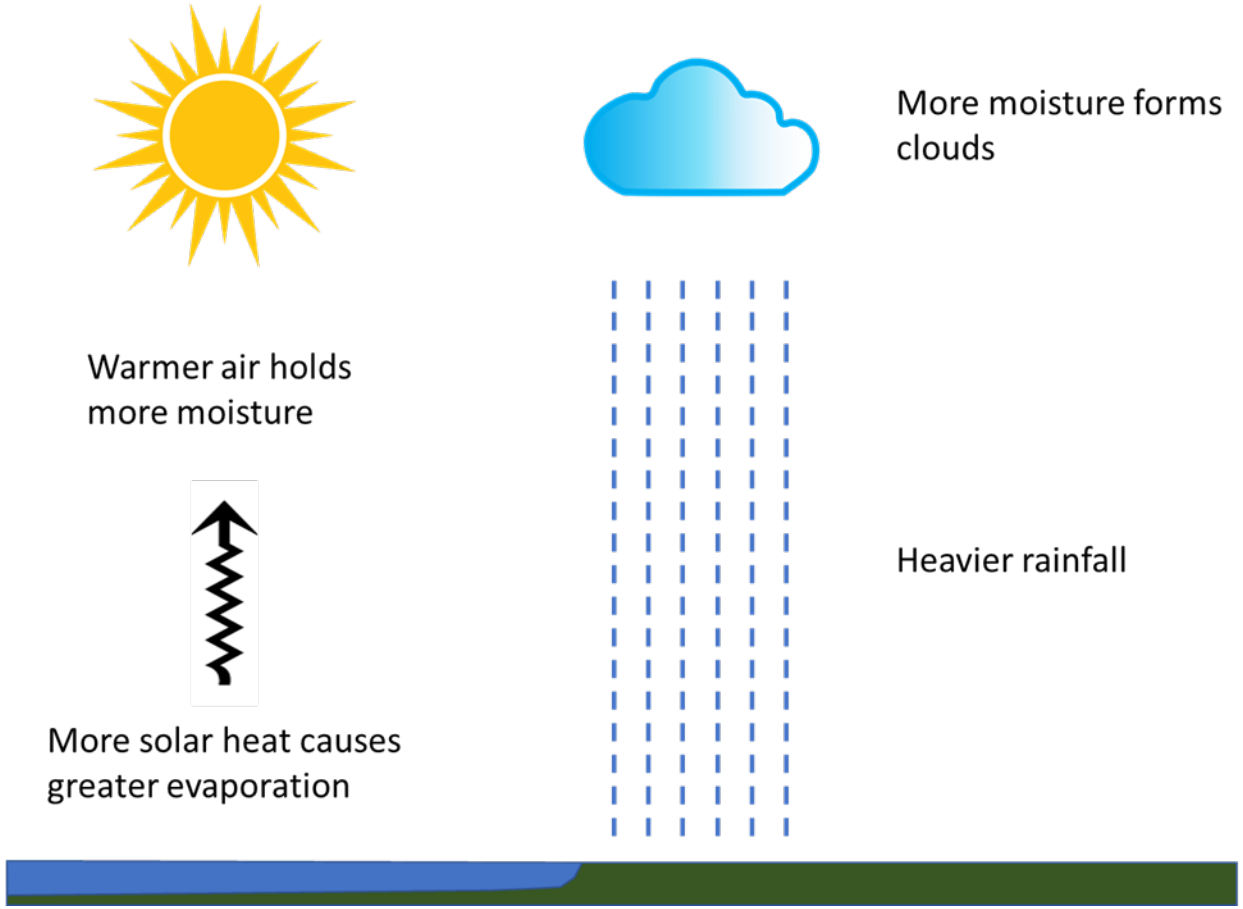
Causes of Flooding in Alexandria

- High tides
- Sea level rise



Old Town Alexandria, 10/29/2021

Climate change is an amplifier



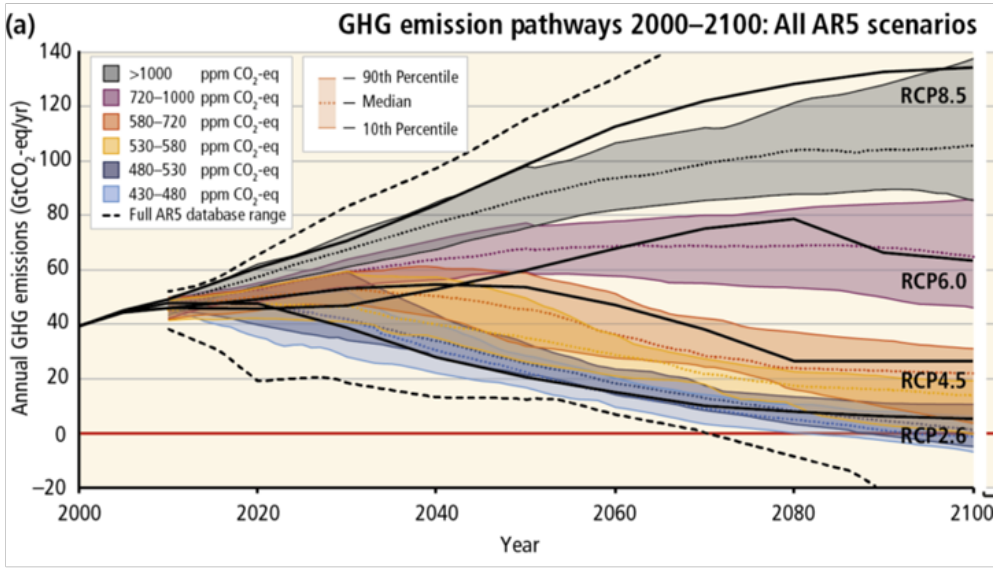
More Frequent, Intense ("Heavy") Rainfall Events

- **2018**: Virginia's wettest year on record, 20"+ over normal
- **July 8, 2019:** Regional Flood
- **July 23, 2020:** Local Flash Flood
  - 60-80% of monthly avg in 30 minutes
- **Sept. 10, 2020:** Local Flash Flood
  - 2.5-4" with rates up to 3"/hr in 10 mins
  - Daily rainfall record at National Airport
- **August 21, 2021:** Very Local Flash Flood in single local watershed

Radar, September 10, 2020

Climate change is an amplifier

- Top Down – Downscaling of global predictions
- Bottom Up – Robustness analysis



World Bank, 2020. Resilient Water Infrastructure Design Brief

Optimization

- Best solution at the smallest cost

Alexandria's holistic approach

- Large capacity projects
- Spot improvements
- Maintenance and Operation of the Stormwater and Sanitary Systems
- Stream and channel maintenance
- Community involvement (Alex311)
- Waterfront initiative
- Flood mitigation grant program
- Stormwater utility fee

Neighborhood Spot Improvements

A crew pours concrete to form the catch basins for the new, wider inlets on Hume Avenue.

Engineer Brian Rahal, of the Stormwater Management Division, monitors progress on larger inlet installation on Hume Avenue on Jan. 24, 2022

Operations & Maintenance

- ✓Inspecting and cleaning storm lines every 3-5 yrs.
- ✓Inspecting and clearing before storms
- ✓Repairing stormwater infrastructure as needed
- ✓Maintaining streams and channels
- ✓Maintaining large infrastructure components, such as Hooffs Run Culvert
- ✓Inspecting interior of sewers via CCTV
- ✓Street sweeping & leaf removal
- ✓Additional maintenance in response to service requests received via Alex311

Alexandria's holistic approach

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Alexandria's holistic approach

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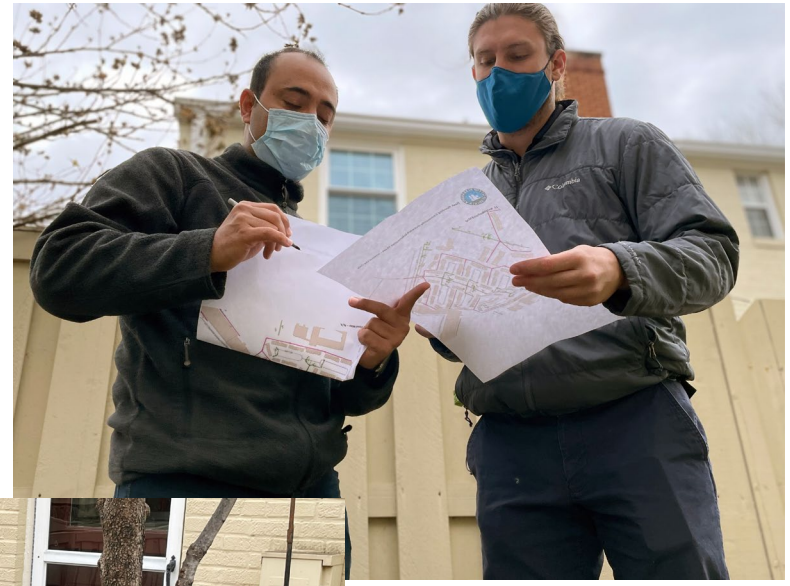
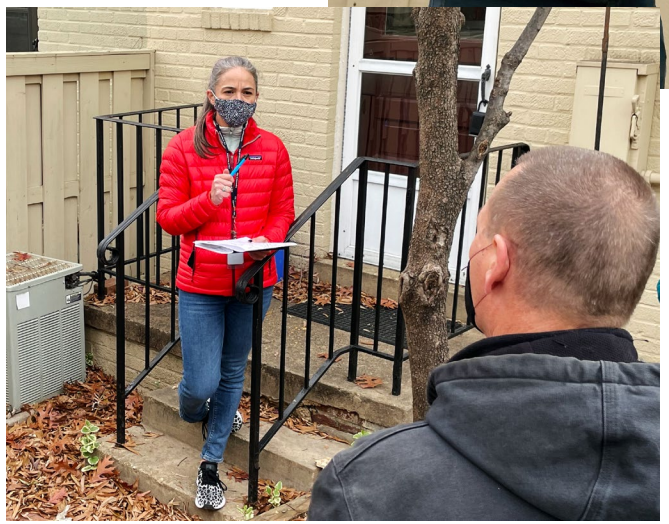




Communications

FLOOD ACTION NEWSLETTER

Project updates, news and messages directly from senior leaders.

FLOODACTION ALEXANDRIA

FEBRUARY 2022 Issue 5

ABOUT US ADVISORY GROUP ENEWS

Manager's Message

A message from the Stormwater Management Division Chief.

When future generations of Alexandria residents trace back flood-resilient improvements in the City, they'll see the journey started with all of us.

While there is still much work to be done, the City has made steady progress in building resiliency to the impacts of flooding. We started the year off strong with construction beginning on multiple neighborhood spot improvement projects and putting out a request for qualifications on two large capacity projects, both of which you'll read about below.

Jesse Maines

Alexandria is a great historic city and a great place to live and work. But this history also means the sewer systems are older, and some of these systems carry live streams. While these systems were advanced when they were first installed, I don't think they were designed to contain runoff from these intense storms that we used to call 50- or 100-year storms that we now experience once or twice a year. With a warmer atmosphere holding more moisture, precipitation drops all at once and can overwhelm our systems, so we need to build more capacity and measures to protect us from flooding.

Working with the City is particularly special to me as I get to serve the community where I live. This makes it not just a job, but a way to contribute to the community to make people and their property safer.

Like many people in the City, my family's house has experienced flooding from these more recent storms. Yes, we do have some significant challenges. However, I truly believe we can meet the challenges we face by working together.

With the support of the community and City Council, we've hired more experts, pursued more grant opportunities and devoted more time to examining problems in pursuit of solutions.

I'm proud of the team we've been building across the Department of Transportation and Environmental Services in the Stormwater Management Division, Sanitary Sewer Division and Department of Project Implementation in the past year. I'm energized about the work we've done with the community and the work that lies before us to squarely focus on infrastructure solutions that will alleviate flooding.

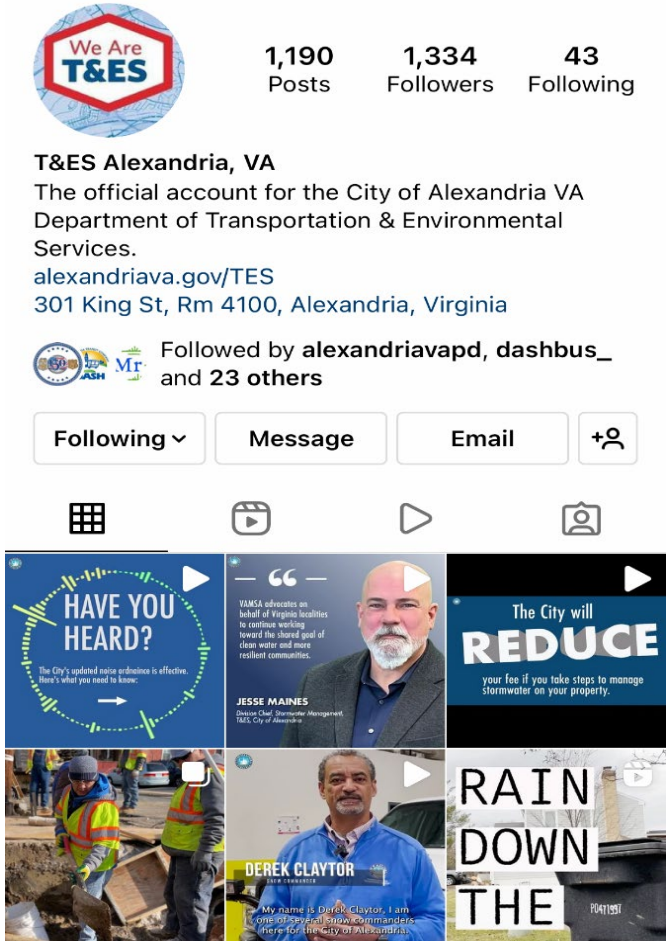
We've got the experts, strategy and your support. I'm looking forward to working alongside the community over the next year as we continue designing a City that future generations will be proud to call home.

VIDEO STORYTELLING

Informative and educational video messaging from the staff.

SOCIAL MEDIA

Are you following T&ES?
Get an inside look at projects.



ART: FREEPIK

Alexandria's holistic approach

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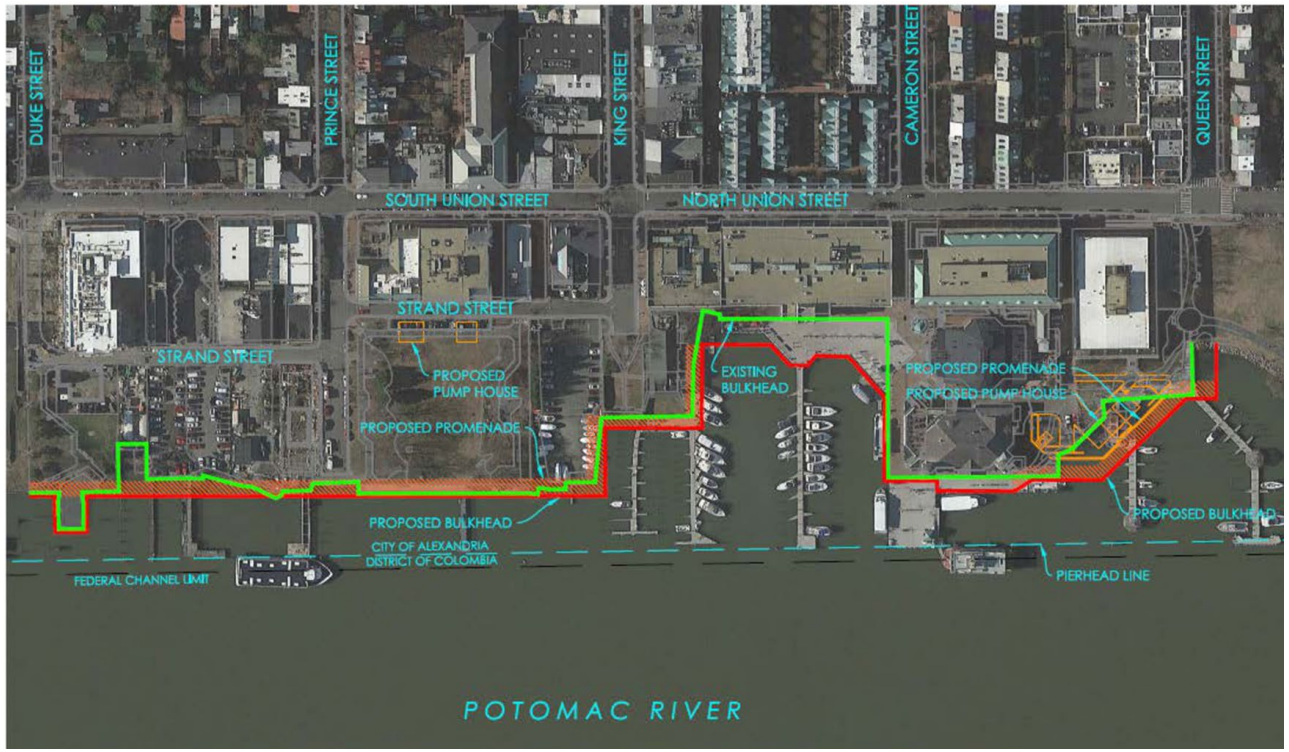

Alexandria's holistic approach

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Thank you!

www.alexandriava.gov/FloodAction

daniel.medina@alexandriava.gov

Coast Smart Construction Program

Goal: Minimize impacts and optimize resilience of infrastructure to sea level rise and coastal flooding

Outcome: Development of Coast Smart Siting and Design Criteria for State and local capital projects

Coast Smart Construction Program

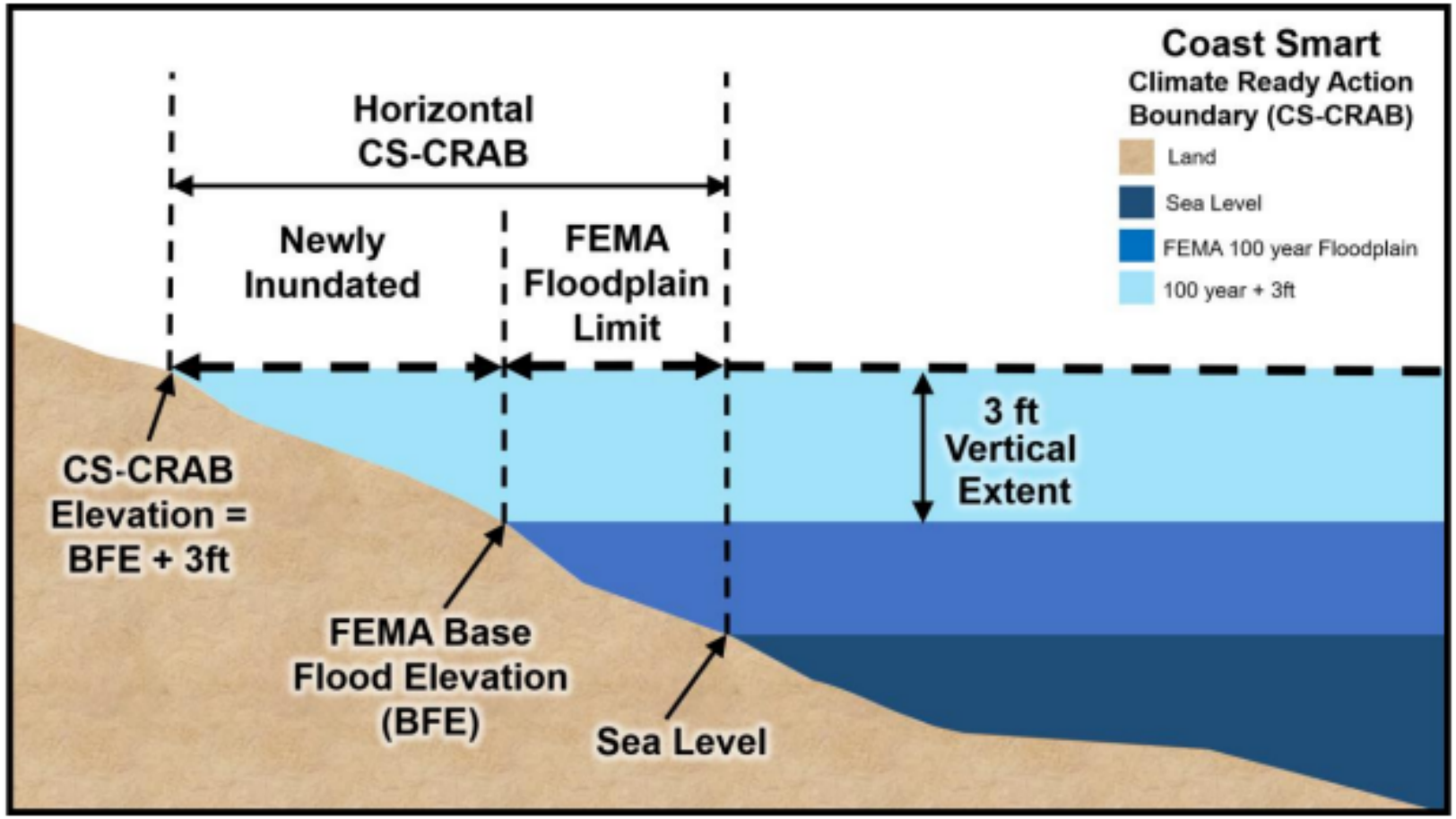
- Siting and design criteria apply to:
  - State and local capital projects involving the:
    - Construction or reconstruction of a structure
    - Construction of a new highway facility
  - Projects with a cost of $500,000 or more
  - Projects funded with at least 50% state funds

- Exemptions and waivers can be granted

MARYLAND DEPARTMENT OF NATURAL RESOURCES

Coast Smart - Climate Ready Action Boundary (CS-CRAB)

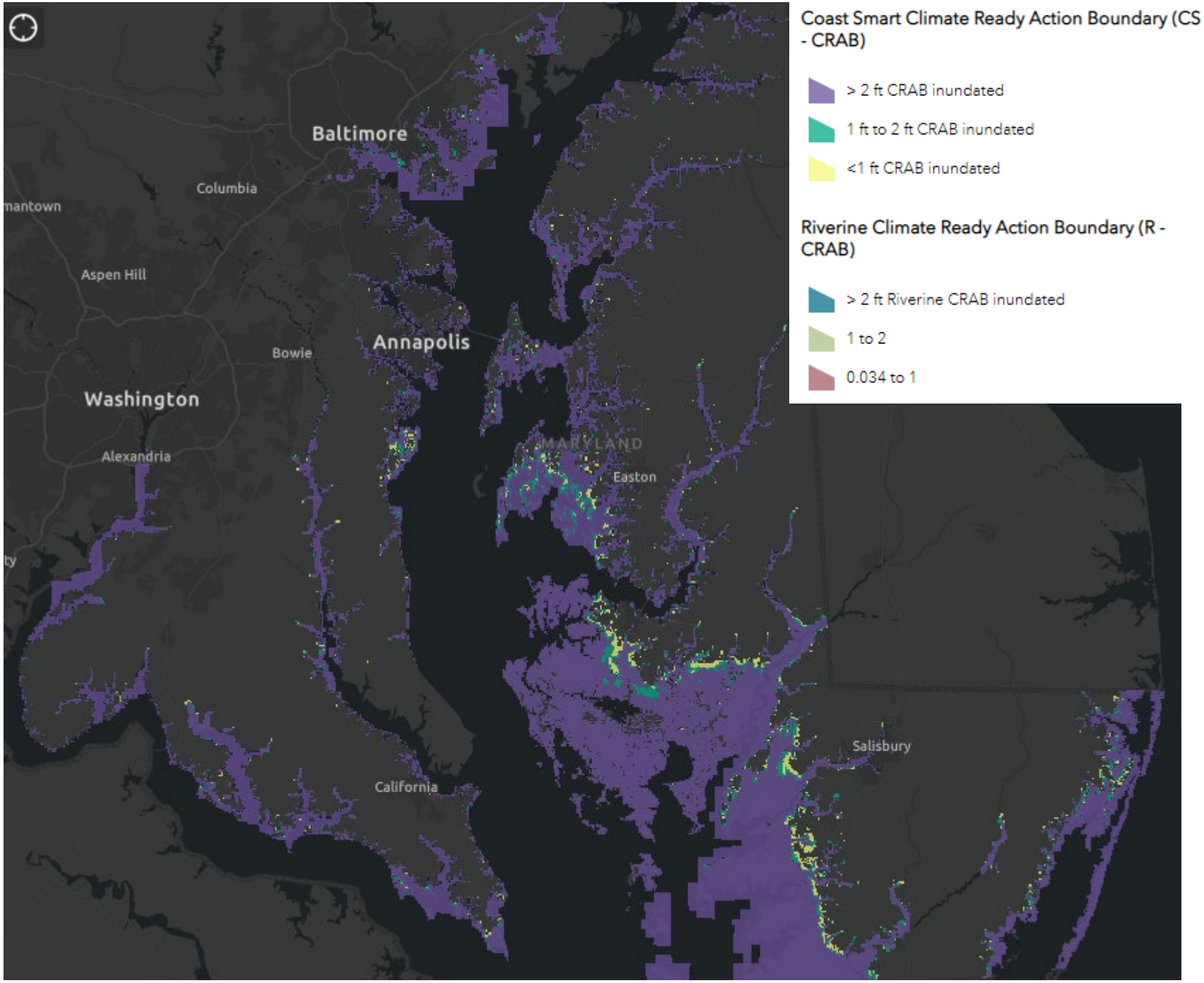
FIGURE 1: Coast Smart Climate Ready Action Boundary (CS-CRAB) & CS-CRAB Elevation



MARYLAND DEPARTMENT OF NATURAL RESOURCES

Coast Smart - Climate Ready Action Boundary (CS-CRAB)

Riverine - Climate Ready Action Boundary (R-CRAB)



MARYLAND DEPARTMENT OF NATURAL RESOURCES

Project Screening Form

APPENDIX A: Coast Smart Project Screening Form

This document is intended to help Maryland State agency personnel and others understand and apply the Coast Smart Construction Program guidelines for various phases of their capital project to prevent or minimize the future impacts of coastal and riverine flooding, storm surge and sea level rise inundation.

1. ***Applicability.***

   Does the State or local capital project funded with more than 50% State funds and costing at least $500,000 involve:

   a. Construction of a structure: Yes _____ No _____

   b. Reconstruction of a structure: Yes _____ No _____

   c. Construction of a new highway facility: Yes _____ No _____

2. ***Coast Smart Climate Ready Action Boundary (CS-CRAB) and CS-CRAB Elevation.***

   a. Is the project located waterward of the CS-CRAB? Yes* _____ No _____

   *If yes, include a map showing the proposed footprint of the project relative to the CS-CRAB. Also, provide the CS-CRAB Elevation and lowest ground elevation of the structure or highway facility.

3. ***General Project Information.***

   a. Project name:

   _____

   b. Location (Address, Community Name, Zip Code):

   _____

   c. Contact Name:

   _____

   Email: _____ Phone: _____

   d. Brief project description:

   _____

   _____

   _____

   _____

   e. Tax Map/Grid/Parcel or State Department of Assessments and Taxation (SDAT) Account Number:

   _____

   f. Flood Insurance Rate Map (FIRM) Panel No.:_____

   g. FIRM effective date:_____

   h. Identify (circle) Flood Zone(s) present:

   Zone A, Zone AE, Zone AH, Zone AO, Zone AR, Zone A99, Zone V, Zone VE, Zone X (shaded or unshaded) or Zone D

Moderated Discussion

Wrap-Up

Michael Neibauer, Washington Business Journal

Poll

Mentimeter

Please go to www.menti.com

Use code: 9254 7453

Or use the link in the chat:

https://www.menti.com/h2ntqjpxnf

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

What can we do to improve these webinars?

Webinar 4 - Break Down Barriers: Integrate Climate Resilience into Planning and Programming

Friday, July 15th
2 to 3:30 pm

Goal:

- Illustrate the value of and process for integrating resilience into planning and programming

Learning Objectives:

- Identify opportunities for integrating resilience into planning and programming
- Increase familiarity with new FHWA resources
- Gain knowledge and lessons learned from peer organizations

Thank You!

National Capital Region
Transportation Planning Board