HAMPTON ROADS PDC

HAMPTON ROADS TPO

INTEGRATING RESILIENCE INTO PROJECT PRIORITIZATION AND DECISION-MAKING

Hampton Roads Certification Review

August 14, 2024

Background

HRPDC Resiliency Studies and Planning Efforts

HRTPO Resiliency Studies and Planning Efforts

Incorporating Resiliency in the LRTP Process

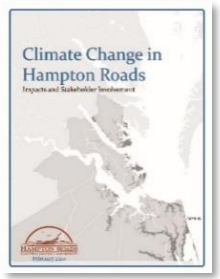
SEA LEVEL RISE IN HAMPTON ROADS

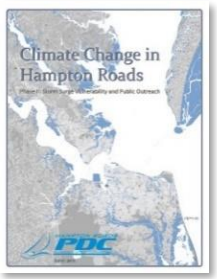
- Hampton Roads is experiencing the highest rate of relative Sea Level Rise on the East Coast
- Sea Level Rise will result in significant impacts:
  - Permanent inundation of some areas
  - More frequent flooding of other areas
  - Some areas that have not seen flooding will start to experience it

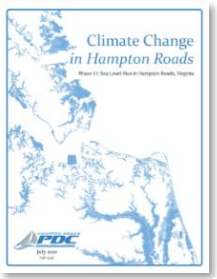
Vulnerability to Sea Level Rise (SLR)

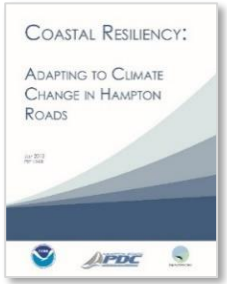
Source: National Climate Assessment via EPA, data from Hammar-Klose and Thieler 2001

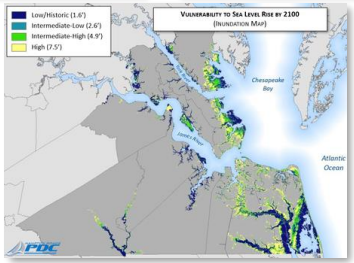
RESILIENCY AND VULNERABILITY PLANNING EFFORTS

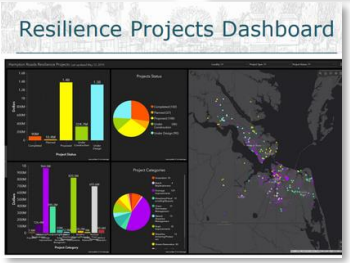


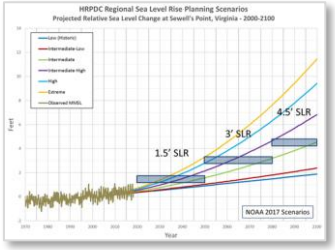












Regional Sea Level Rise Policy

Screening Values

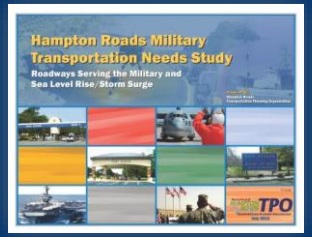
- 1.5 Feet for Near-Term Planning (2018-2050)
- 3 Feet for Medium-Term Planning (2050-2080)
- 4.5 Feet for Long-Term Planning (2080-2100)

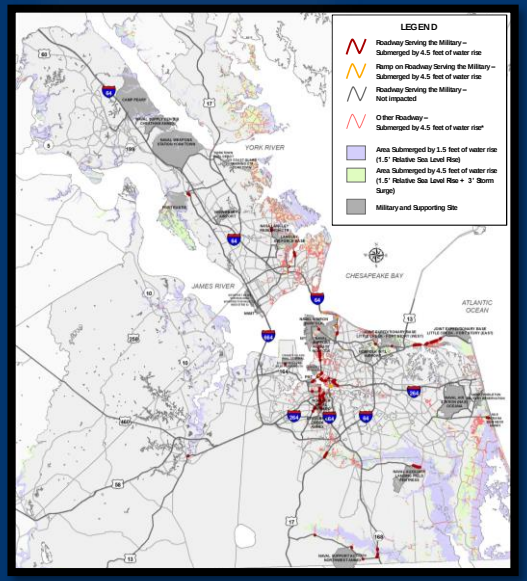
Risk-Based Engineering

- Utilize best available seal level rise projections
- Explicitly account for construction timeline, project lifespan, criticality, and vulnerability to flooding
- Determine possible sea level rise impacts
- Perform benefit-cost analysis of adaptation options

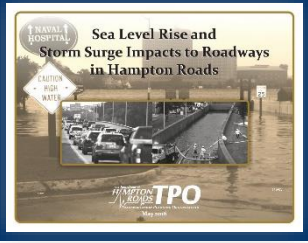
HRTPO STUDIES – VULNERABILITY ANALYSES

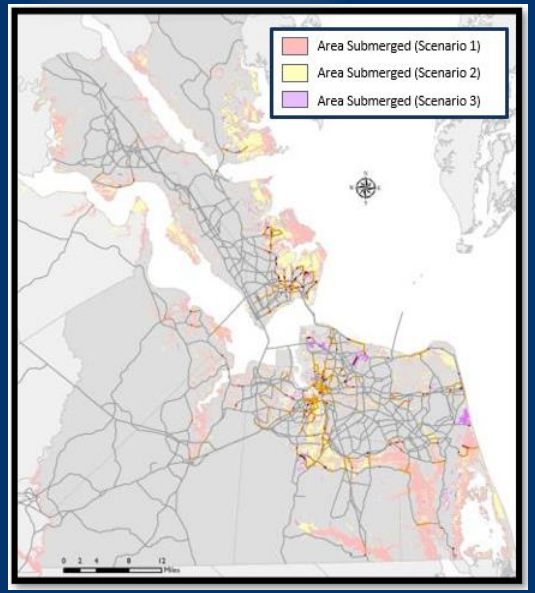
2013





2016





Identify Vulnerabilities and Develop Adaptation Strategies

- Identify roadway segments vulnerable to flooding to develop adaptation strategies
- Raise awareness of potential flood locations to consider during design

Project Evaluation and Prioritization

- Use study results to add a "flooding vulnerability" component within the Project Prioritization Tool

2025 – Plan to Update Study
(Resiliency Improvement Plan)

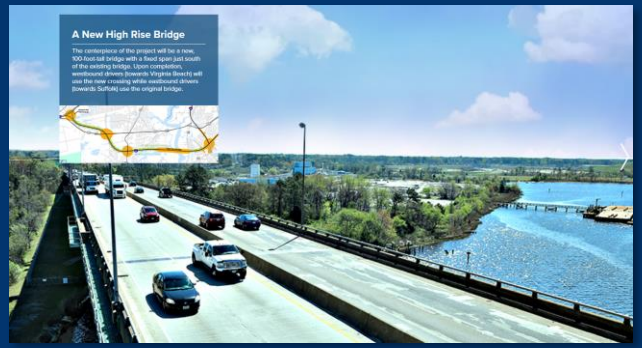
STUDIES THAT HAVE INCORPORATED 2016 SLR/SS STUDY

- JBLE Fort Eustis JLUS – Jan 2018
- Hampton Roads Military Transportation Needs Study – 2018 Update – Jul 2018
- Isle of Wight County Transportation Study – Jul 2019
- Norfolk and Virginia Beach JLUS – Aug 2019
- Hampton-Langley Air Force Base JLUS Study Addendum: Resiliency and Adaptation – Aug 2019
- Historic Triangle Comprehensive Transportation Study – Jul 2020
- 2045 LRTP - 2021
- Portsmouth and Chesapeake JLUS – Apr 2021
- Gloucester County Transportation Study – Oct 2021
- JBLE Langley Transportation Management Plan (TMP) – Oct 2023
- Chesapeake Industrial Waterfront Study – Aug 2023
- Hampton Roads Freight Facilities Interactive Map – Aug 2023
- City of Hampton Comprehensive Transportation Study
- City of Chesapeake Comprehensive Plan – Feb 2024
- City of Portsmouth Local Studies (Safe Streets and Roads for All & OLDCC Grant) – Mar 2024

INTEGRATING ADAPTION STRATEGIES

- Adaptation strategies reduce potential impacts to ensure transportation system reliability and resiliency

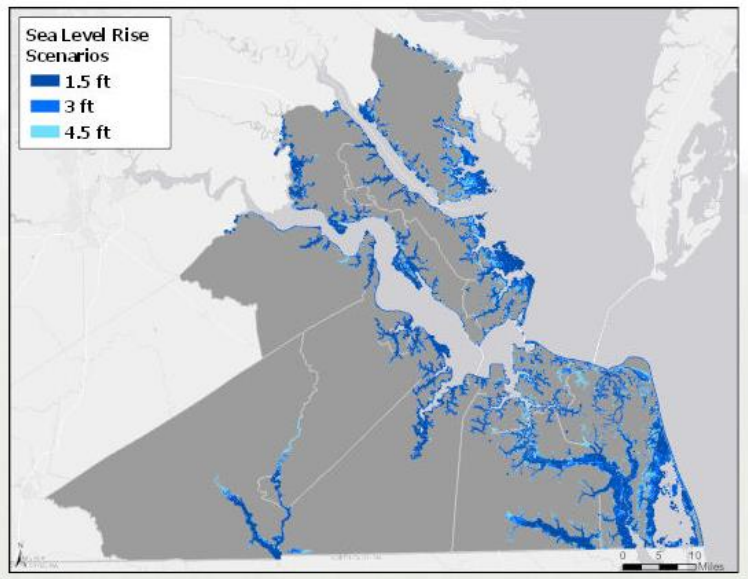
- **Wythe Creek Road widening project**
  - Coordination between Poquoson, Hampton, and NASA
  - Used inundation mapping tool and modeling to make design modifications



- **I-64 Southside High Rise Bridge project**
  - As a result of sea level rise planning efforts, VDOT increased bridge design height by 5-feet to account for future sea level rise

ENHANCING RESILIENCY CONSIDERATIONS IN THE LRTP

Sea Level Rise Scenarios



- **Scenario Planning**
- **Project Prioritization Measures**
- **Data-driven, Objective, Comprehensive Inputs**
- **Resiliency Pilots with Volpe and Fernleaf**

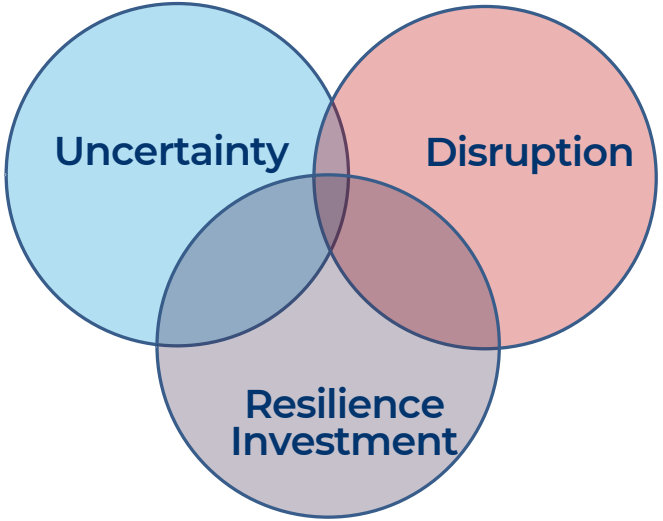
RESILIENCY PILOT WITH VOLPE

HRTPO Objectives with Volpe RDR Tool

- Model multiple flooding scenarios efficiently
- Support objective, data-driven resiliency measures for use in Project Prioritization Tool
  - Identify inundation and extent (low and high frequency events)
  - Quantify congestion as a result of flooding
  - Quantify congestion avoided from mitigating flooding
  - Cost-benefit ratio of resiliency improvements

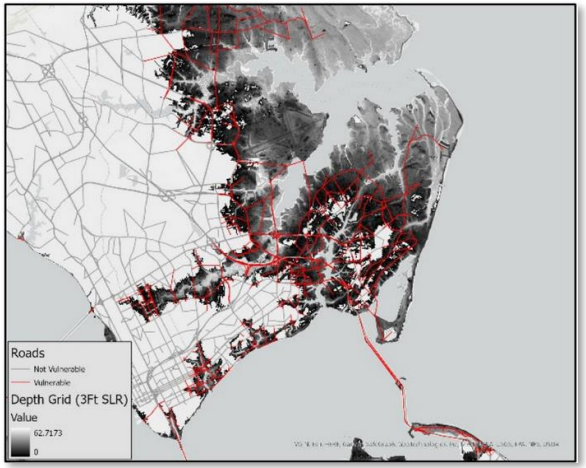
Modeling Uncertain Disruption Scenarios

- RDR Tool to explore a large scenario space to assess Network-wide effects of losing some assets (highway links)



VOLPE RDR TOOL OVERVIEW

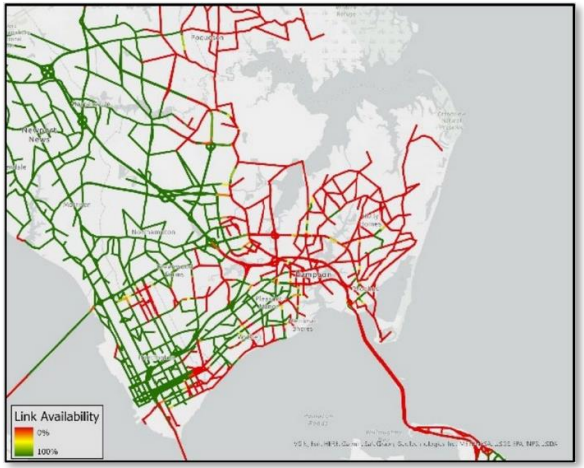
RDR EXPOSURE ANALYSIS TOOL



Maximum network exposure on each link

- Identify network assets vulnerable under given hazard condition

RDR LINK CAPACITY LOSS CALCULATION



Capacity reduction on each link

- Assess lost/reduced capacity under given hazard condition

PROJECT RANKING BY ROI, PERFORMANCE UNDER UNCERTAINTY

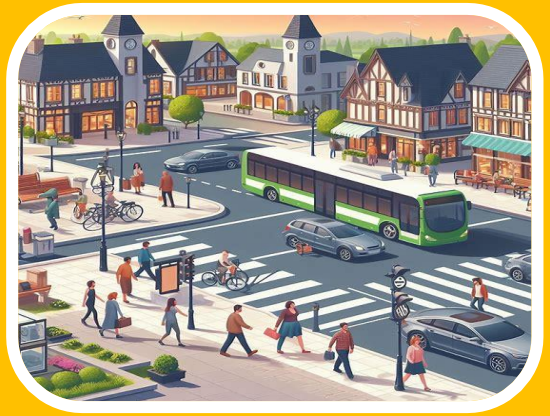
- Identify resiliency-focused projects that provide most benefit across range of hazard scenarios

Source: Volpe

HAMPTON ROADS 2050 LRTP

2050 LRTP SCENARIO NARRATIVES

Greater Urban Growth



Greater Suburban Growth

Greater Inland/ Westward Growth

Sea Level Rise/Storm Surge Assumptions (based on Regional SLR Policy)

Greater Urban Growth	Greater Suburban Growth	Greater Inland/ Westward Growth
3-feet Sea Level Rise 10-year Storm Surge	3-feet Sea Level Rise 100-year Storm Surge	4.5-feet Sea Level Rise 100-year Storm Surge

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VOLPE RDR TOOL: HRTPO PLANNING APPLICATIONS

Scenario Planning

- Multiple flooding scenarios

Candidate Project Identification

- Identification of high disruption assets for project consideration
- Project design/cost refinement incorporating resilience

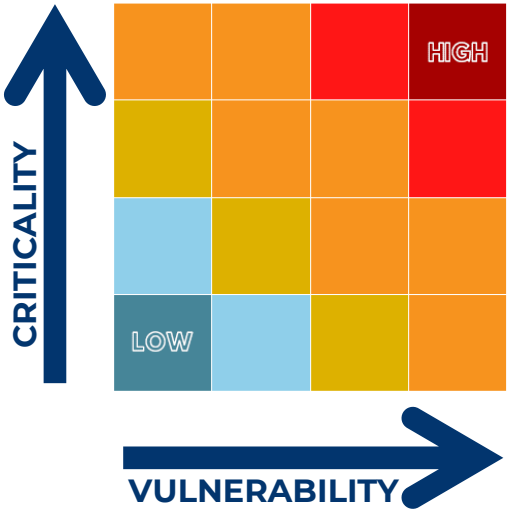
Factors for Project Prioritization

- Vulnerability/exposure across scenarios (added equity and transit)
- Disruption severity/change in network performance
- Refinement of cost effectiveness measures

Fiscal Constraint

- Help identify critical projects to constrain in LRTP

Measuring Criticality and Vulnerability



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RESILIENCE/ EQUITY PILOT WITH FERNLEAF

- Extreme weather/climate-induced events have had a disproportionate impact on socially vulnerable populations

- Build off Volpe RDR Tool and JLUS efforts
  - Data-driven objective measures to include in Project Prioritization

- Approach:
  - Screening Level Analysis
  - Combines Social Vulnerability with Roadway Network Analysis

fernleaf

RISE
Resilience Innovations

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EVACUATION ANALYSIS AND RECOMMENDATIONS

- **We have done evacuation analysis for decades**
  - **https://www.hrtpo.org/361/Evacuation**
- **Earlier recommendations:**
  - **Lane reversal, using all tunnel capacity, etc.**
- **Recent work:**
  - **Review of VDOT's Traffic Control Points document**
    - Staff reviewed the document and submitted detailed comments in January 2024.