MOVING BEYOND ASSESSMENT: SEA LEVEL RISE PREPAREDNESS AND COMMUNITY RESILIENCY IN HAMPTON ROADS, VIRGINIA


US Navy file photo


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National Academy of Sciences

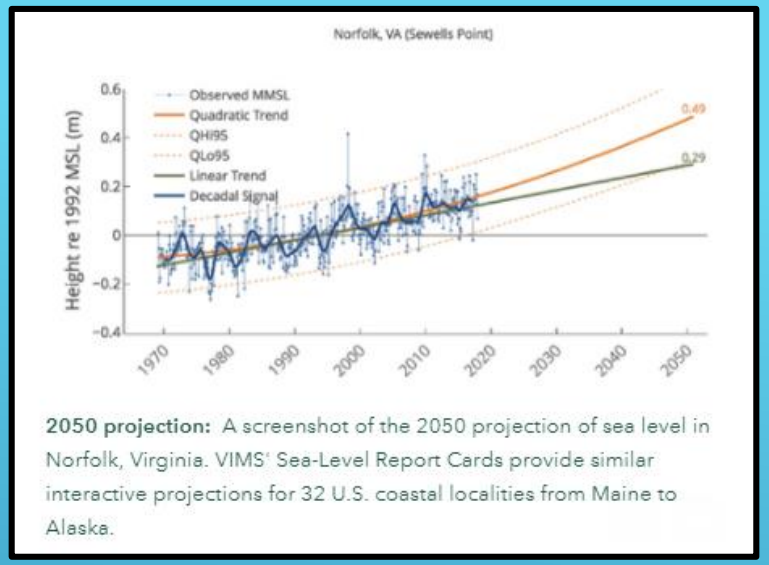
Climate Assessment Workshop

August 15th, 2018

Rear Admiral Ann Phillips, US Navy (Retired)

SETTING THE STAGE

- The region is flat – a little sea level rise inundates a lot of land
- Sea level rising + land subsidence causing more hours of flooding and more extreme flooding events = serial flooding
- Substantial Federal and Commercial Maritime presence in Hampton Roads
  - Increasing risk
  - Not easily relocated
- Challenge: How to adapt Federal facilities, cities, municipalities, neighborhoods, and transportation corridors to increased flooding?
- Adaptation is happening - but:
  - Need collaboration across region
  - Slow pace (series vice parallel progress)
  - Danger = Wait for the "Big One"?
  - What role for State of Virginia?



2050 projection: A screenshot of the 2050 projection of sea level in Norfolk, Virginia. VIMS' Sea-Level Report Cards provide similar interactive projections for 32 U.S. coastal localities from Maine to Alaska.

http://www.vims.edu/research/products/slrc/localities/norfolkva/index.php

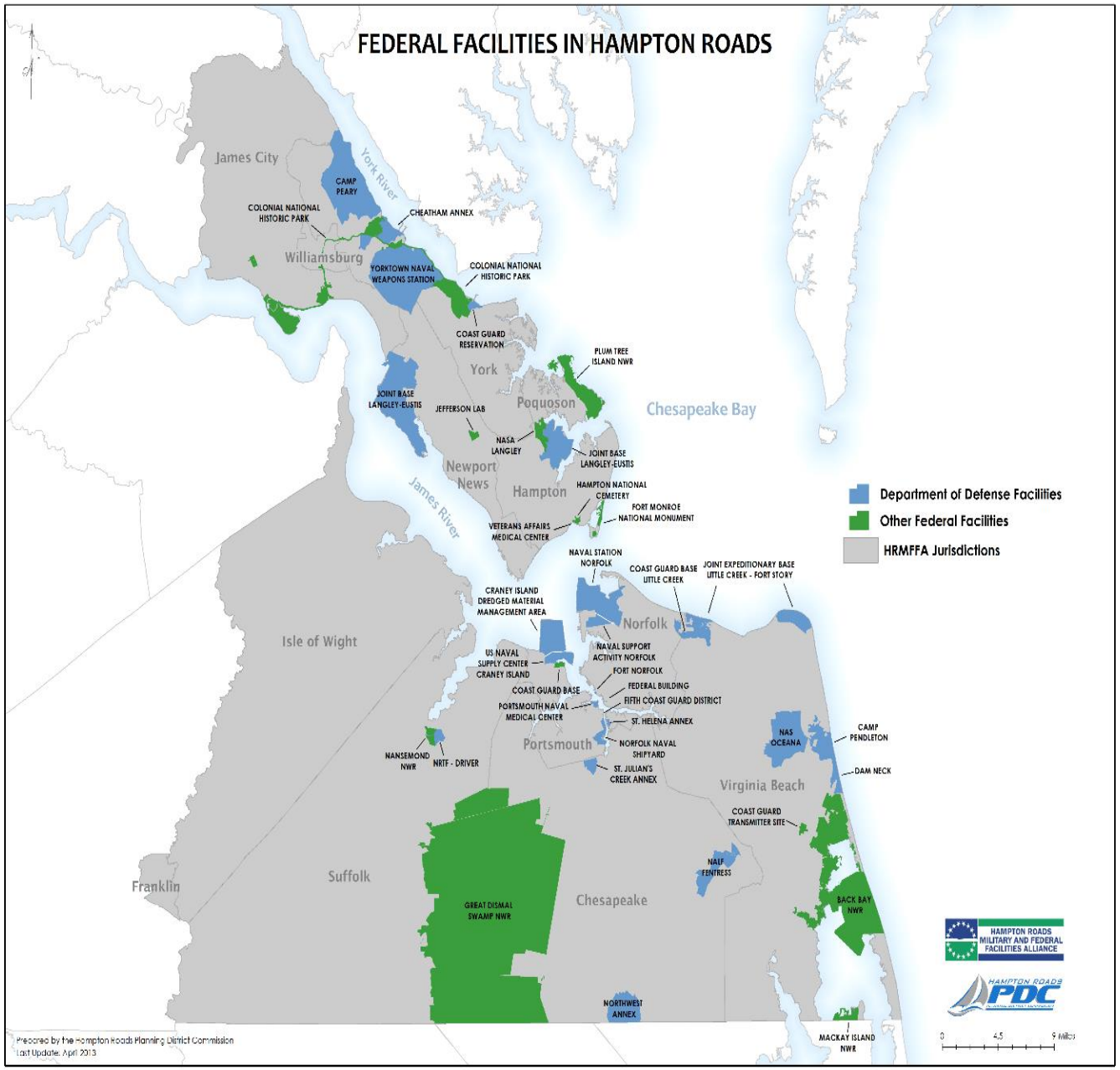
US Navy File Photo

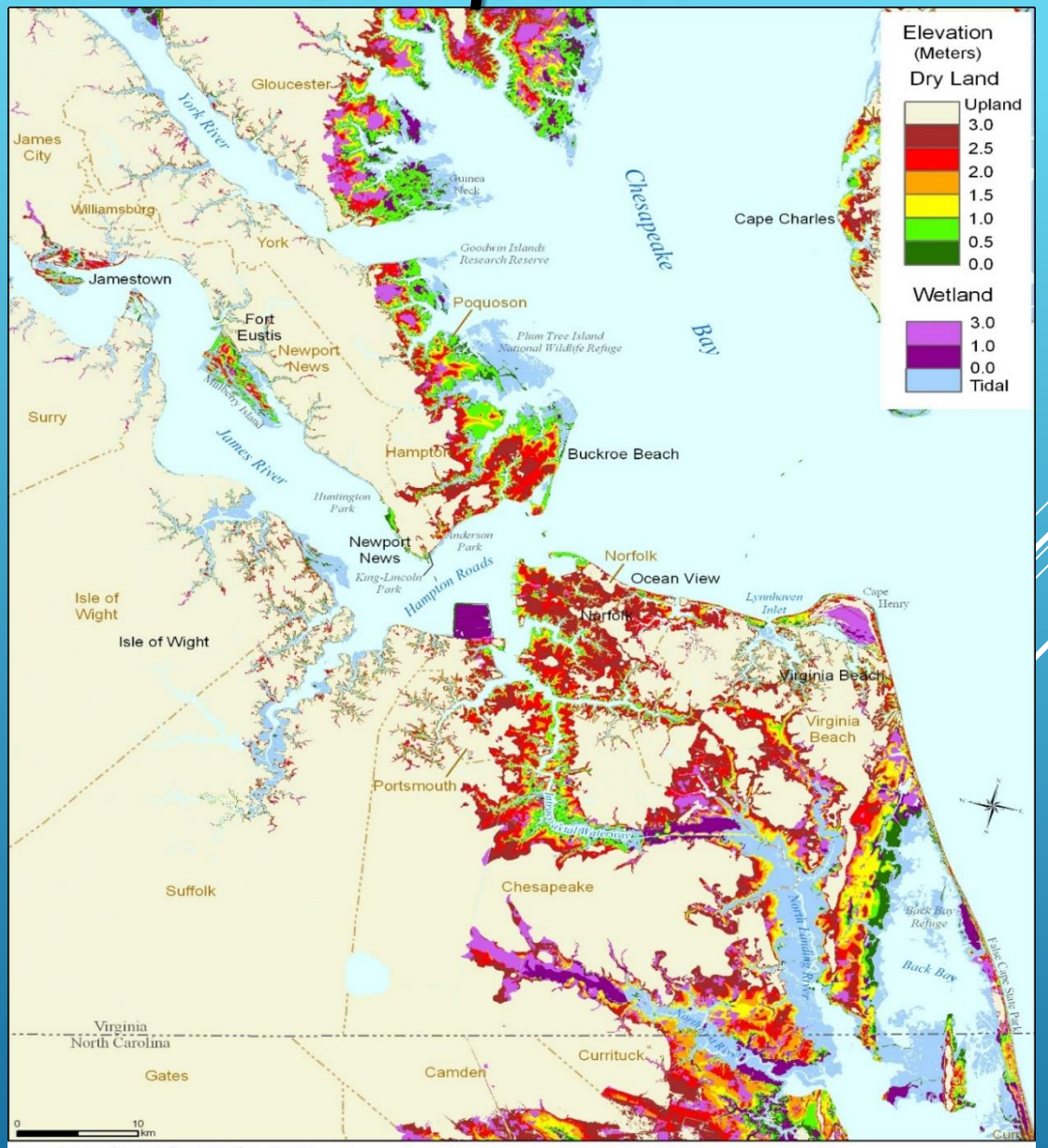
ISABEL 2003

Photo courtesy of Virginia Beach Fire Department and WAVY 10 News

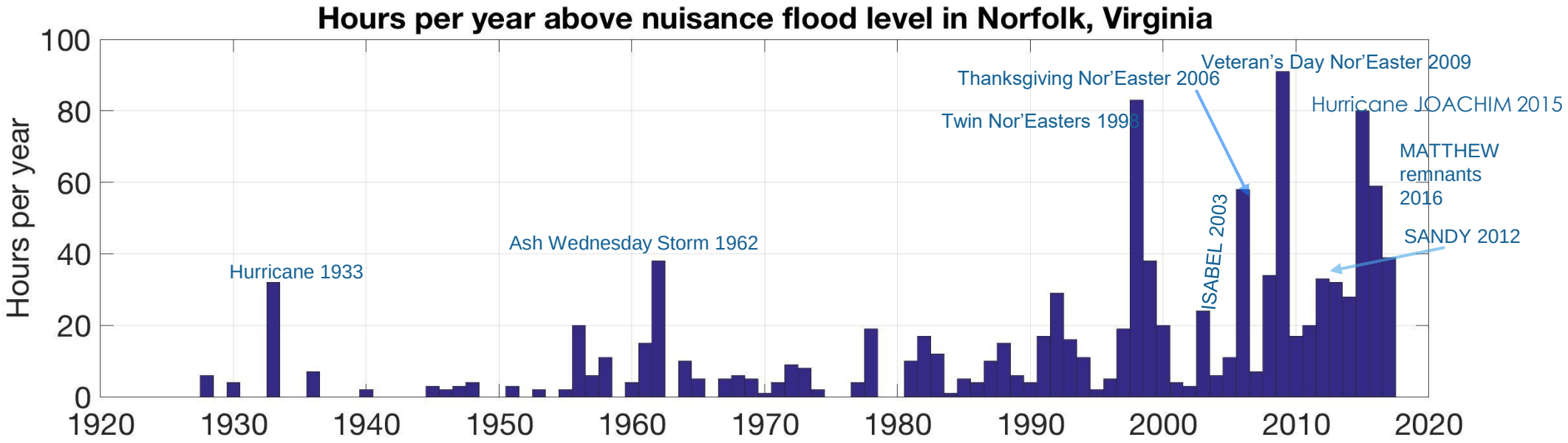
Pungo, July 2018

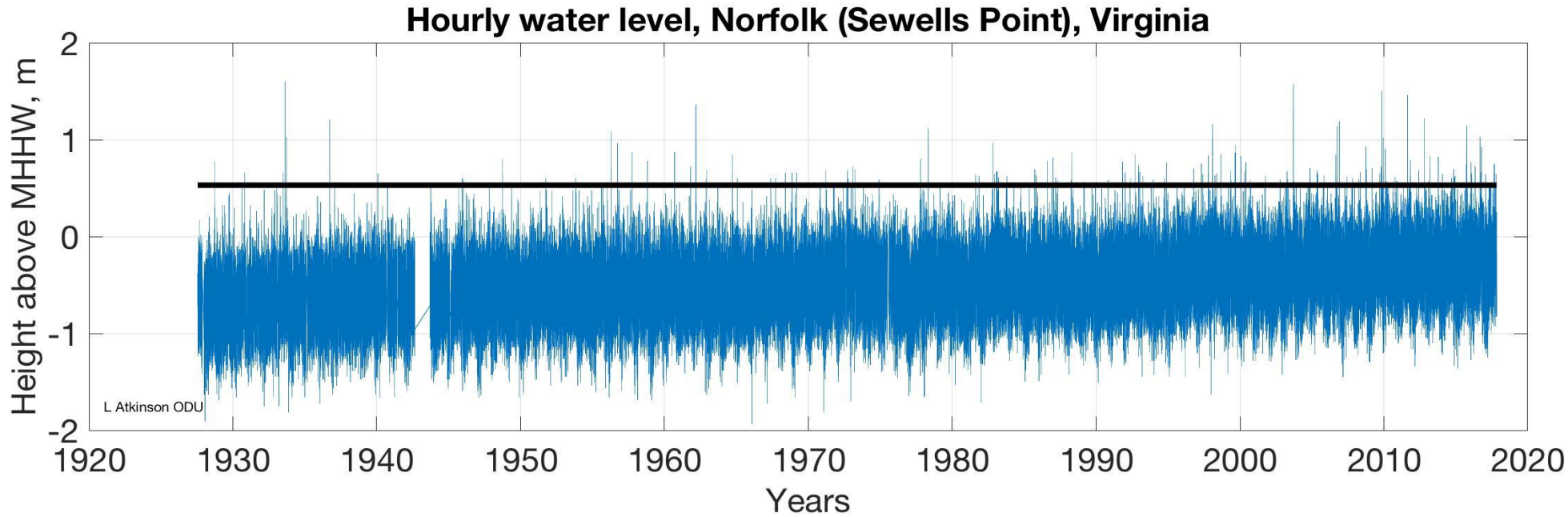
Federal Facilities with Elevation . . . For Comparison





Elevations of Land Close to Sea Level
Elevations are above spring high water, which is the average high tide during new and full moons, and approximately the inland boundary of tidal wetlands. This map is a general graphical representation of elevations in the area depicted, not designed to estimate the precise elevations at specific locations. Actual elevations at specific locations may be 75 cm above or below the elevation shown.
Source: J.G. Titus and J Wang. 2008. "Maps of Lands Close to Sea Level along the Mid-Atlantic Coast".
US Environmental Protection Agency.





Nuisance Flood Value = 0.53m indicated

Source: DR Larry Atkinson, Professor Emeritus, ODU, 2017

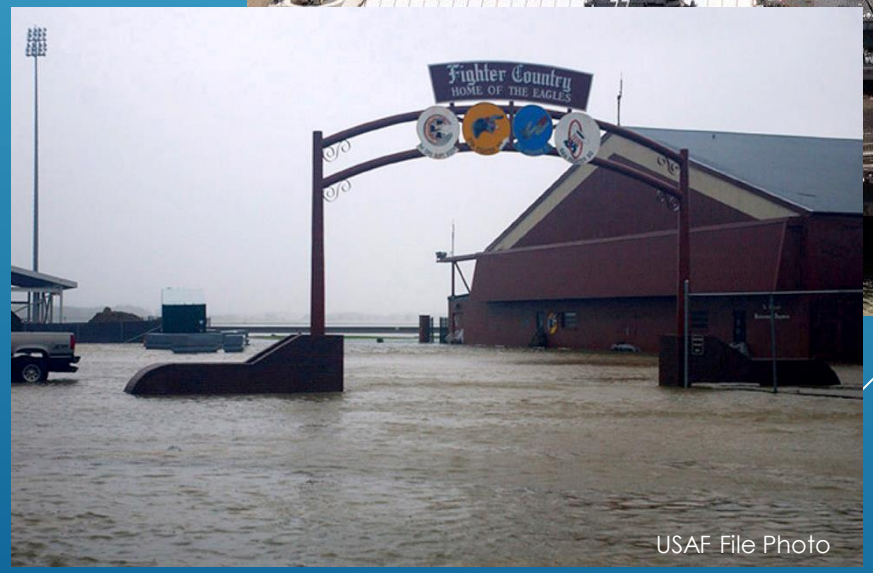
So, What have we done?

Regional Studies/ Projects/ Assessments:

- Hampton Roads Resilience Forums 2012 to present
- HRPDC Resilience Impact studies 2009-2013
- HRTPO Military/regional transportation needs / SLR impact
- Norfolk 100 Resilient Cities / Resiliency Officer 2013
- Dutch Dialogues Virginia - 2015
- Norfolk Resilience Plan - 2015
- plaNorfolk 2030/Vision 2100 - 2016
- Hampton Roads Integrated SLR Pilot Planning Project
  - 2014-2016
- Resilient Hampton Phase 1 - 2018

FEDERAL

- **Risk Quantification for Sustaining Coastal Military Installation Asset and Mission Capabilities (RC-1701) SERDP (Focus: Naval Station Norfolk) (prior to NOAA 2017 SLR Curve update)**
  - **Sea level rise – threat multiplier to mission sustainability**
  - **Increased risk to infrastructure**
  - **Critical systems incapacitated if SLR above 1.0 m**
  - **Planning must consider a 'tipping point' at SLR of 0.5 m when damage probabilities increase dramatically.**
- **NAVFAC Resiliency Planning Guide - 2017**
- **NASA/JB Langley-Eustis**
  - **Predictive Storm / Flooding Mapping Tool**
- **2018 NDAA Section 335 – By service at risk facility prioritization (top 10)**
- **2019 NDAA**



Flight Line 27th Fighter Squadron, Langley Air Force Base, Hampton, Virginia during Hurricane Isabel

PORT OF VIRGINIA

- Adjoins and/or similar infrastructure to Federal/DOD/regional infrastructure
- Port Resiliency Study 2017 w/Virginia Modeling Analysis and Simulation Center – ID vulnerabilities, dependencies, interdependencies – develop resilience planning processes
- DOT Hampton Roads Infrastructure Resiliency Quantification Initiative – in progress
- Tipping point (SERDP) will be an issue for both inside and outside the gate and the transportation infrastructure serving the sites: rail and road access also vulnerable.

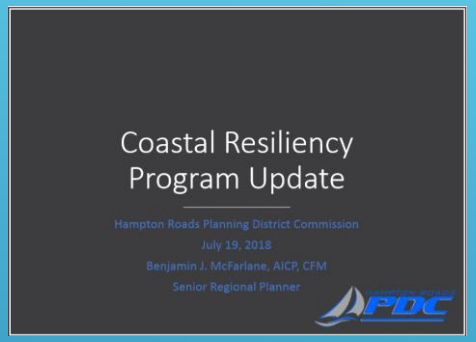
Courtesy of Port of Virginia

Courtesy of Port of Virginia

MOVING TO ACTION:

State:

- Commonwealth Center for Recurrent Flooding Resiliency - 2016
- Special Assistant to the Governor for Coastal Adaptation and Protection - 2018



Region:

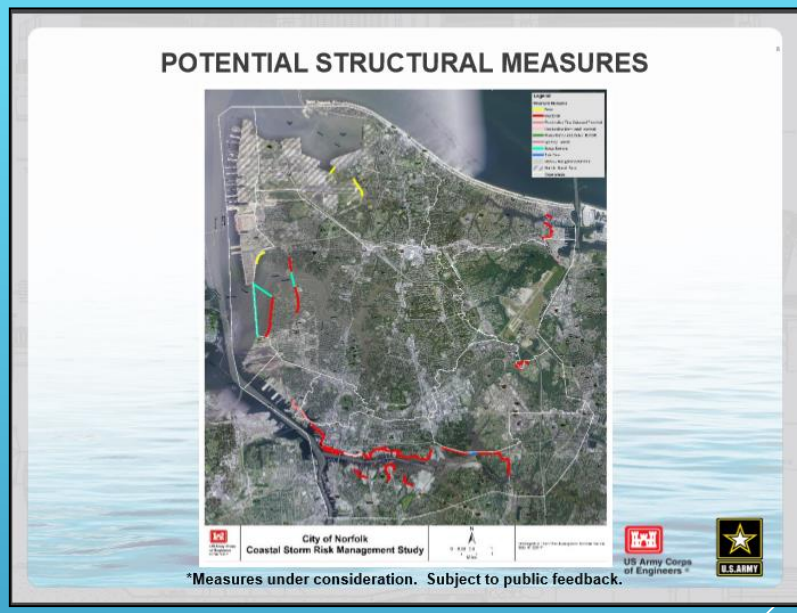
- HRPDC Coastal Resiliency Committee 2016
- HRPDC Board Sea Level Rise Subcommittee July 2018
- HRPDC Coastal Resiliency Program Goals - 2018; Develop, Coordinate, Advocate, Implement (Regional Focus)
  - Flood Insurance Community Engagement Plan
  - Sensor network

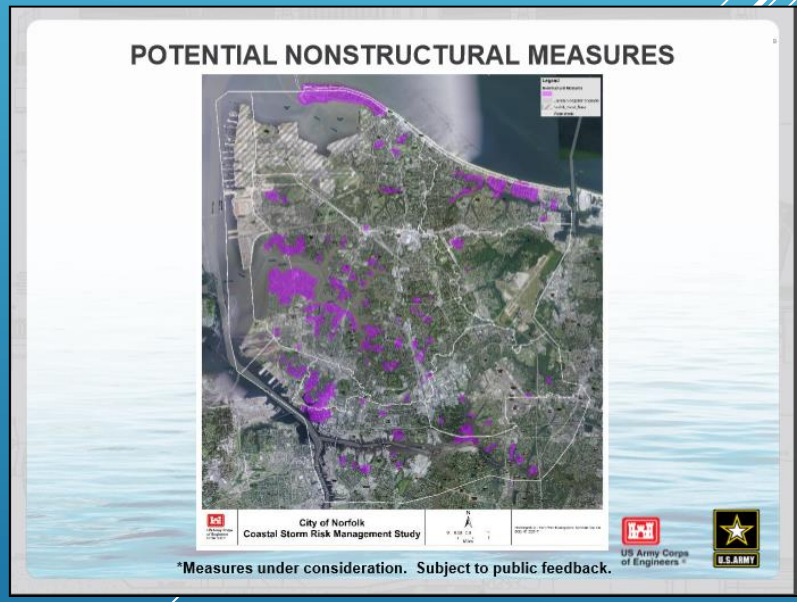
Cities:

- Norfolk USACE 3x3x3 Coastal Storm Risk Management Study 2018 (2019 WRDA pending)
- Norfolk NDRC Grant/RISE Coastal Resilience Inc.
  - Chesterfield Heights Ohio Creek 2016
  - State of Virginia ThRIVe: Resiliency in Va 2015
- Va Beach 4$M SLR and Recurrent Flooding Response Plan and Precipitation Analysis – in progress
- Norfolk 2018 Zoning Ordinance
- OSD/OEA Joint Land Use Study – 2017 - 2019
  - Norfolk/Va Beach
  - Portsmouth/Chesapeake

Ashville Park, Virginia Beach
MATTHEW 2016

Photo Courtesy of City of Virginia Beach





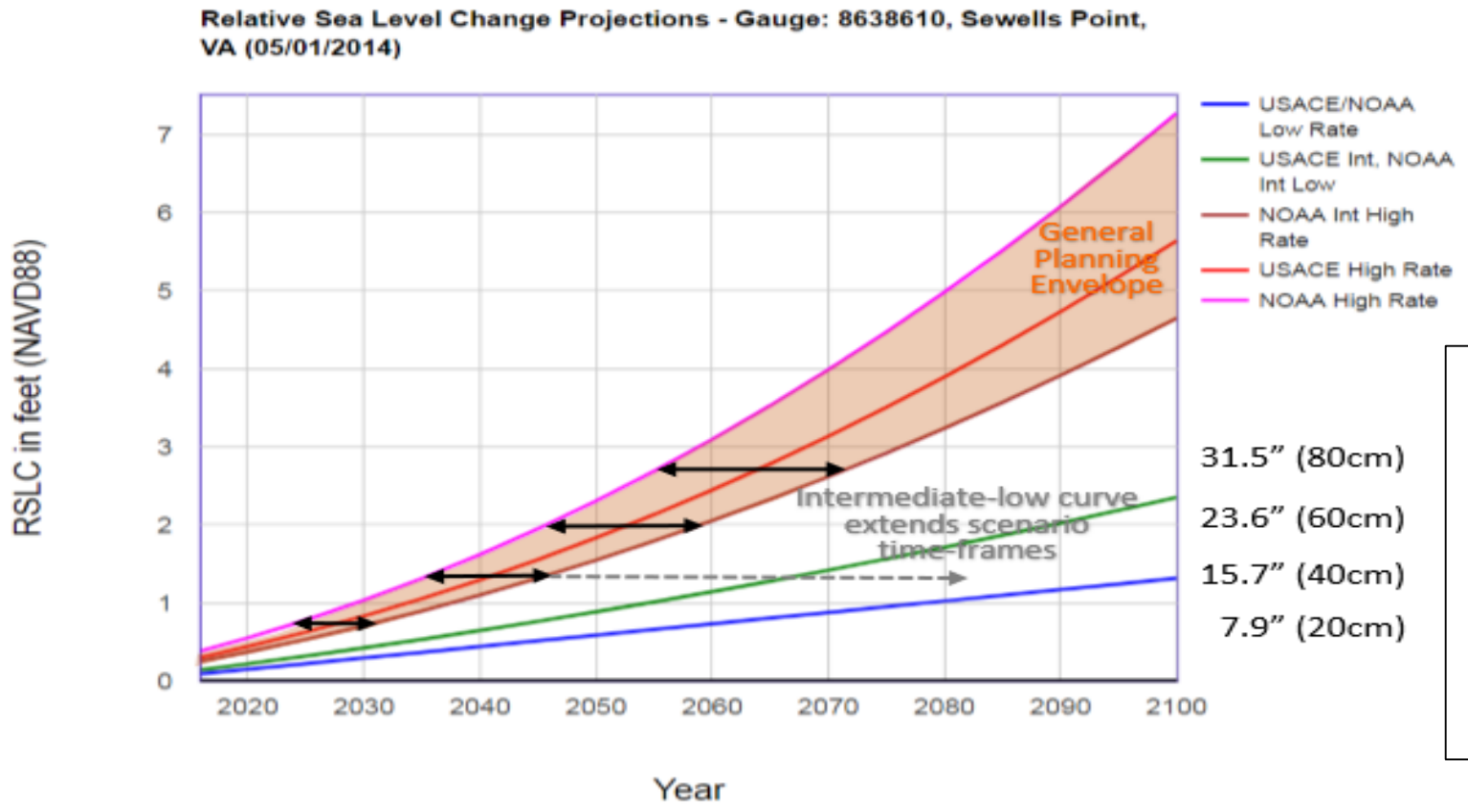


Figure 1. Relative Sea Level Projection Curve for Sewell's Point Tide Gage using US Army Corps of Engineers Sea-Level Change Calculator (v.2017.42) (last accessed 6 June 2017.) The graphic portrays NOAA and USACE curves, general planning envelope between intermediate-high and extreme curves (orange fill), and the NOAA published rate of 0.01457 feet/year (4.44mm/yr) for regional subsidence (http://www.corpsclimate.us/ccaceslcurves.cfm). Arrows depict time ranges for relative sea level curve scenarios within the planning envelope between NOAA High and Intermediate-High SLR) that are used in subsequent modeling of storm surges and tidal flooding.

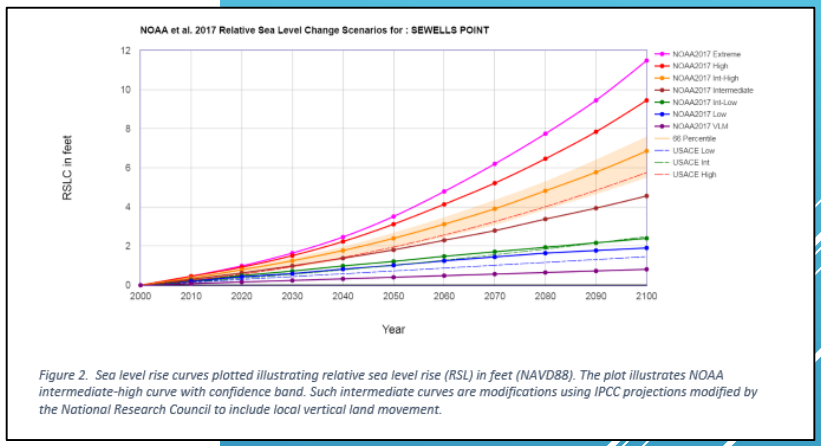


Figure 2. Sea level rise curves plotted illustrating relative sea level rise (RSL) in feet (NAVD88). The plot illustrates NOAA intermediate-high curve with confidence band. Such intermediate curves are modifications using IPCC projections modified by the National Research Council to include local vertical land movement.

LONG TERM IMPACT

Source: Transportation Research Record: http://journals.sagepub.com/doi/figure/10.1177/03611981774234

SUMMARY:

- Regional science and engineering-based opportunities to share information expand collaboration over time.
- Public Education and inclusion in the collaborative process is critical.
- Political motivations must be understood and addressed.
- National Security implications for this region require urgent action.
- Federal, State, and Local stakeholders and governance structures add complexity to the regional collaborative challenge for Hampton Roads.

NEXT STEPS/HAMPTON ROADS:

- Establish Regional "Special District / Political Subdivision" under Virginia State Law
- Educate and Incentivize
- Engage Regional business community
- Develop Regional Master Plan of Actions and Milestones
- Develop coordinated Regional/State/Federal funding strategies.

Courtesy of WAVY 10 News/ Still Photo, American Resilience Project