



Norfolk:  
Resilient City

Commonwealth Joint Subcommittee on Coastal  
Flooding  
July 6, 2016



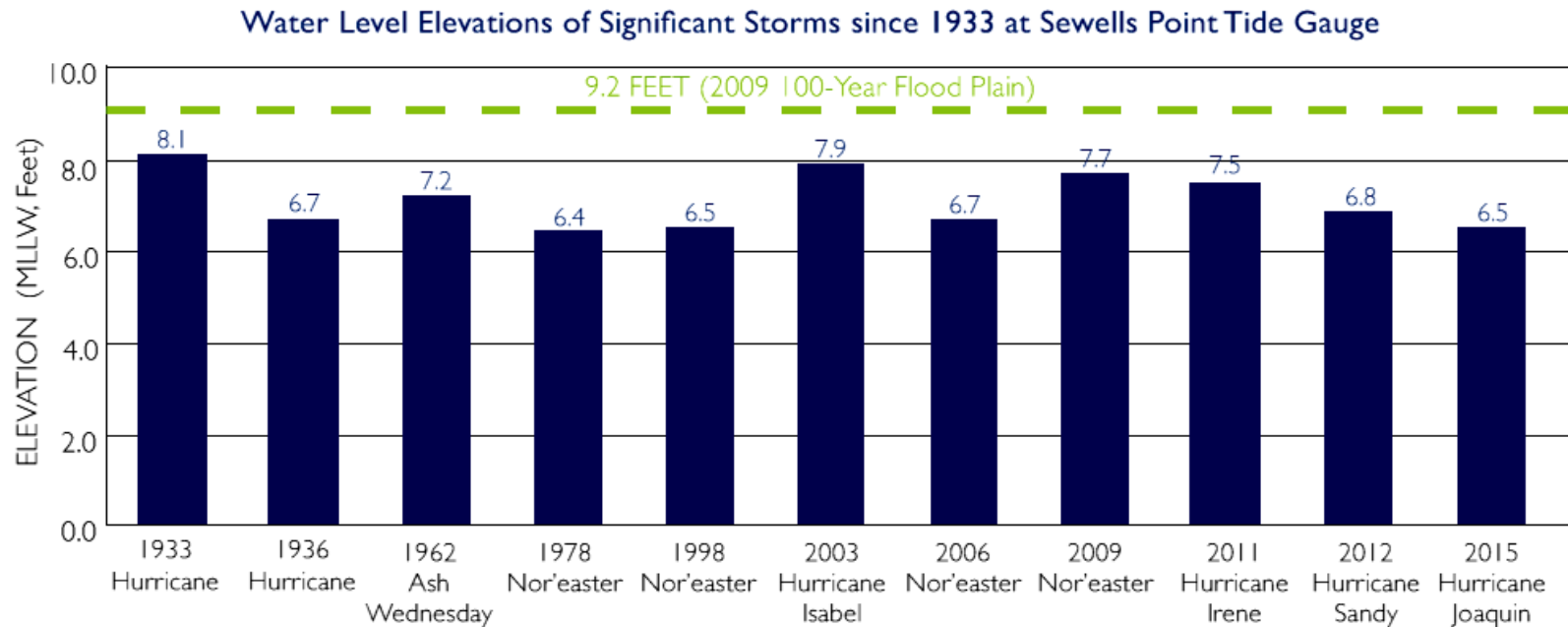
# Rockefeller Foundation's 100 Resilient Cities



Resilience is the capacity of individuals, communities and systems to **survive, adapt and grow** in the face of stress and shocks and even transform when conditions require it.

# Norfolk's Stresses & Shocks

## Increased Flooding



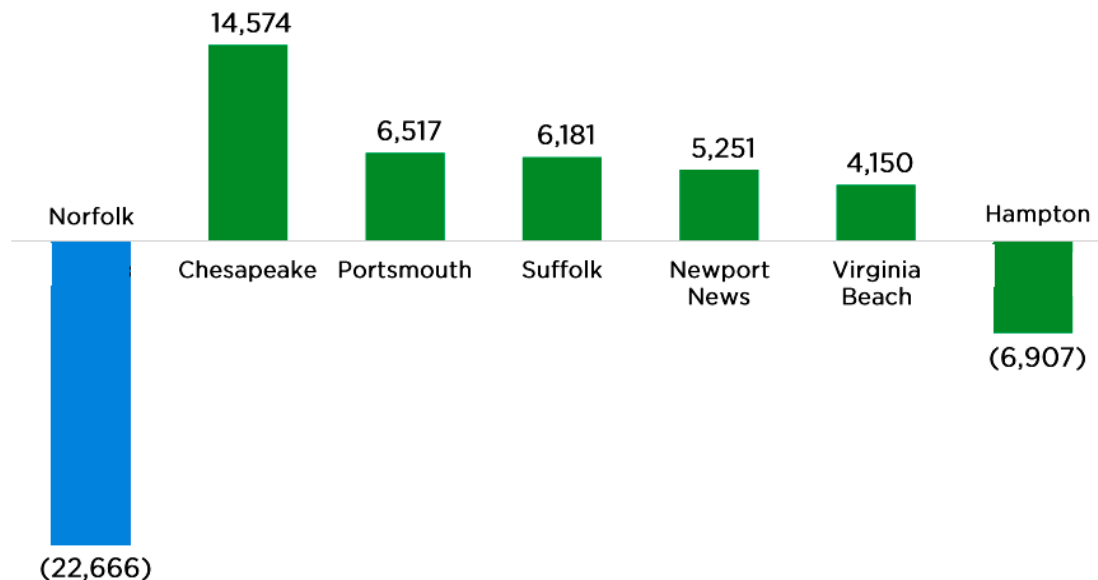
Source: NOAA; Sewells Point Tide Gauge, Norfolk

# Norfolk's Stresses and Shocks

## Over-reliance on Federal Spending

### Absolute change in jobs (2001-2014)

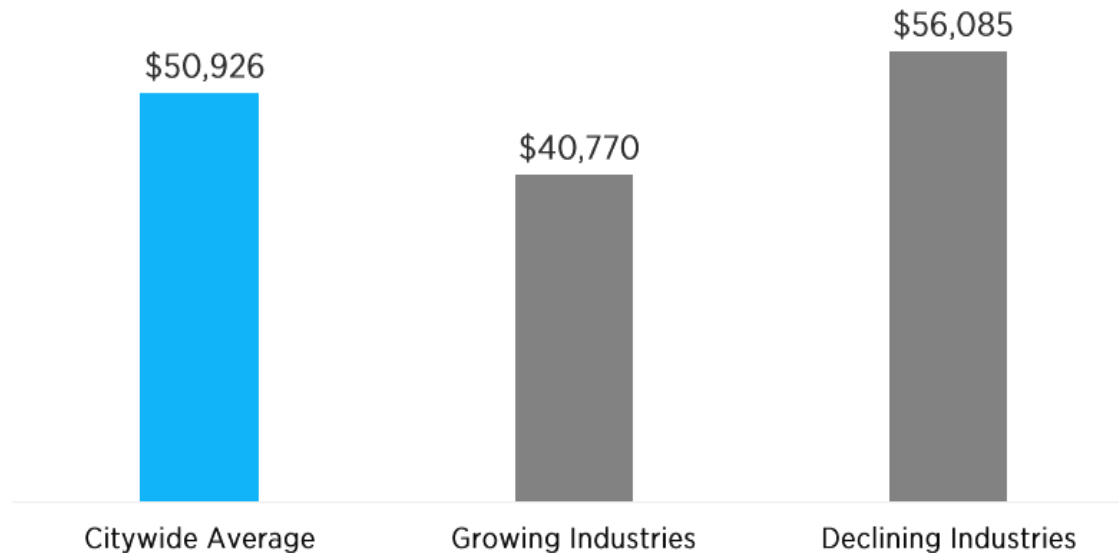
Norfolk has lost a substantial number of jobs, while most other cities gained jobs.



# Norfolk's Stresses and Shocks

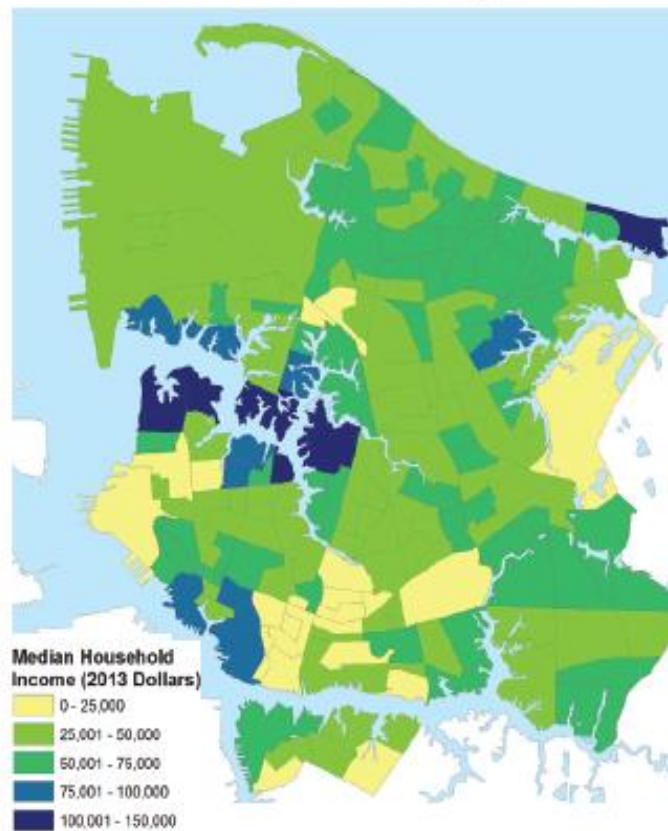
## New Jobs Pay Less

Industries in which Norfolk is gaining jobs have lower wages than industries in which Norfolk is losing jobs.



# Norfolk's Stress and Shocks Concentrated Poverty

Median Household Income by  
Census Block Group, 2013



Source: ESRI

## Norfolk's Resilience Strategy

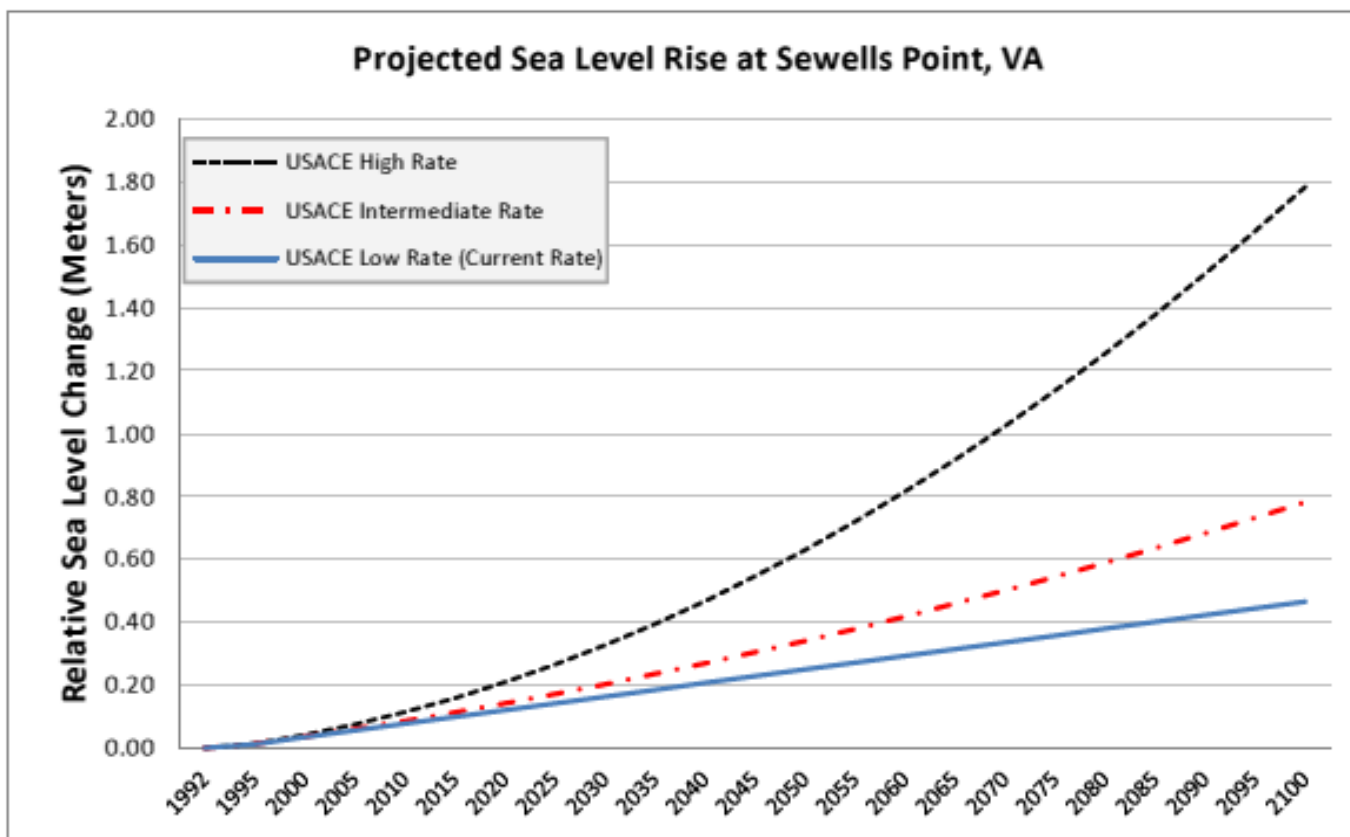
- Goal 1: Design the coastal community of the future
- Goal 2: Create economic opportunity by advancing efforts to grow existing and new industry sectors
- Goal 3: Advance initiatives to connect communities, deconcentrate poverty, and strengthen neighborhoods

Milan \* New York City \* Quito  
 Melbourne \* Boston \* Bangalore  
 Rotterdam \* Athens \* Paris  
 Dakar \* Juarez \* Phnom Penh  
 Thessaloniki \* Norfolk, Virginia  
 Medellín \* Bangkok \* Rio de  
 Janeiro \* Barcelona \* Los Angeles  
 Rome \* Chicago \* Da Nang \* New  
 Orleans \* Cali \* Kigali \* Huangshi  
 Singapore \* Mexico City \* Lisbon  
 Santiago de los Caballeros \* San  
 Francisco \* Belgrade \* Ramallah  
 Glasgow \* Montreal \* Mandalay  
 Accra \* Jacksonville \* London  
 Toyama \* Ashkelon \* El Paso  
 Dallas \* Jacksonville \* Pittsburgh  
 San Juan \* Durban \* Semarang  
 Sydney \* Amman \* Vejle \* Enugu  
 Porto Alegre \* Surat \* Santiago  
 Metropolitan Region \* Deyang  
 Wellington City \* St. Louis \* Byblos  
 Arusha \* Christchurch \* Tulsa  
 Chennai \* Oakland \* Bristol  
 Santa Fe \* Berkeley \* Boulder

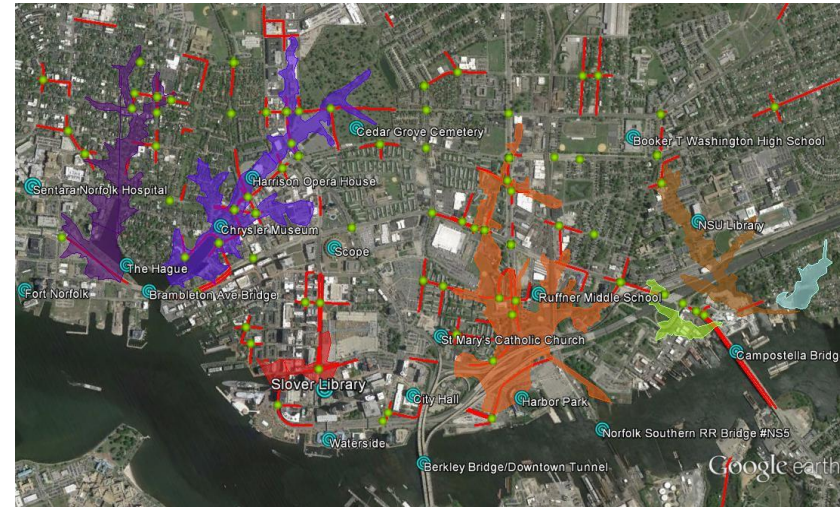


# Sea Level Rise Projections

## High Level of Uncertainty



# Evolution of Strategy—Virginia Dutch Dialogues

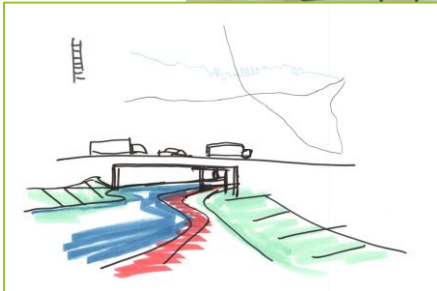
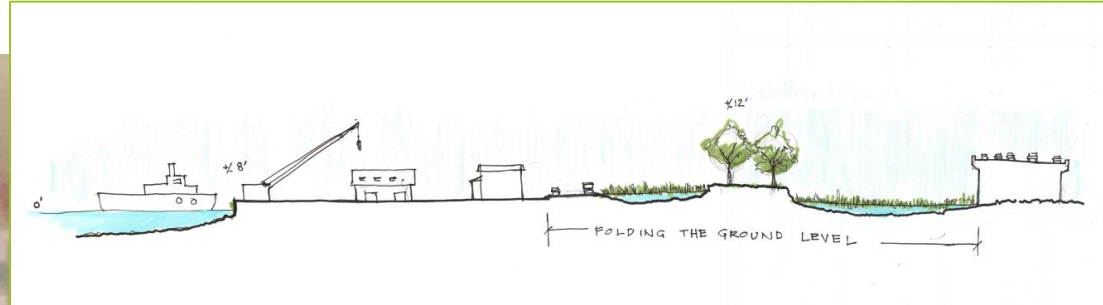




# Coastal Flooding-Rain Meets Coastal Surge



# Rising to Resilience



# Work Underway

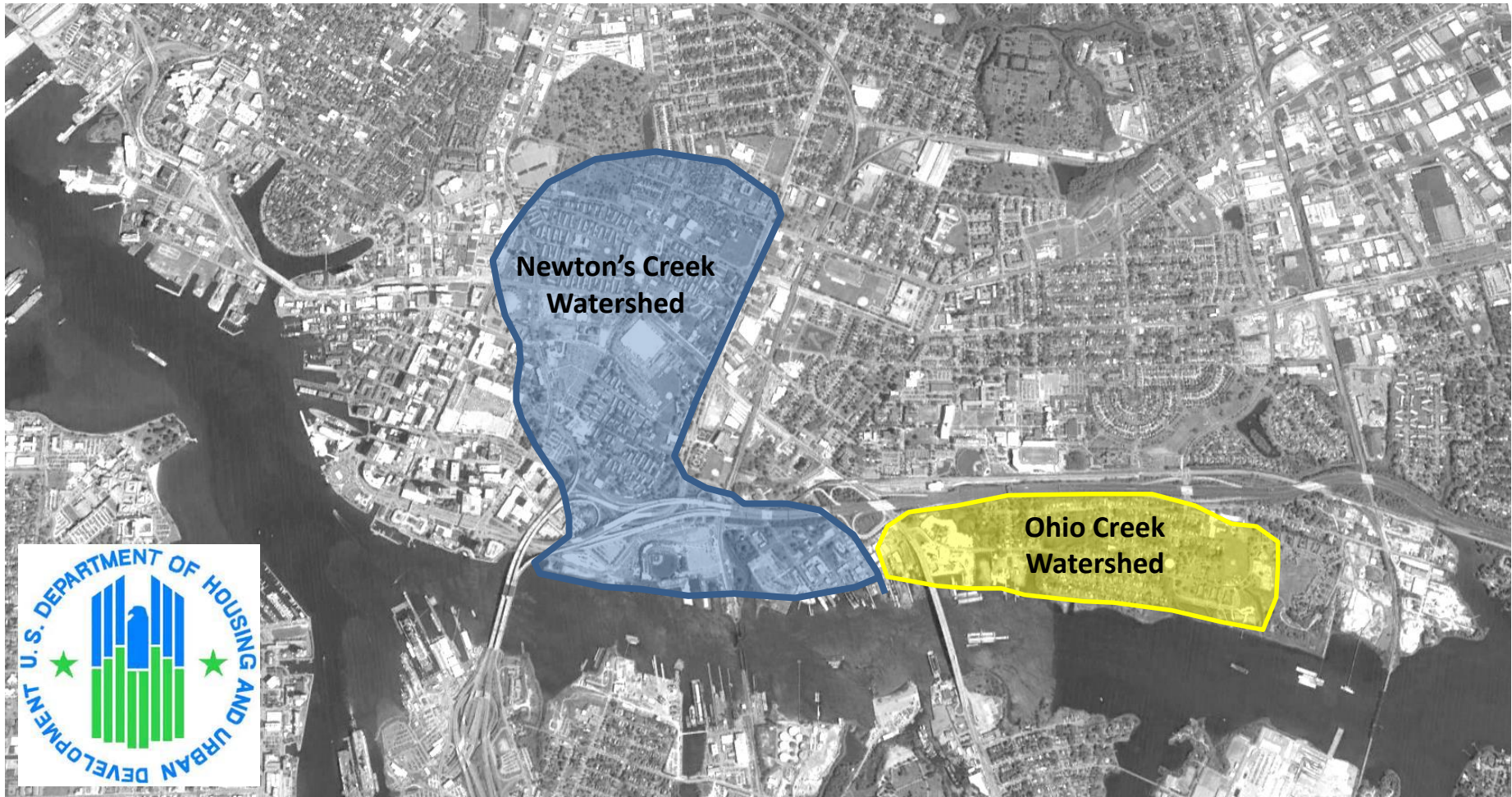
- New freeboard requirements in flood plain
- Comprehensive update of Norfolk's zoning code
- Vision 2100 community visioning process
- Retain Your Rain workshops for citizens

# Work Underway

- USACE Norfolk Citywide Flood Risk Management Study
- HUD-NDRC Implementation—Planning & Design Phase
- Joint Land Use Study—Sea Level Rise Impact

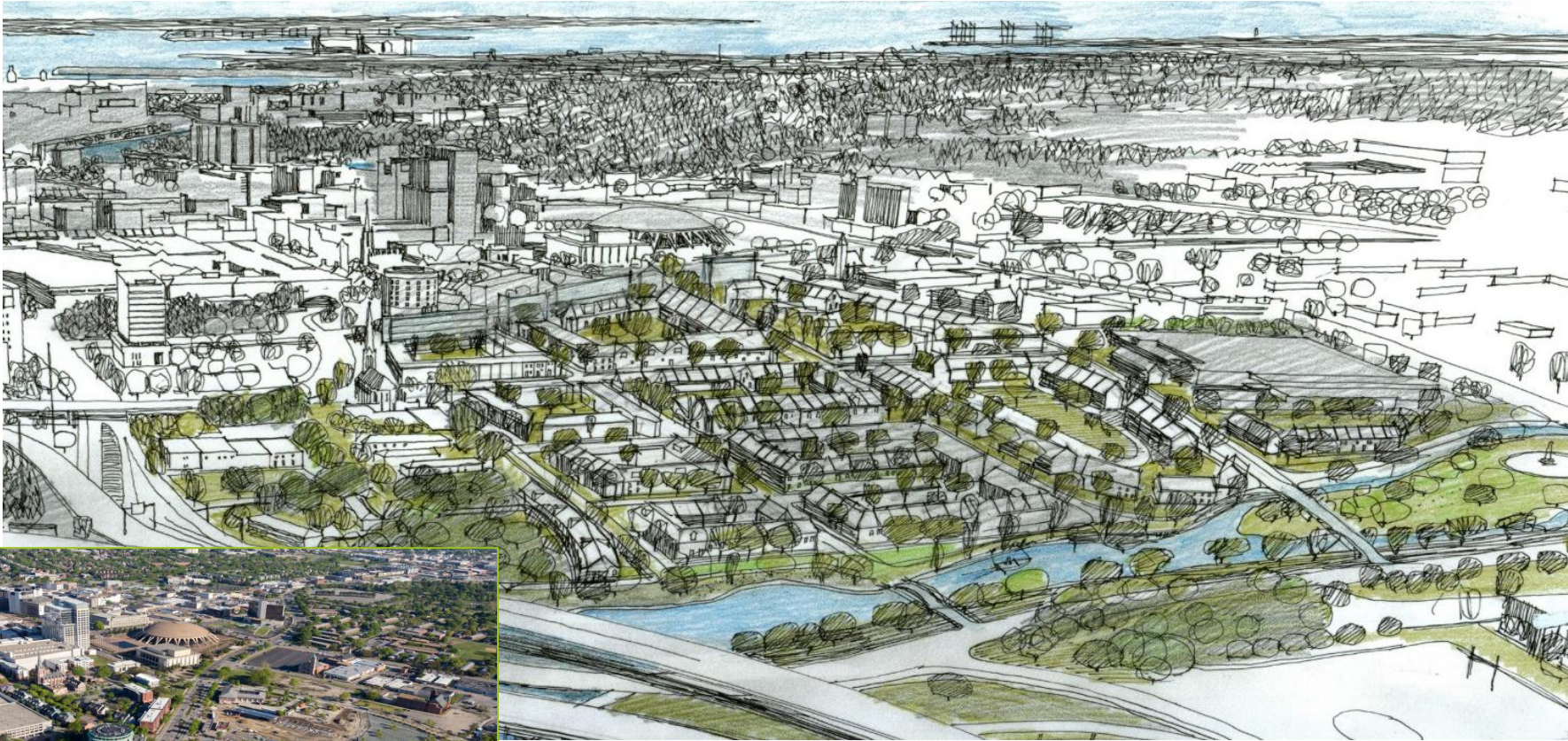


# National Disaster Resilience Competition





# Newton's Creek Watershed



Mac Ball, Waggoner & Ball Architects





# Harbor Park



Mac Ball, Waggoner & Ball Architects





# Designing the Coastal Community of the Future

Ohio Creek Watershed--\$115M

Coastal Resilience Accelerator--\$5M





# Ohio Creek Watershed Potential Landscape Elements



**Waterfront  
Parks**



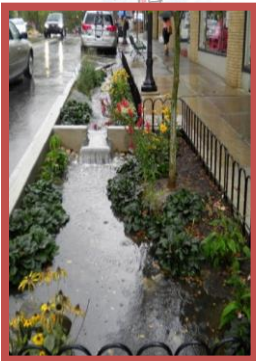
**Retention  
Ponds**



**Permeable  
Parking Lanes**



**Rain Gardens**



**Constructed Wetlands**



**Protected  
Coastal Wetlands**



# Coastal Resilience Laboratory/Accelerator

## Opportunity

- More than 50% of the population and U.S. economic activity are in coastal counties
- HR is a nexus of trade and a global security center
- Region has access, attention, and is already leading
  - Access to 100 Resilient Cities (potential markets),
  - \$120M federal grant to support water management innovation (new market for innovation);
  - ODU Pilot for White House
  - Joint Land Use Study on Impact of Sea Level Rise
  - USACE Flood Risk Management Study (1 of 3 funded)



# Coastal Resilience Laboratory/Accelerator

## Laboratory/Accelerator Functions

- Broker between
  - Companies and clients to identify resilience problems to be solved
  - Innovators and the city laboratories
  - Companies and potential markets through 100 RC Network
  - Innovators and potential investors
- Lender
  - Provides loans to promising companies
- Innovation Incubator
  - Runs competitions to surface innovation around specific problems
  - Provides services and temporary space for companies

# Acceleration Model

Identify  
Problems to  
be Solved

Access to Test  
Laboratories

Provide  
Capital

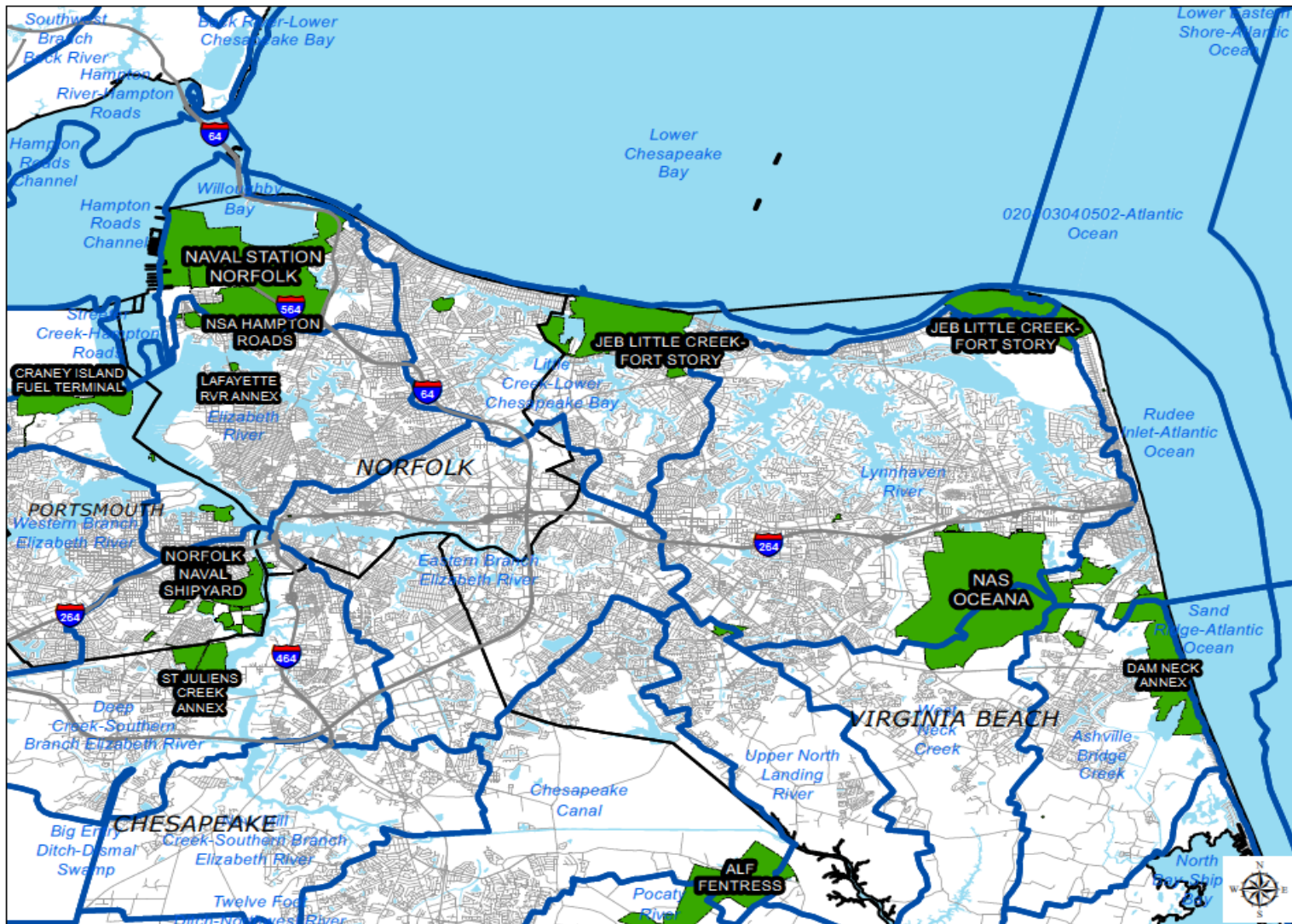
Provide a  
Market

# Joint Land Use Study

- Focus—Impact of Sea Level Rise
- Partners—OEA, Navy, Norfolk, Virginia Beach
- Sponsor—Hampton Roads Planning District Commission (HRPDC)
- Opportunity—where possible, to align the cities' and Navy's flood mitigation work to enhance mission readiness



# Joint Land Use Study





# Partnership with the Commonwealth

- Uniform Building Code--consider local resilience requirements
- Commonwealth Resilience Fund
- Coordination with Federal Partners
- Active Commonwealth agencies participation in regional/local resilience actions