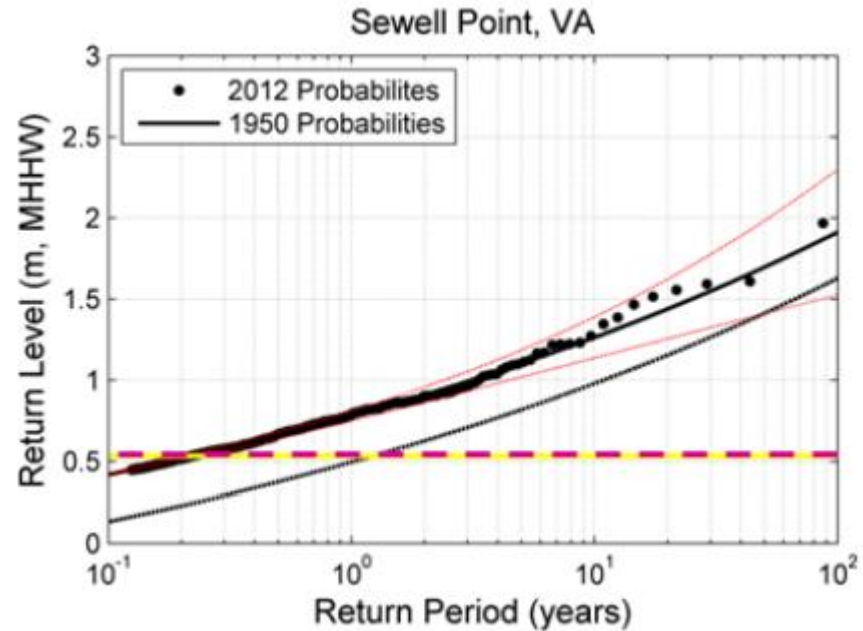
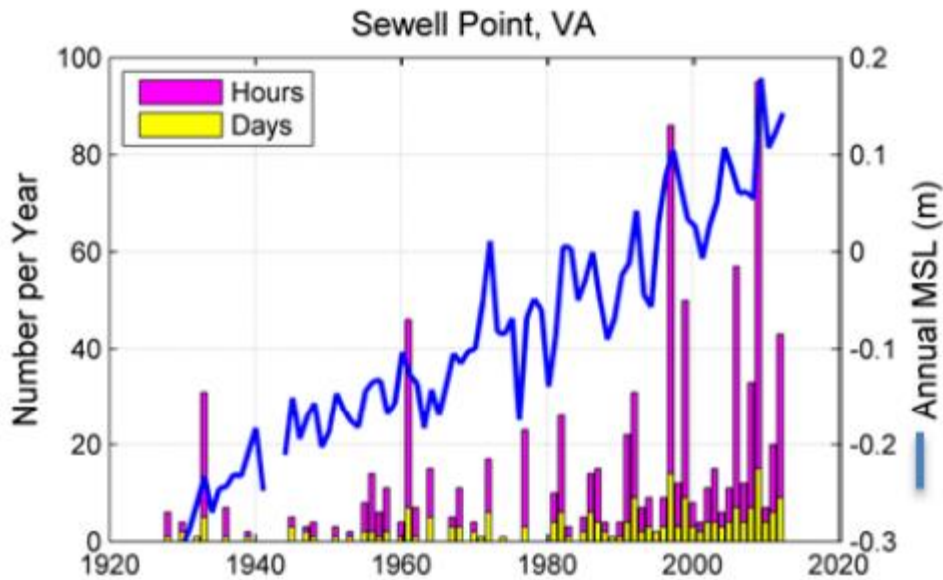




# Planning for SLR Resiliency in Virginia Beach

Brian Batten, Ph.D., CFM, Dewberry

# SLR and Recurrent Flooding



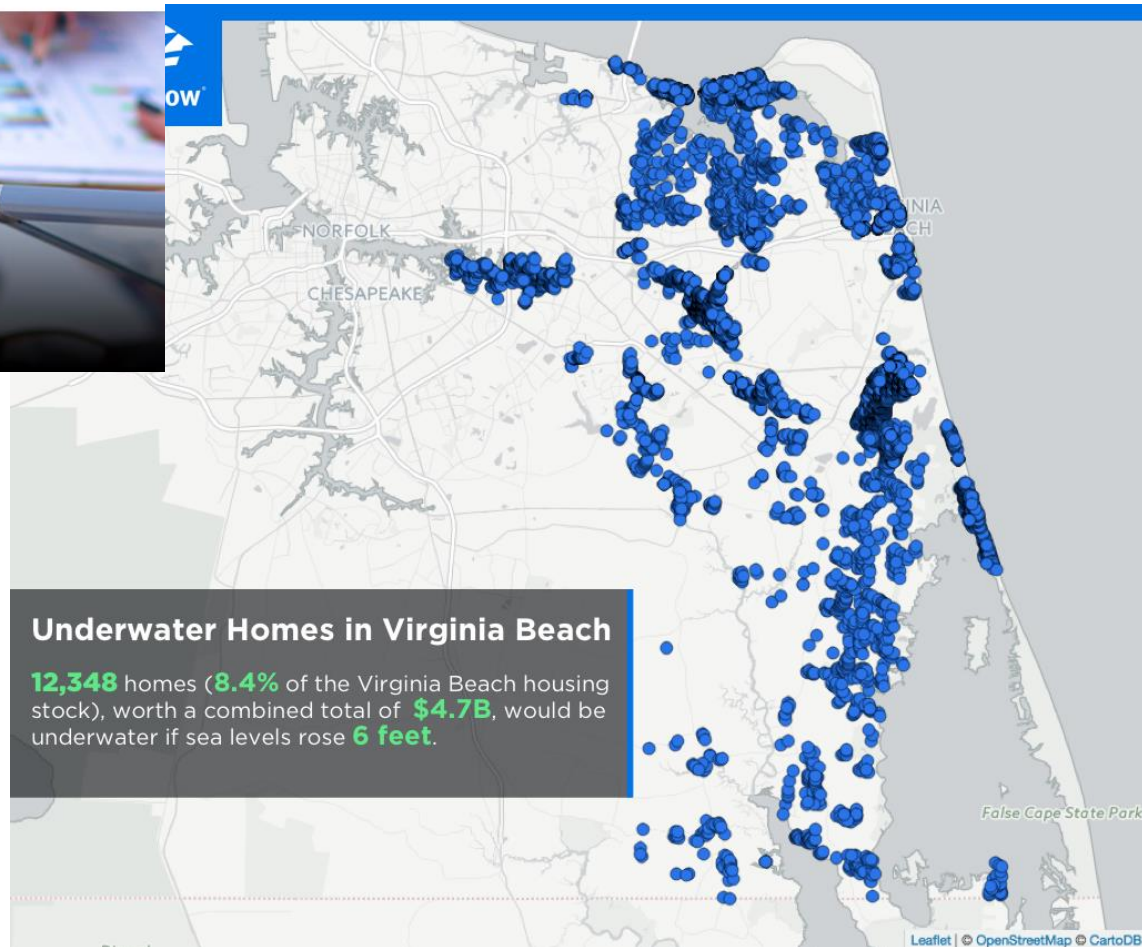
# Community Issues



# Future risk to real estate



- In fact, based on our calculations, it may turn out that actual water poses almost as much of a problem for the housing market in the future as negative equity has in the past.<sup>[1]</sup>



# Reflecting Sentiments

## Power for the People VA

[Home](#) [About](#)

As sea level rise accelerates, buying  
shorefront property becomes a game of  
musical chairs

*April 1, 2015 by Ivy Main*

- “So smart buyers—and landowners—have to consider not just today’s flood maps, but also ones that haven’t been drawn yet. If a rising sea will threaten property some decades from now, it will depreciate over time, like a car. At some point only chumps and climate deniers will buy.”

<https://powerforthepeopleva.com/2015/04/01/as-sea-level-rise-accelerates-buying-shorefront-property-becomes-a-game-of-musical-chairs/>

# Increasing Awareness

“Proximity to the water has long been a big selling point”...“some of the most desirable neighborhoods are right on the water.”

“The first question we get in most cases [from buyers] is, ‘Is it in a floodplain?’” said longtime Norfolk real estate broker Kathy Heaton.

“And if so, how much is the insurance?”

“We’re in the inspection, the agent gets a phone call and finds out that the flood insurance premium on this house would be \$3800 a year,” Heaton said, “way above what anybody who was going to buy this house could afford.”



# Flood Complaints

## Ocean Park Flooding



During the November and December 2009 northeasters, extreme flooding due to abnormally high storm tides and heavy rainfall occurred which impacted the Ocean Park neighborhood, among others. The City of Virginia Beach commissioned a study of these occurrences and the Draft report from Parsons Brinckerhoff was received and made available in November 2010, may be viewed by clicking

NEWSCHANNEL 3 TV SCHEDULE

NewsChannel 3  
TAKING ACTION  
GETTING RESULTS

NEWS MILITARY TAKING ACTION TRAFFIC SPORTS CONTESTS HEALTH TEAM 3 EVENTS WEATHER 60°

### Virginia Beach looks for long-term Shore Drive flooding fixes

POSTED 5:47 PM, APRIL 29, 2014, BY TODD CORILLO, UPDATED AT 09:55PM, APRIL 29, 2014

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60° Overcast  
The Virginian-Pilot  
PilotOnline.com

NEWS OPINION BUSINESS SPORTS LIFE OBITUARIES CLASSIFIEDS

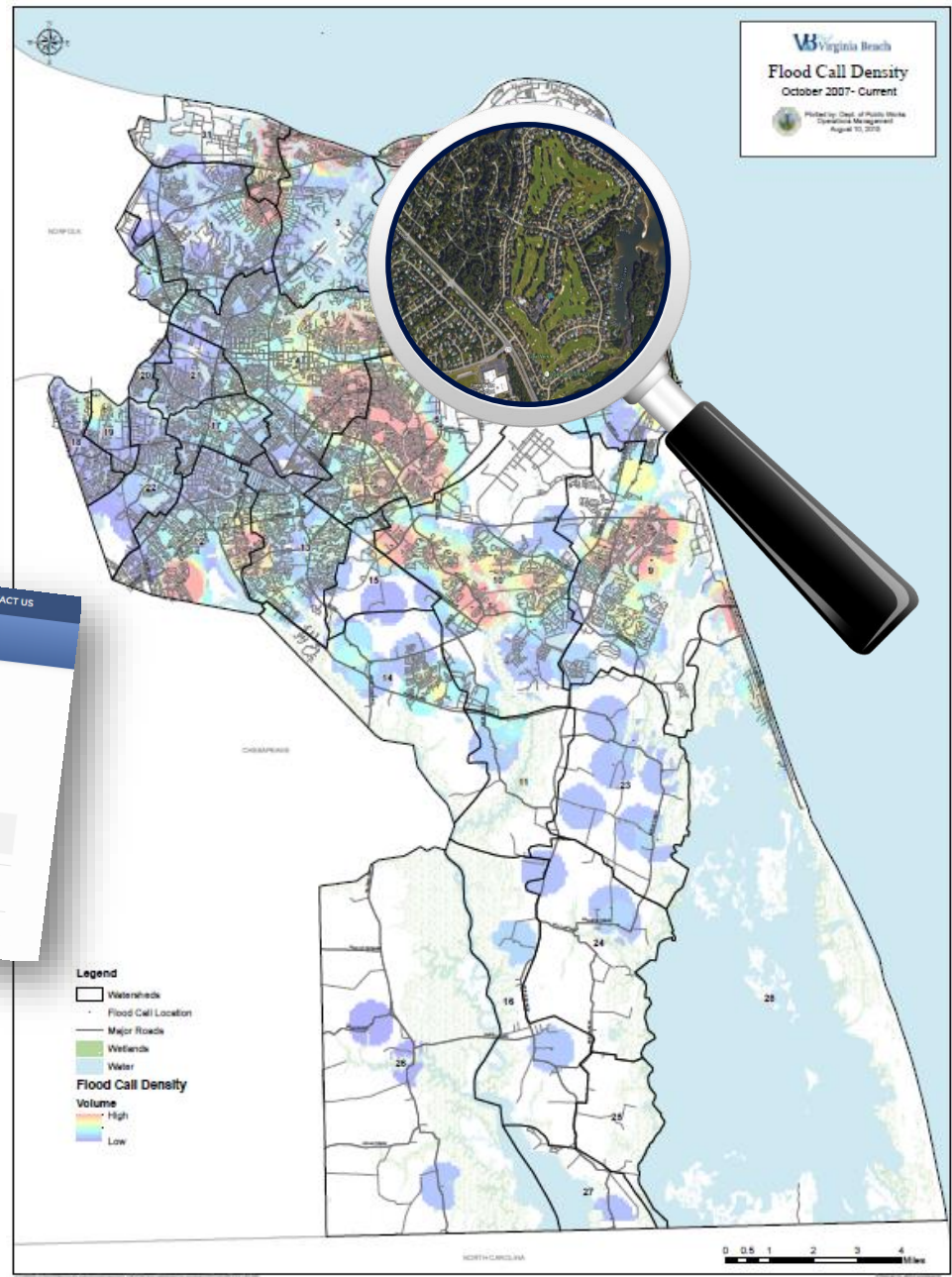
### LOCAL NEWS

#### Va. Beach residents seek answers about flooding

Selene D. Guerrero  
Dec 3, 2012

FOLLOW US

TODAY'S FORECAST



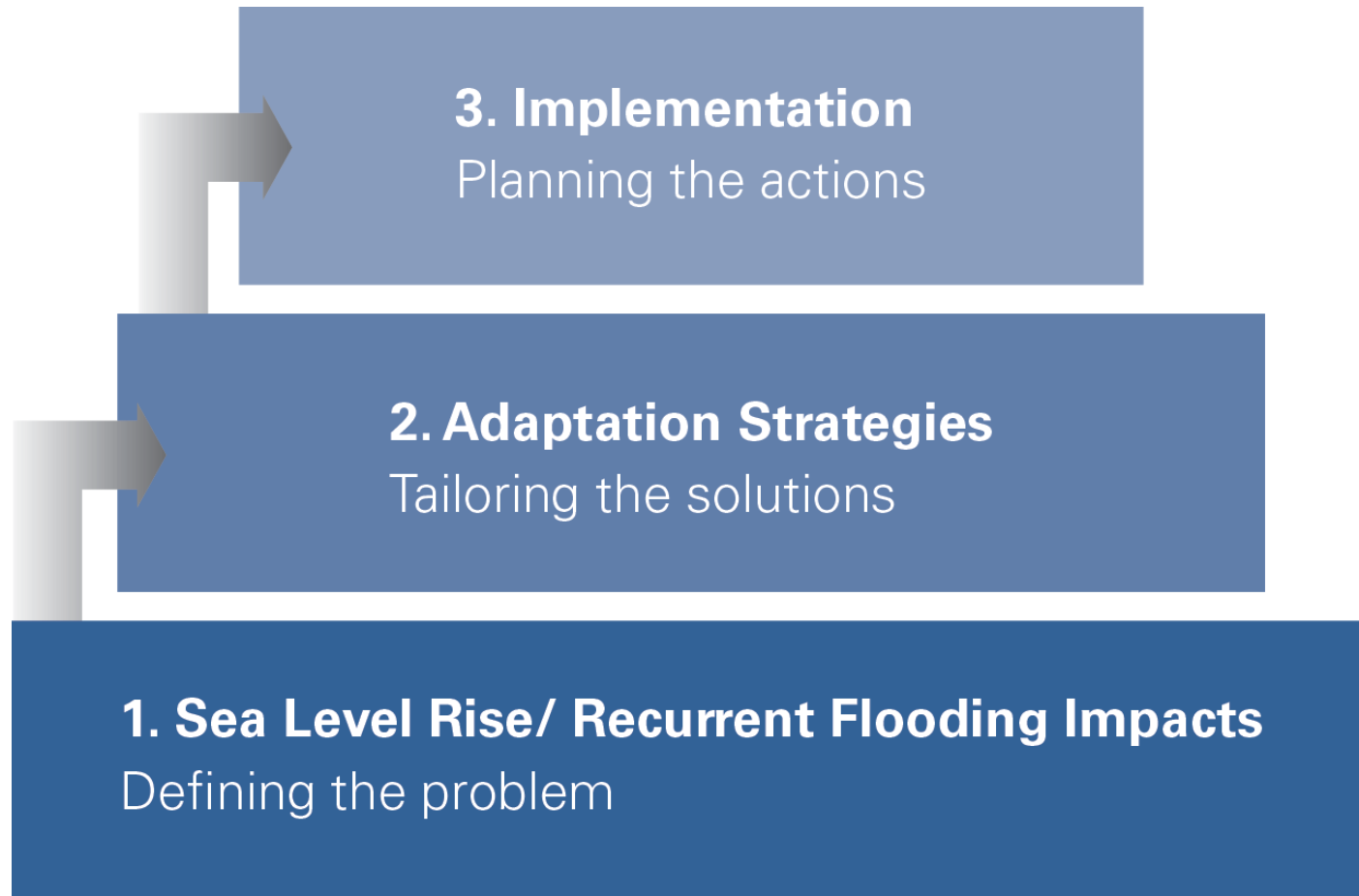
# “Trident Approach”

**Synergized  
Activities in Capital  
Improvement  
Program**

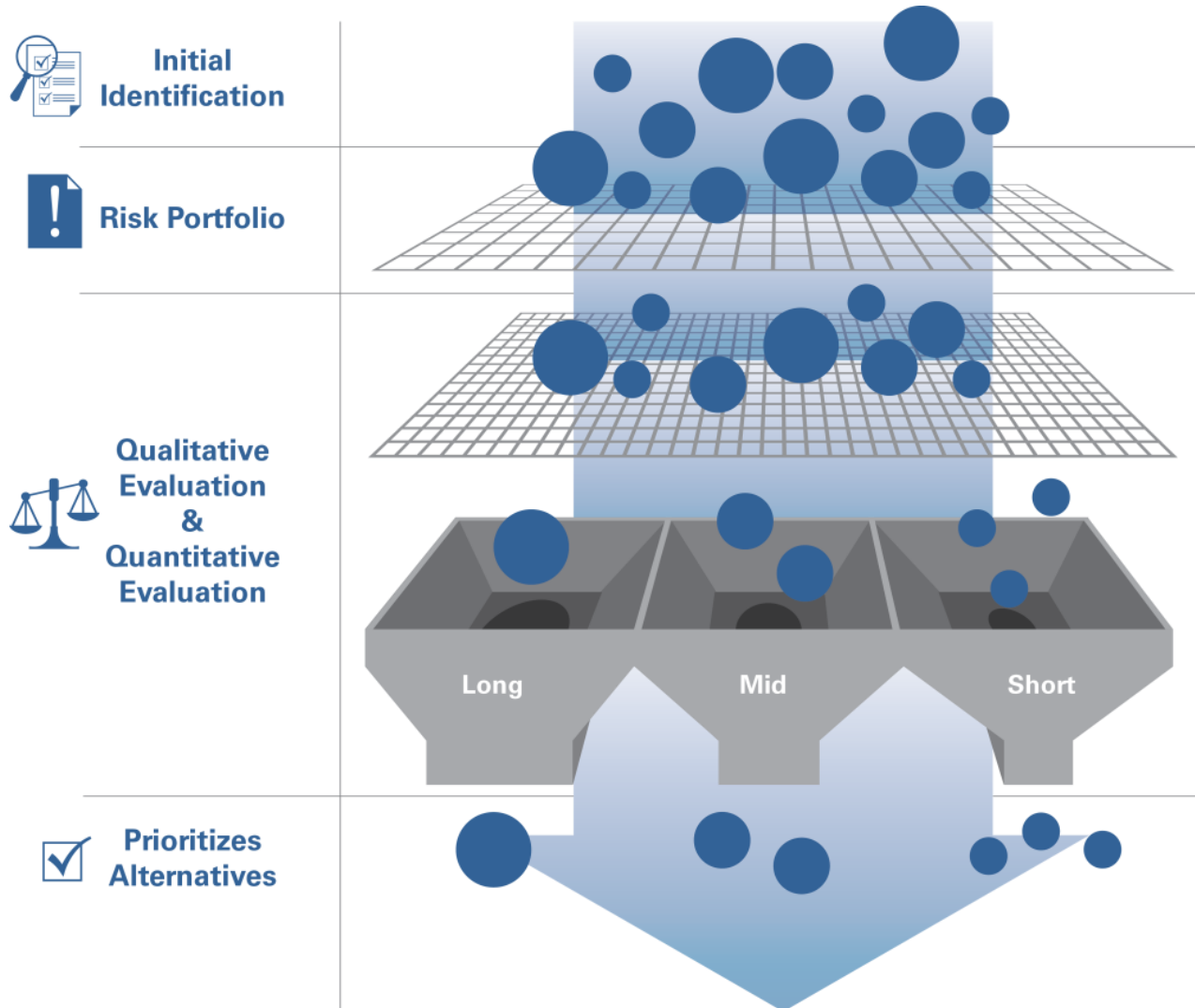




# Virginia Beach Comprehensive SLR Study



# Outcome-driven



# Menu of Strategies

## Non-structural

Short and Long-term  
Planning

Government Operations  
and Administration

Regulatory

Spending

Tax and Market-Based  
Incentives

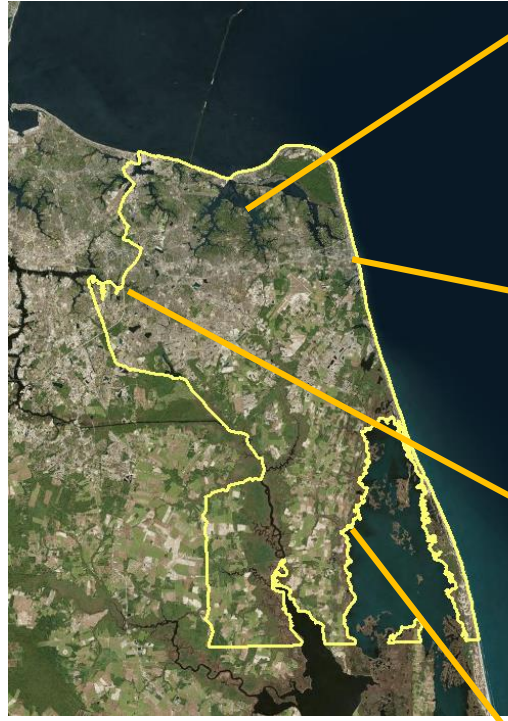
Public Awareness and  
Education





Funding

## Structural



# Environmental, Economic Diversity

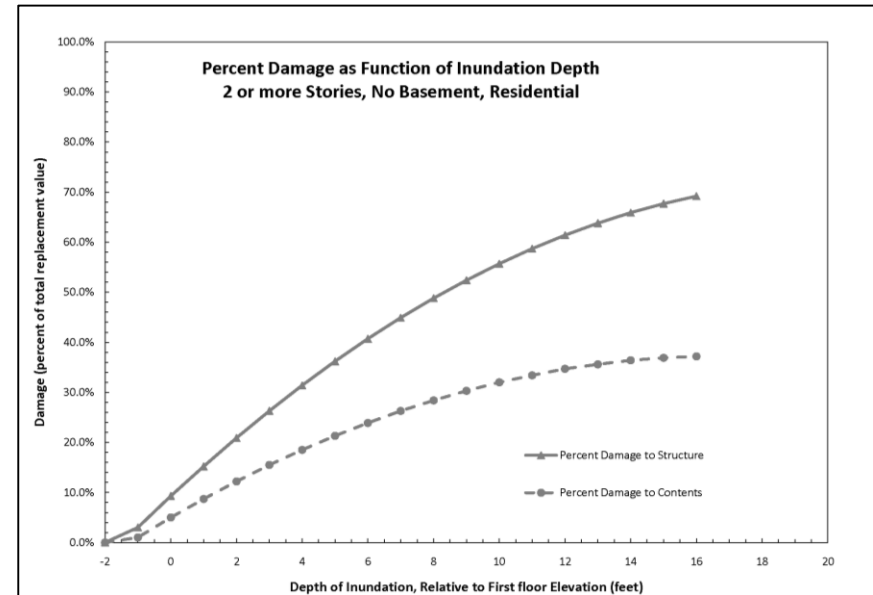
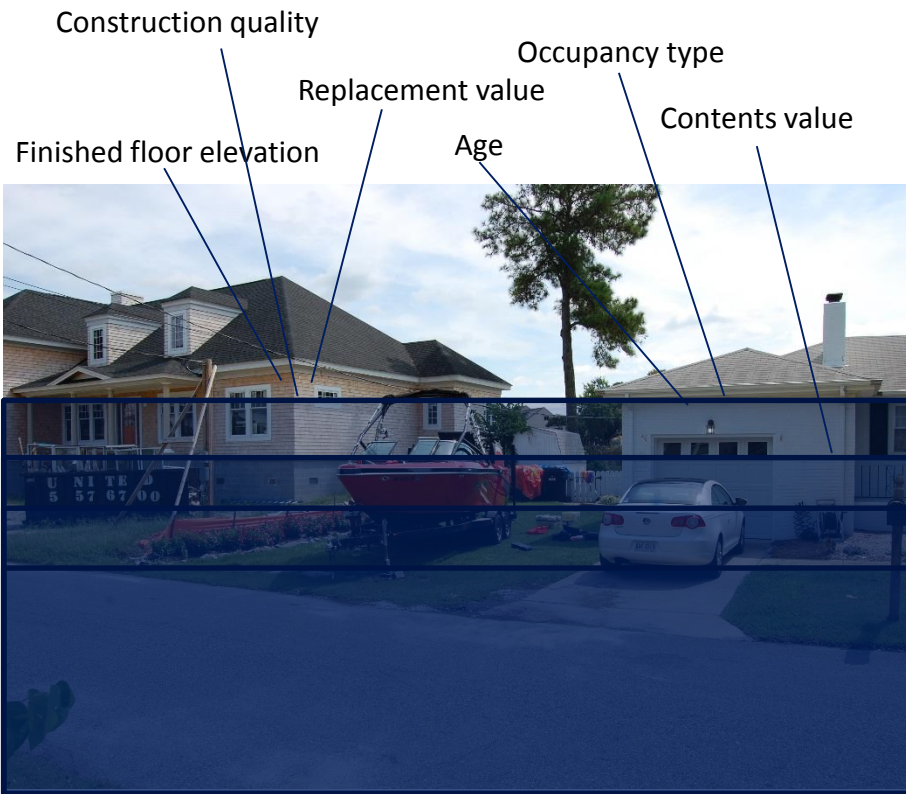


Planning Area/ Natural Resources	Defining Characteristics	Challenges
<p>Lynnhaven / Tidal sheltered bay, estuarine, fringing marsh</p> 	<p>Mixed residential, military, commercial, lower elevation properties with high tax base. High quality natural resources. Assets at vulnerable elevations.</p>	<p>Addressing repetitive losses from recurrent flooding and preservation of low-lying natural resources.</p>
<p>Oceanfront / Ocean, headland beaches, tidal inlet, bay</p> 	<p>Dense commercial and residential development. Tourism as primary economic driver. Re-development opportunities. USACE Civil Works flood risk reduction project.</p>	<p>Protecting existing development and economic base while instilling resilience as a keystone in re-development.</p>
<p>Elizabeth River / Estuarine, fringing marshes</p> 	<p>Dense residential, commercial, industrial development. Aging infrastructure.</p>	<p>Upgrading infrastructure and maintaining water-based industrial economy with higher sea levels.</p>
<p>Southern / Ocean, barrier beaches, bays and extensive marshes</p> 	<p>Light residential, military, rural, recreational, waterfowl and land preserves. Agriculture important economic concern. Low elevation gradients.</p>	<p>Establishing land use strategies that preserve resources and limit new development and infrastructure in areas susceptible to future flooding.</p>

# Vulnerability Assessment

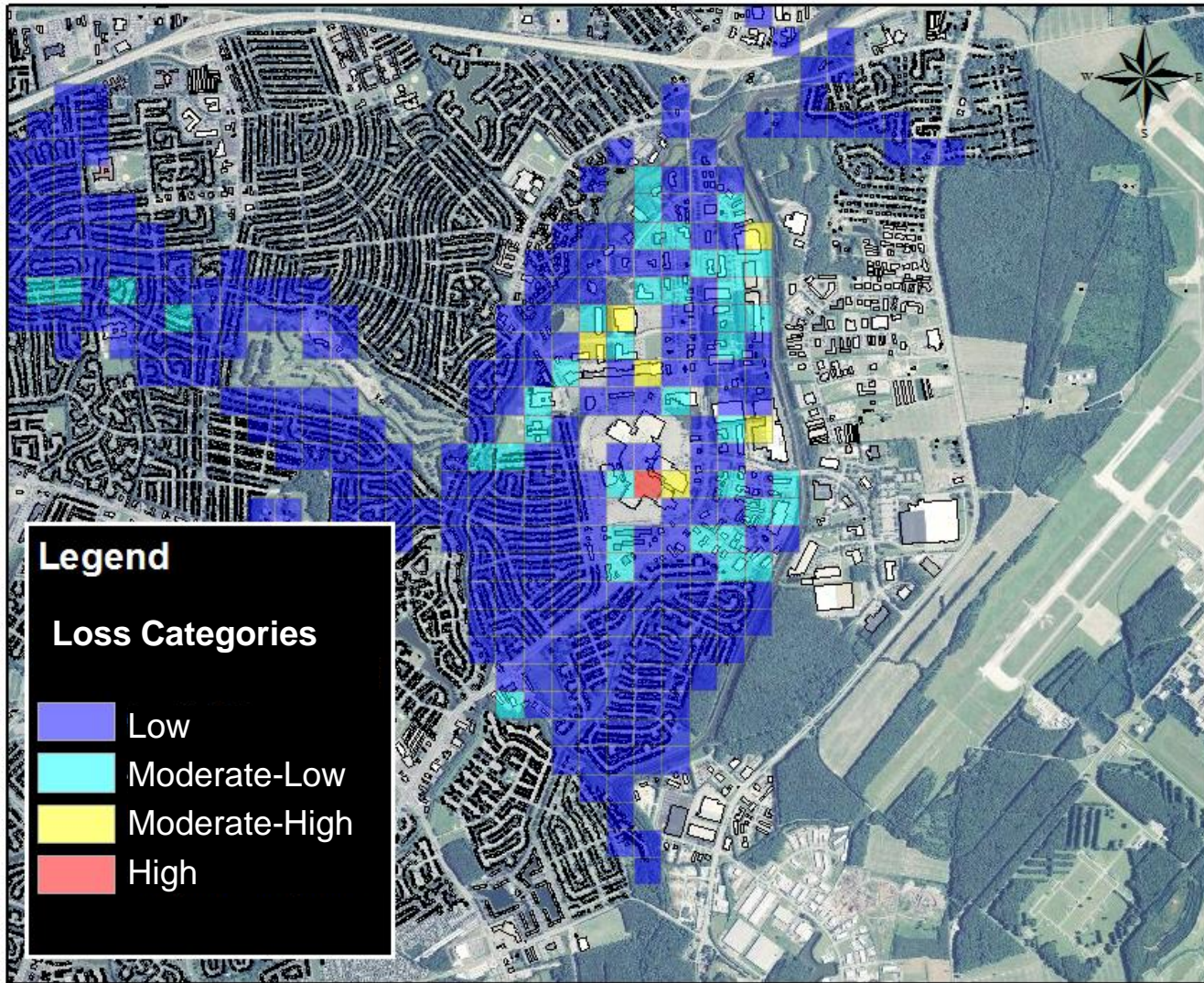


# Damage Assessment

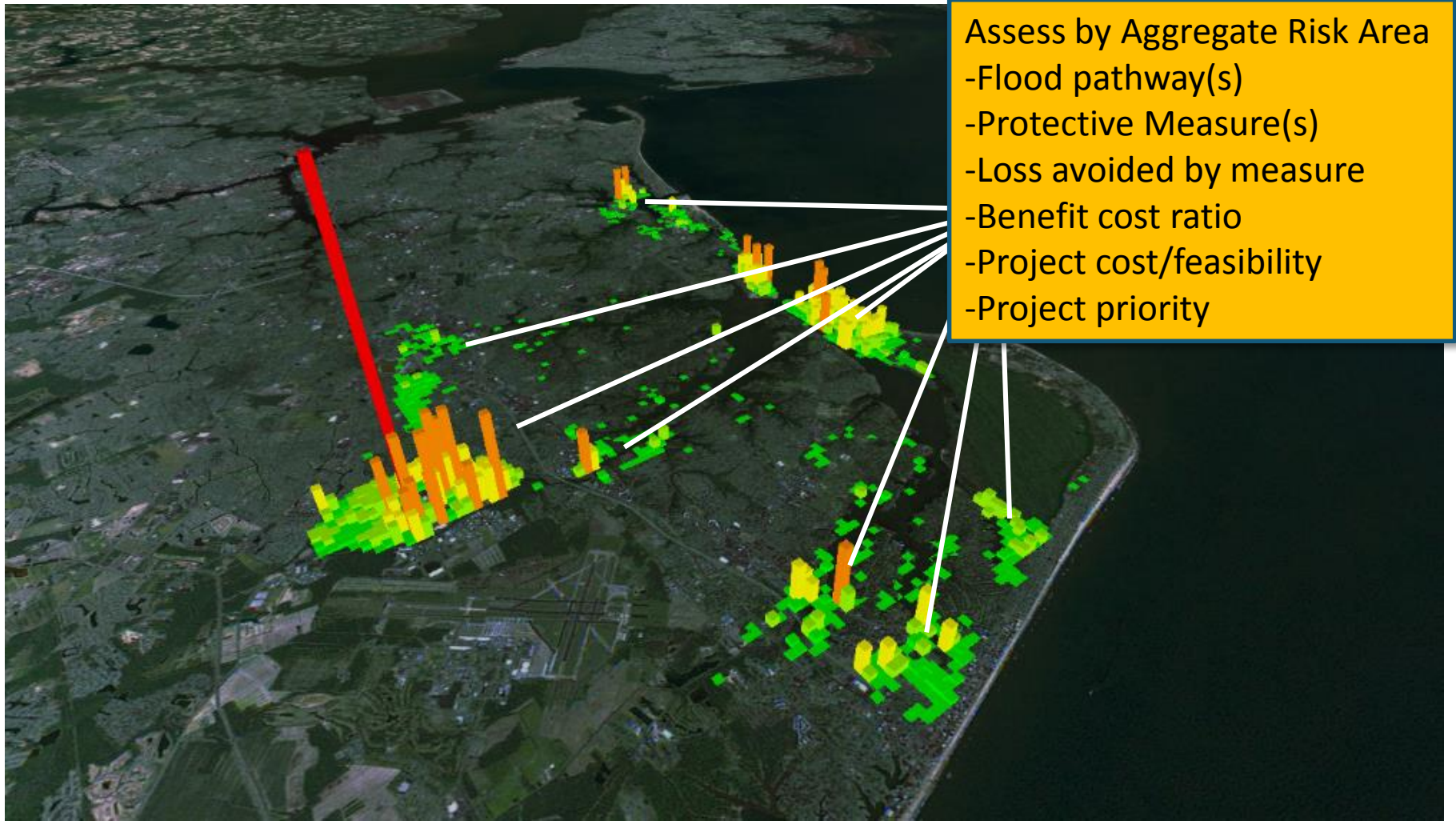


- Hazus Loss Calculations
  - \$ loss due to
    - Depth of flooding
    - Building characteristics

# Aggregation

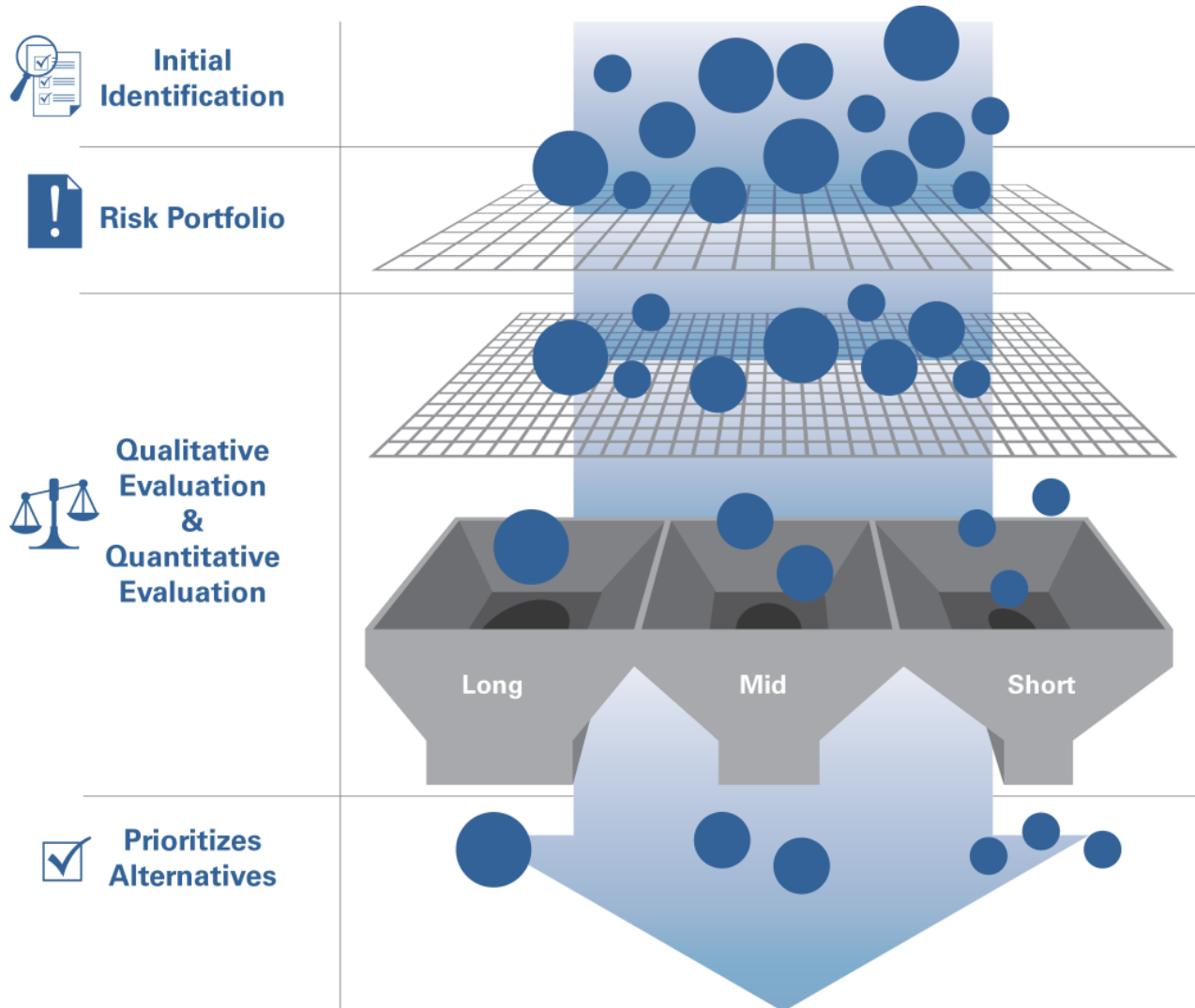


# Forensic Flood Risk Analysis





# Evaluation



# Evaluation and Prioritization

Feasibility											
Technical		Administrative		Political		Legal		Fiscal		Environment	
Access to Needed Tools		Staffing		Political Support		Consistent with State/Fed Laws		Cost		Limited Environmental Consequences	
Complexity		Maintenance		Public Support		Potential Legal Challenges		Funding Availability		Consistent with State Environmental Goals	

- Benefit Cost Analysis
  - Return on investment – do strategies buy down risk?

# Sequencing of Response

Short to mid-term, low hurdles, low cost



Mid to long-term, moderate hurdles, higher cost



# Questions?

## Dewberry

Brian Batten, Ph.D., CFM

804-823-6981

[bbatten@dewberry.com](mailto:bbatten@dewberry.com)

## City of Virginia Beach

Department of Public Works

Greg Johnson, P.E.

757-385-4131

[gjohnson@vbgov.com](mailto:gjohnson@vbgov.com)

Shanda Davenport, P.E., CFM, AICP

757-385-8439

[sdavenpo@vbgov.com](mailto:sdavenpo@vbgov.com)