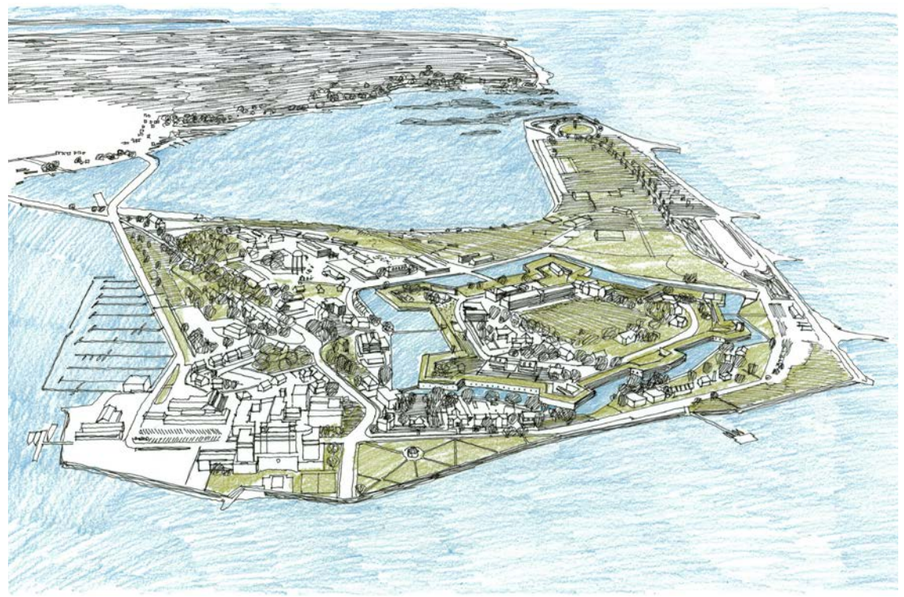
13 DECEMBER 2017
HAMPTON DUTCH DIALOGUES

Living with Water Hampton: A Holistic Approach to Addressing Sea Level Rise and Resiliency

WAGGONNER & BALL

Dutch Dialogues Virginia: Life at Sea Level



Dutch Dialogues Virginia: Life at Sea Level

Phase 1 - current phase:

- City-wide high-level assessment
- Locating and understanding the best available data
- Establishing guiding principles and values
- Creating goals
- Preliminary creation of an evaluation tool (to be further tested)
- Establishment of a legal framework for implementation of resilience policy and projects
- List of next steps

Sequence

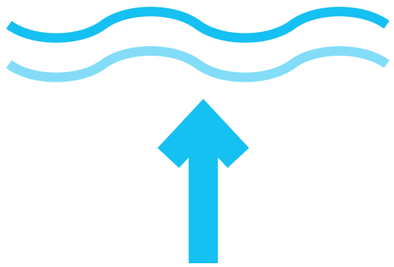
Phase 2 – beginning early 2018:

- Implementation strategy for pilot area
- Test evaluation tool
- Education & outreach plan

Phase 3 and beyond – near future:

- Other identified priorities and initiatives

Sequence



Rising Tides

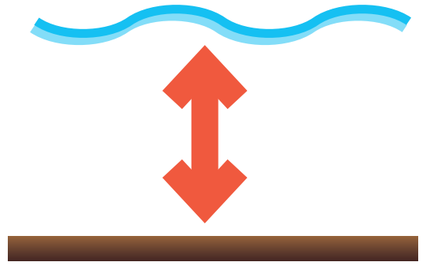
(Sea Level Rise)

+

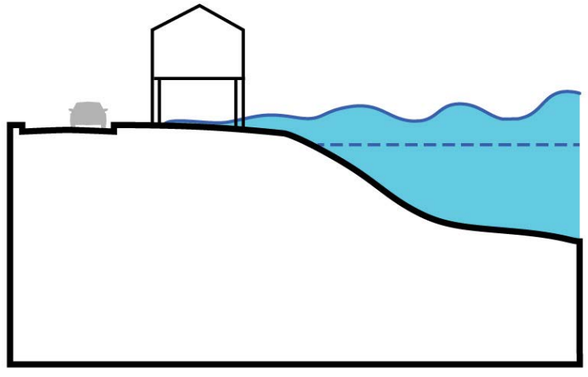
Sinking Land

(Subsidence)

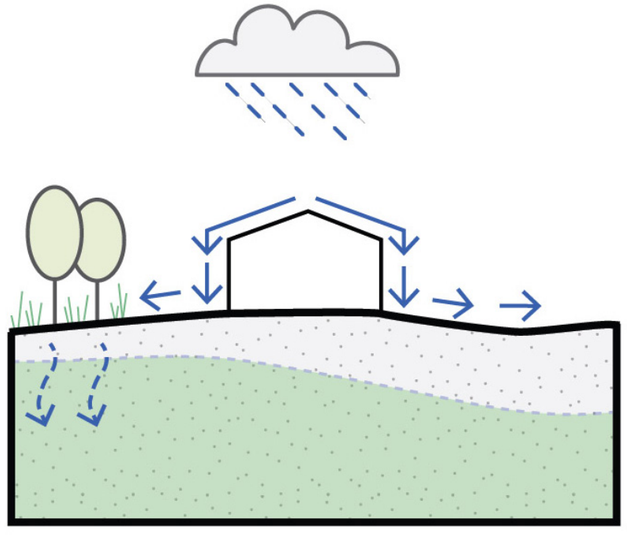
=



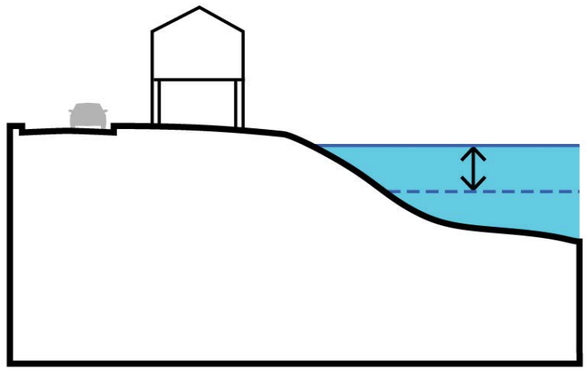
Relative Sea Level



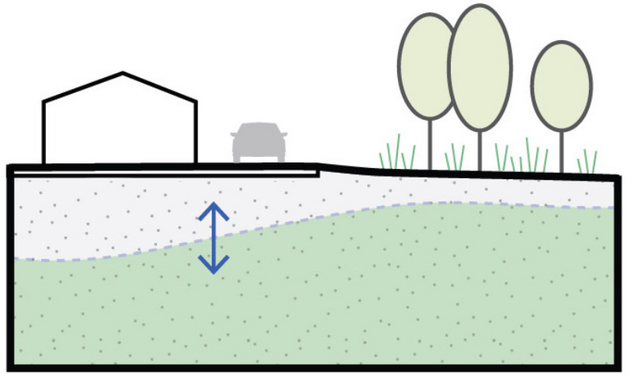
Storm Surge



Stormwater



Tidal Action



Groundwater

Forces of Water

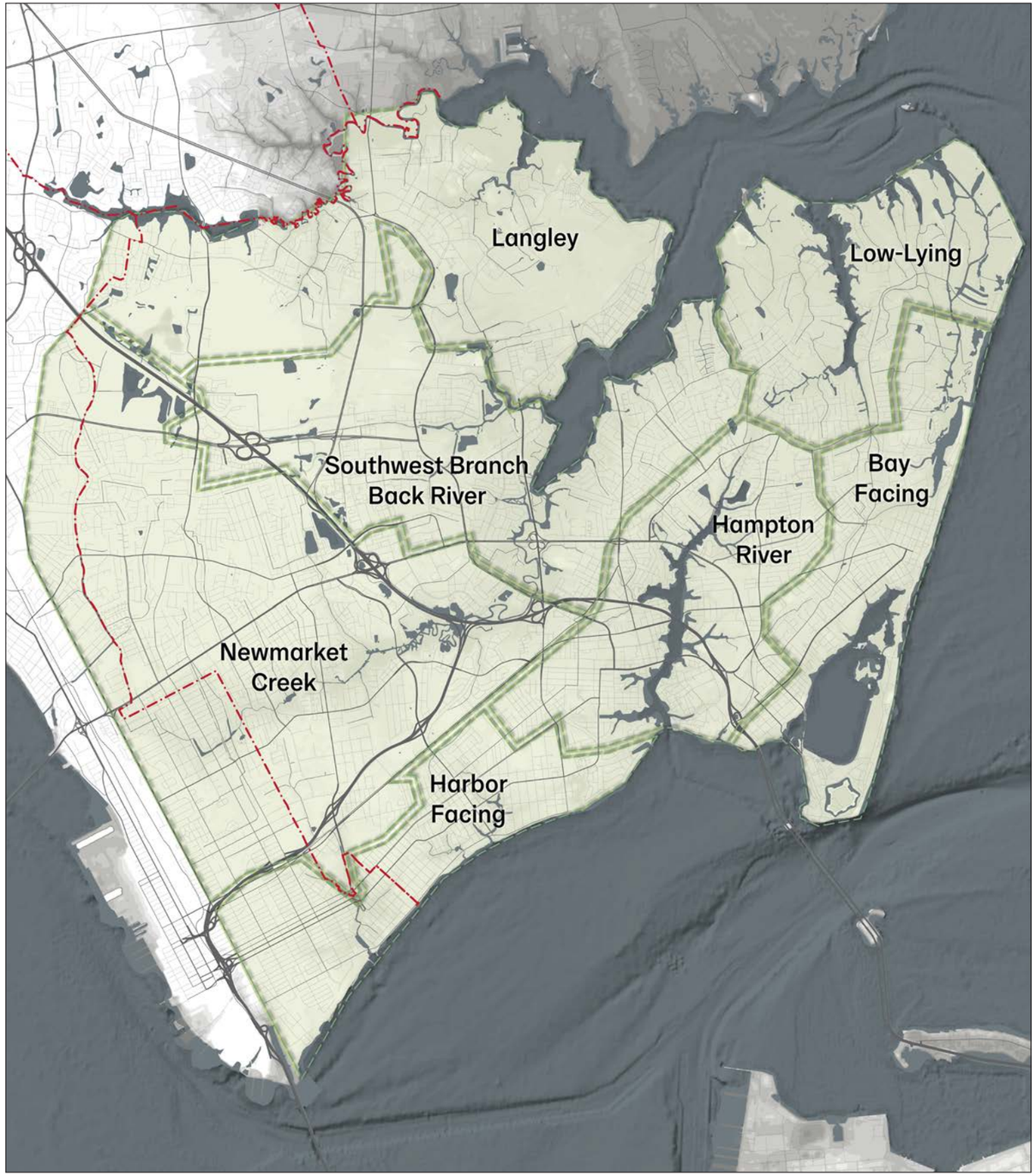
POLICY

EDUCATION & COMMUNICATION

PHYSICAL

OPERATIONS & MAINTENANCE

Place-Driven Analysis



Hydrologically-Based Study Areas:

- Different challenges
- Different priorities and values
- Different outcomes

Location-Specific Conditions

Major Topics

1. Nuisance flooding
2. Access
3. Balancing government intervention with citizen privacy

Possible Strategies

1. Create dry/safe egress routes in flood-prone areas.
2. Improve the power grid to maintain consistent operation (eg. bury utility lines, raise substations, etc.).
3. Create a central evacuation site.
4. Improve city communication about impending storm events and develop/improve the system for communicating with emergency services during/after events.
5. Enhance or create water-based assets (eg. marinas) to enhance recreation and economy.

Low-Lying

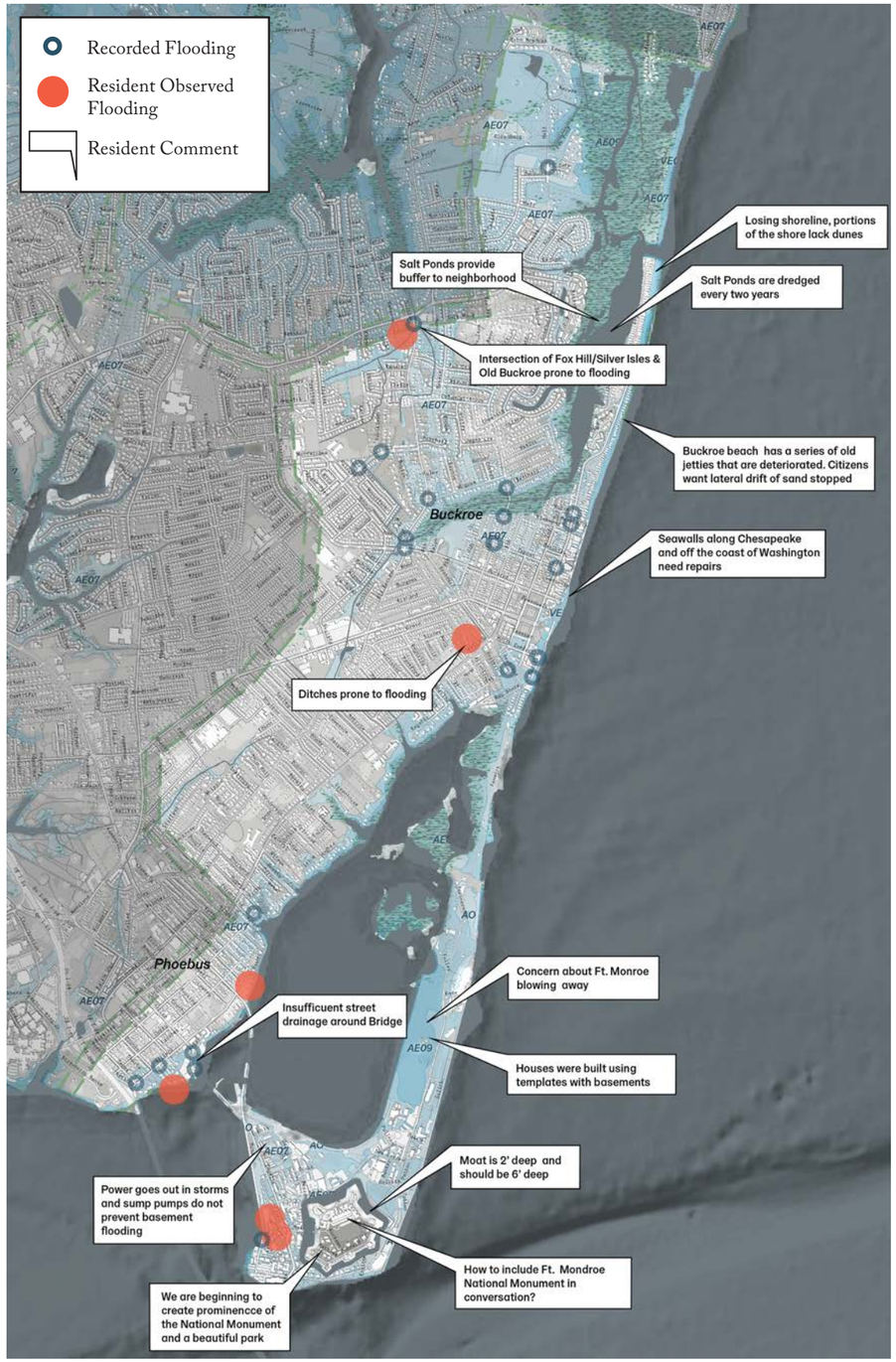
Foxhill, Grandview, Harris Creek

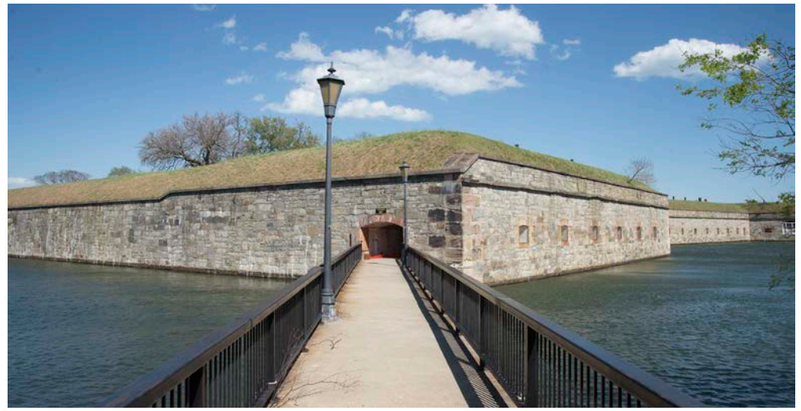
Major Topics

1. Major storm events
2. Tidal flooding / backflow through pipes
3. Future of Fort Monroe

Possible Strategies

1. Expand shoreline stabilization measures to prevent erosion/ degradation and Look for co-benefit opportunities to expand recreational opportunities and/or create habitat.
2. Improve the power grid to maintain consistent operation (eg. bury utility lines, raise substations, etc.).
3. Explore architectural adaptations and/or floodproofing measures that are sensitive to historic buildings.
4. Adapt subsurface drainage outfalls to prevent backflow.





Bay Facing

Buckroe, Phoebus, Fort Monroe

Major Topics

1. Tidal flooding
2. Shoreline maintenance
3. Old utilities
4. Balancing government intervention with citizen privacy

Possible Strategies

1. Expand shoreline stabilization measures to prevent erosion/ degradation. Work with residents to design holistic solutions where the shoreline is located on or near private property.
2. Work with residents to develop consistent strategies for maintaining infrastructure on private property.
3. Replace outdated utilities and locate them in lower-risk areas.

Harbor Facing

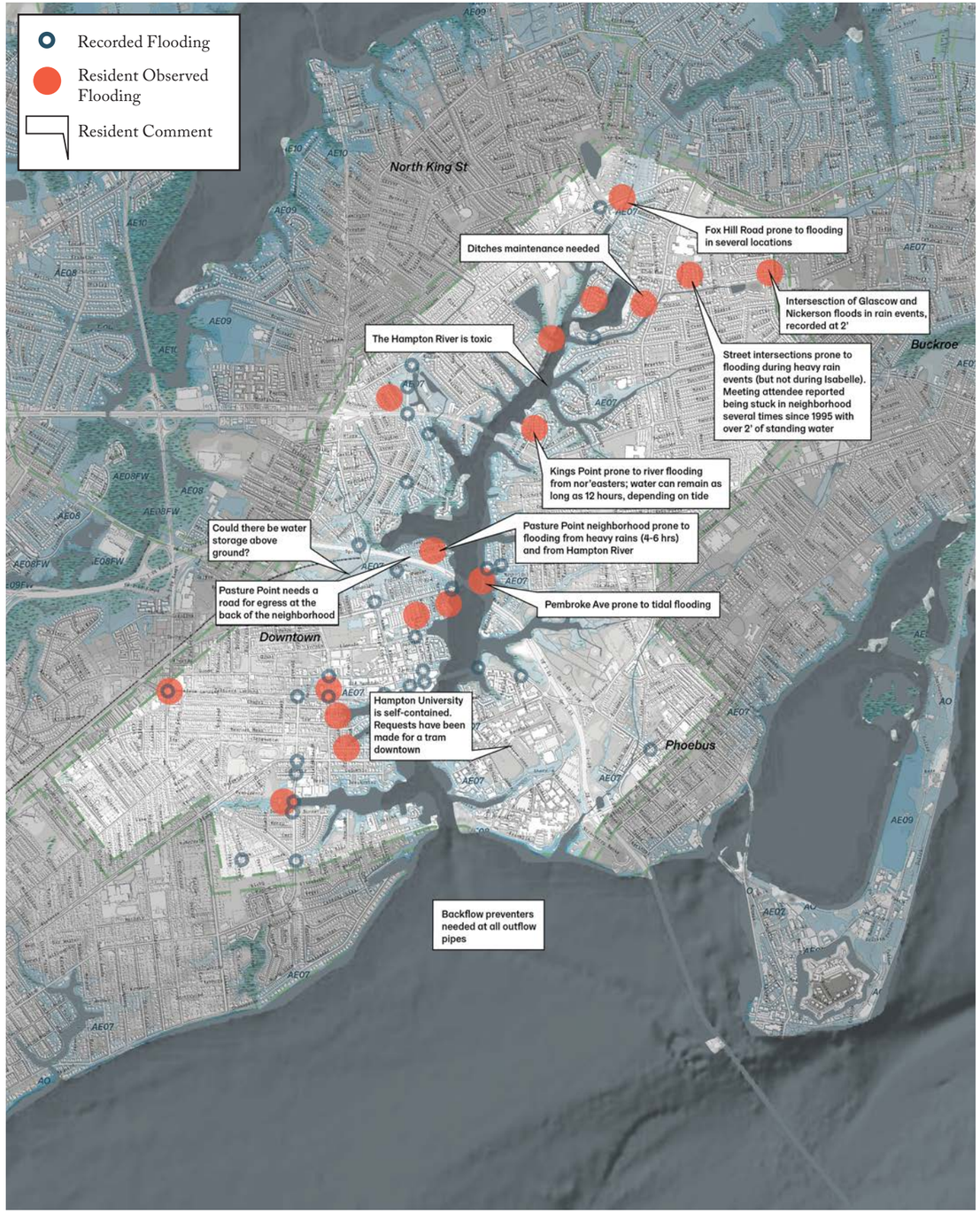
Greater Wythe, Merrimac Shores, Armstrong Gardens

Major Topics

1. Prevalence of impervious surface
2. Water backflow through pipes
3. Access

Possible Strategies

1. Designate spaces to detain and clean water.
2. Create dry/safe egress routes in flood-prone areas and to critical assets.
3. Explore architectural adaptations and/or floodproofing measures for buildings at a range of scales (eg. residential, commercial, institutional).



Hampton River

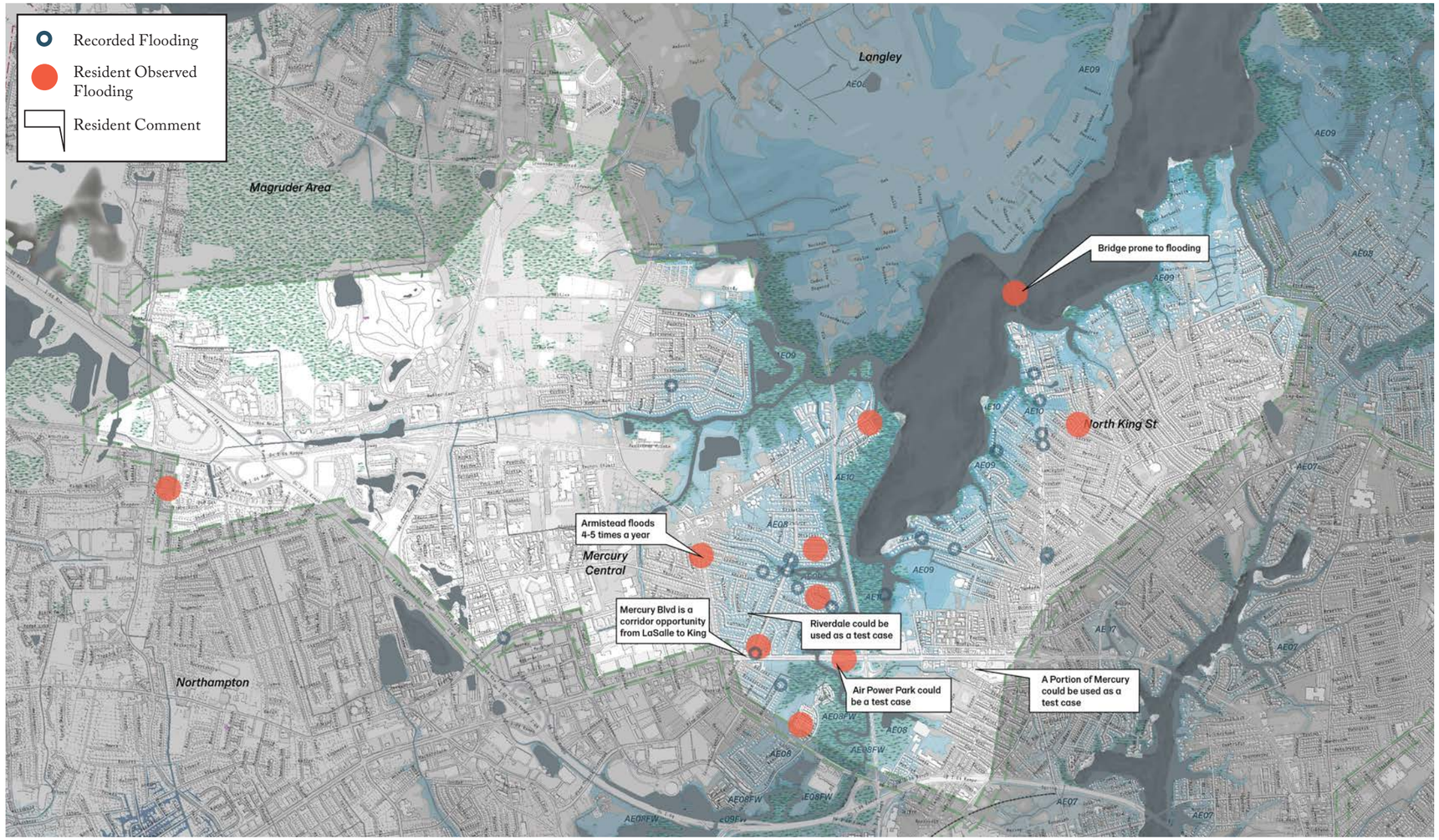
Downtown, Hampton University, Hampton VA Medical Center, East Hampton, Elizabeth Lakes, Little England, Pasture Point

Major Topics

1. Tidal flooding
2. Shoreline erosion

Possible Strategies

1. Explore architectural adaptations and/or floodproofing measures for residential structures.
2. Create upland water storage in undeveloped areas.
3. Create dry/safe egress routes in flood-prone areas and to critical assets.



Southwest Branch Back River

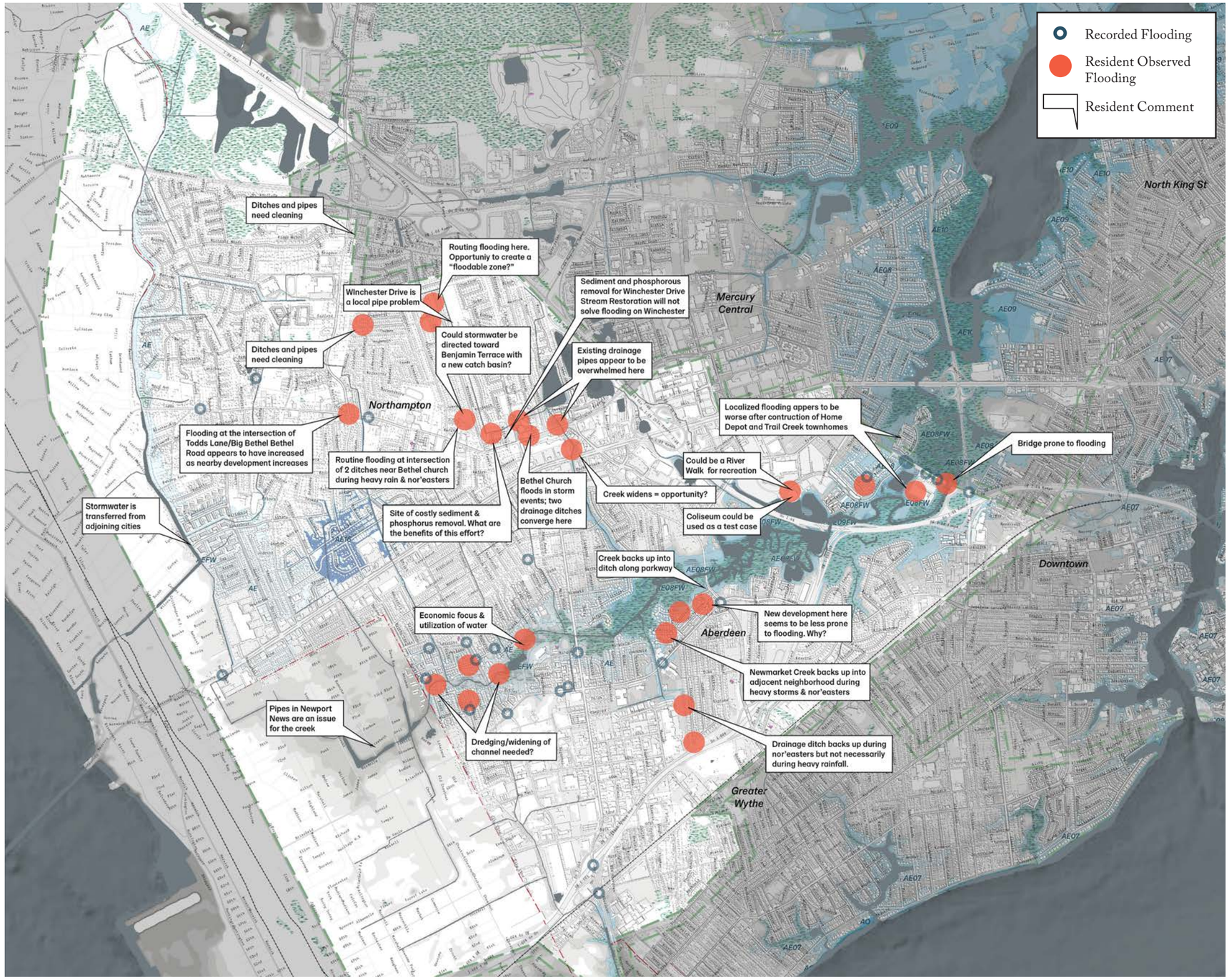
Riverdale, Seldendale, Pastures, Tide Mill, Windsor Terrace, Coliseum Central

Major Topics

1. Tidal & stormwater flooding
2. Prevalence of impervious surface
3. Erosion & silting of creek
4. Inconsistent standards & policies

Possible Strategies

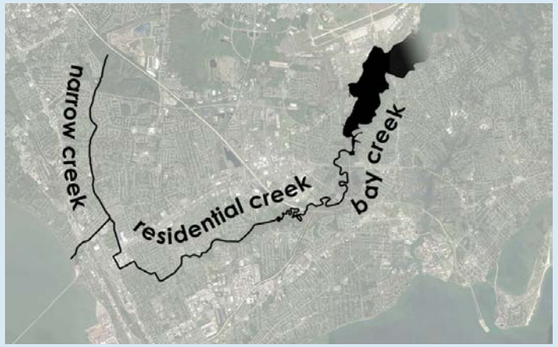
1. Partner with Newport News to enact policies and strategies that consider the full length of Newmarket Creek.
2. Revise zoning and land use policies to protect sensitive areas from further encroachment and development.
3. Look for opportunities to create buffer areas around the creek; where possible, utilize these spaces for recreation.
4. Create spaces to detain and clean water.



Newmarket Creek

Coliseum Central, Northampton, Aberdeen, Westhampton, Briarfield, Newport News

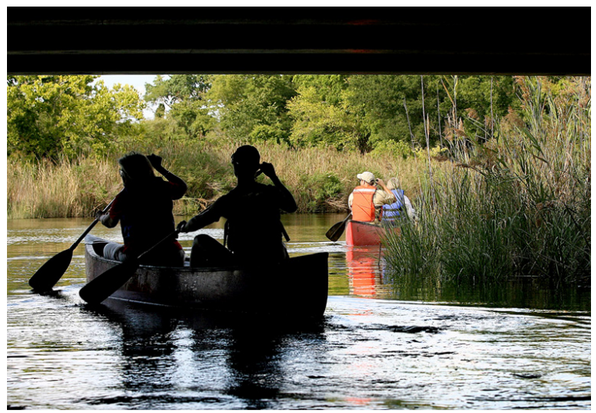
Newmarket Creek Conditions



Bay Creek

Residential Creek

Narrow Creek



Newmarket Creek

Coliseum Central, Northampton, Aberdeen, Westhampton, Briarfield, Newport News

CREATE VALUE DRIVEN SOLUTIONS

REINFORCE ASSETS

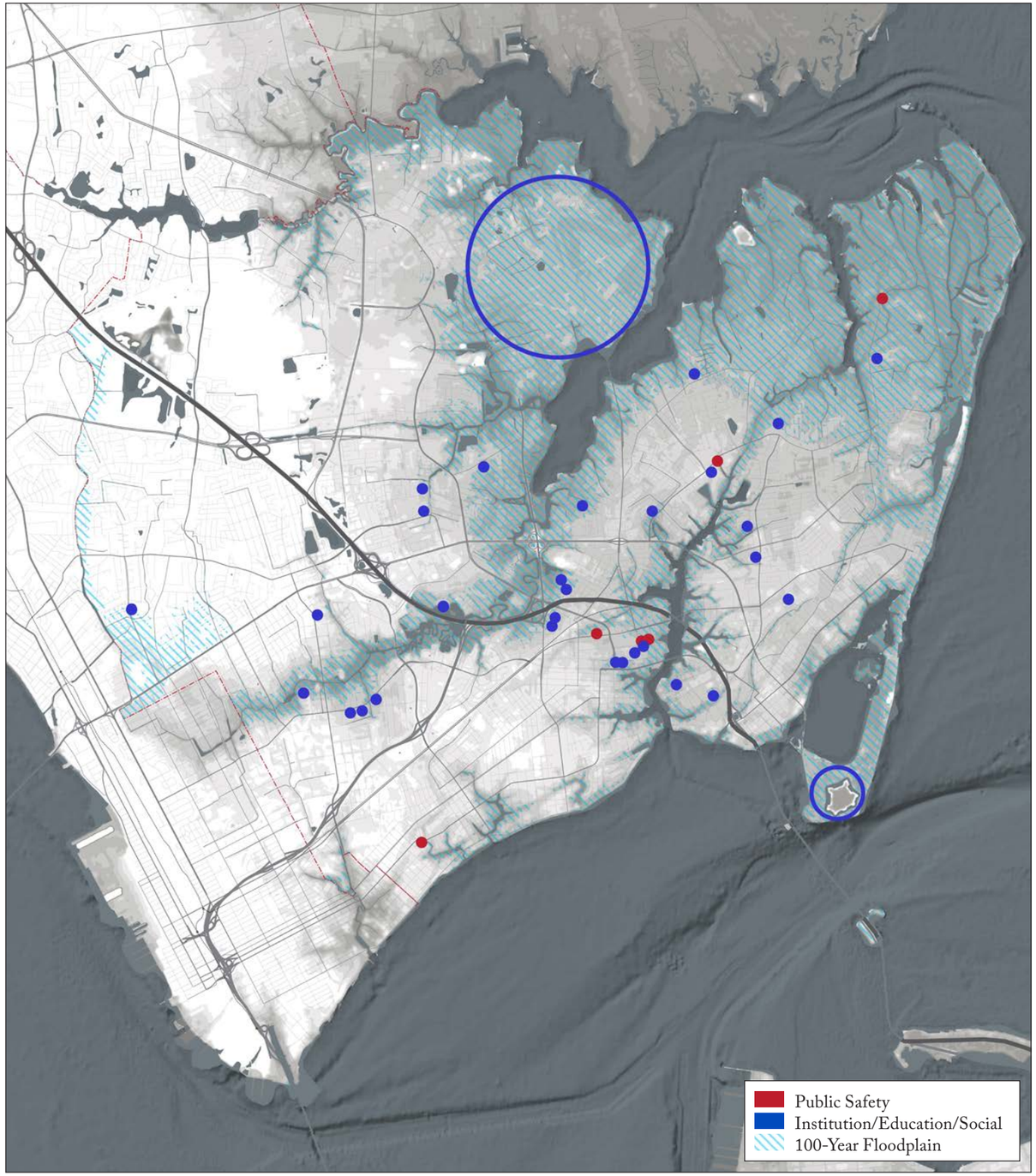
LAYER PUBLIC BENEFITS

STRENGTHEN PARTNERSHIPS

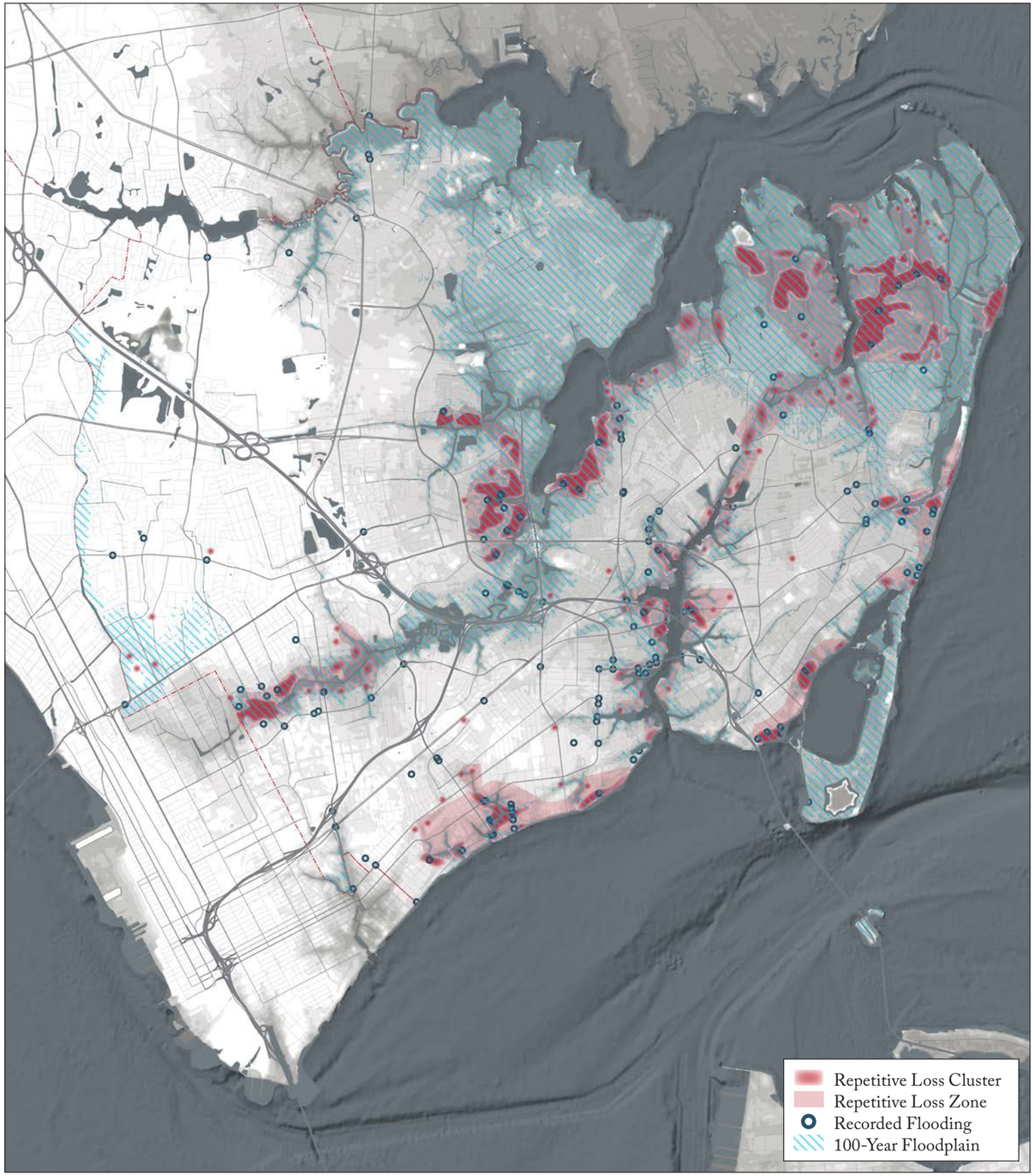
USE BEST DATA

SHARE KNOWLEDGE AND RESOURCES

Guiding Principles



Facilities at Risk



Repetitive Loss

SAFE

EQUITABLE

NATURAL

HERITAGE

INTEGRATED

SUFFICIENT

NIMBLE

INNOVATIVE

Community Values

ADDRESS THE CHALLENGE

EMBRACE THE INITIATIVE

ADOPT RESILIENCE STANDARDS

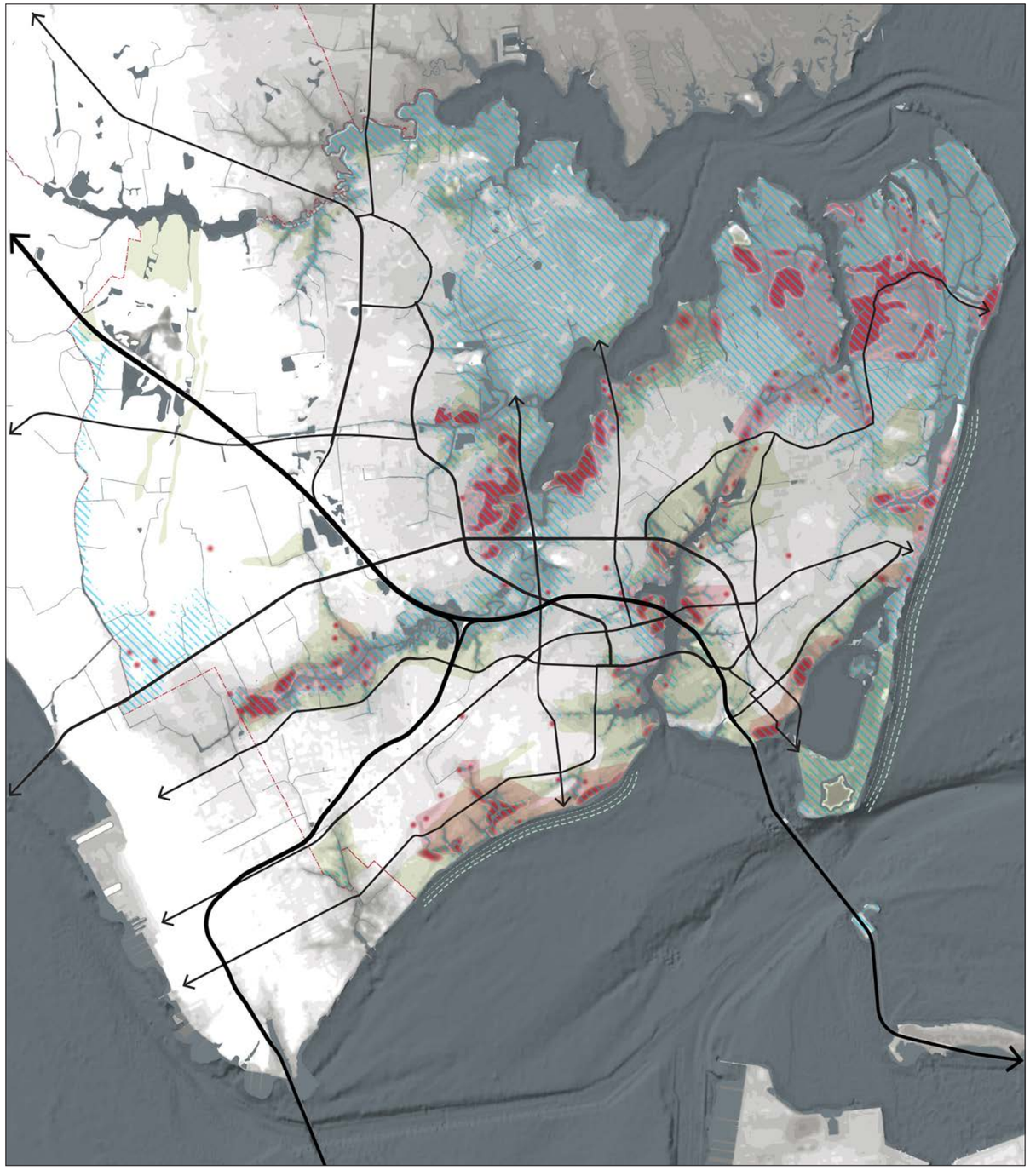
SOLUTIONS AT MULTIPLE SCALES

EDUCATE COMMUNITY

FOLLOW GUIDING PRINCIPLES

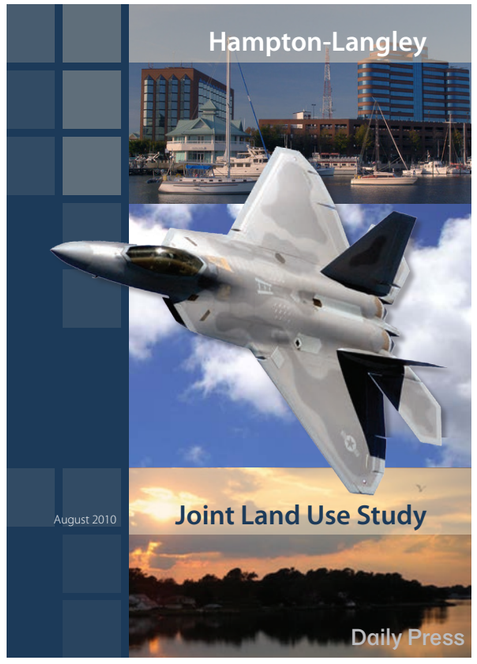
EVALUATE

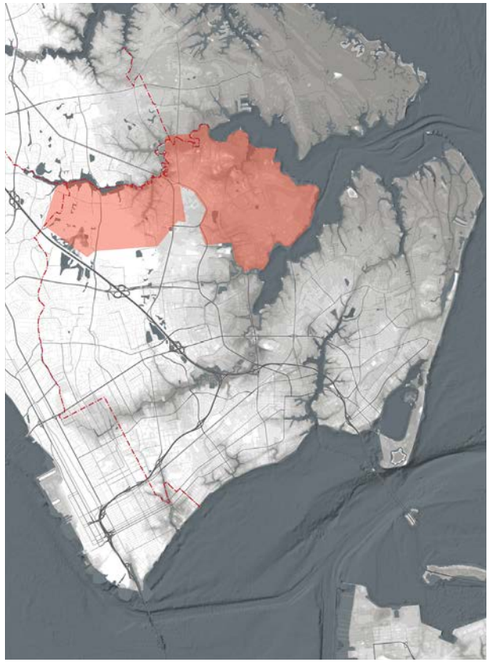
LEAD THE WAY



Phase 2 Potential Focus Areas

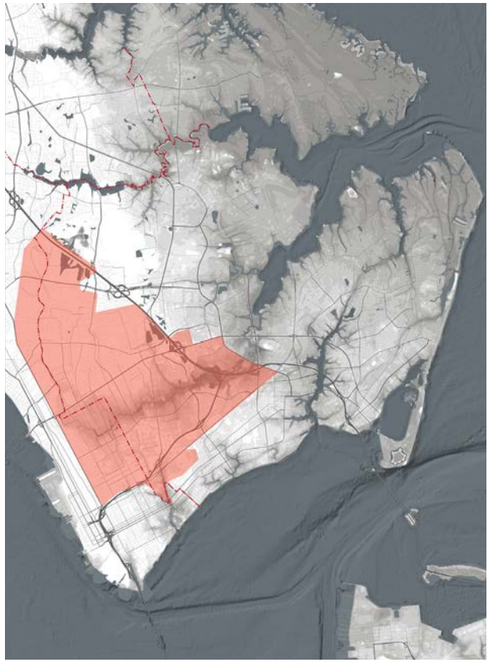
- Langley Air Force Base
- Newmarket Creek
- Downtown
- Fox Hill
- Buckroe – public beach frontage





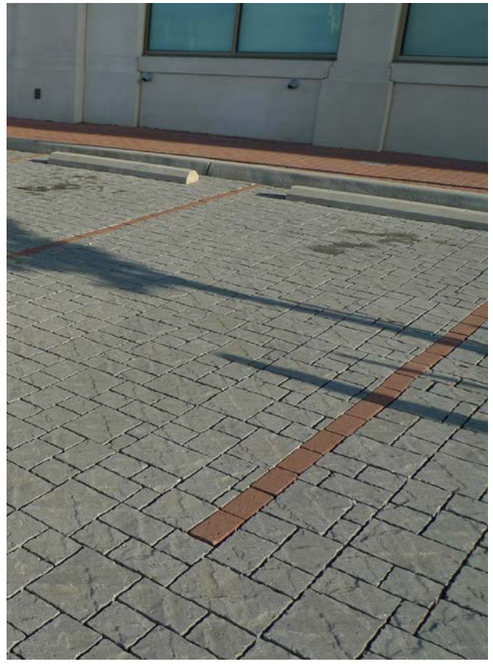
- Major asset of national importance; economic driver
- Important federal partnership
- Applicable to NASA Langley and the Hampton VA Medical Center

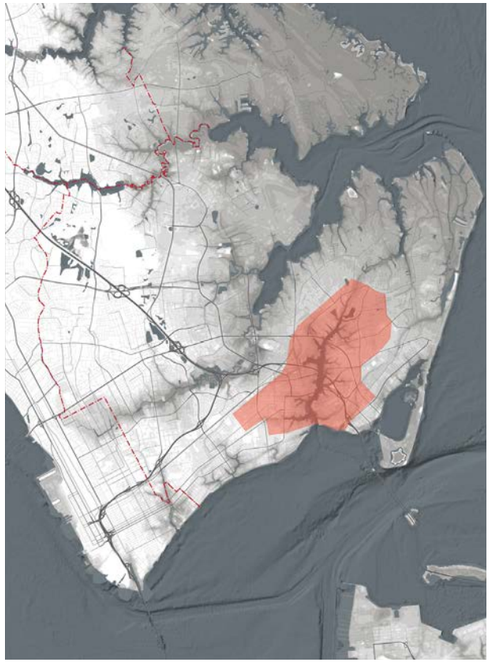
Langley Air Force Base



- Central to the city – touches many neighborhoods
- Wide range of challenges and potential solutions
- Potential partnership with Newport News
- Potential to assist vulnerable populations
- Potential economic catalyst, e.g. San Antonio Riverwalk

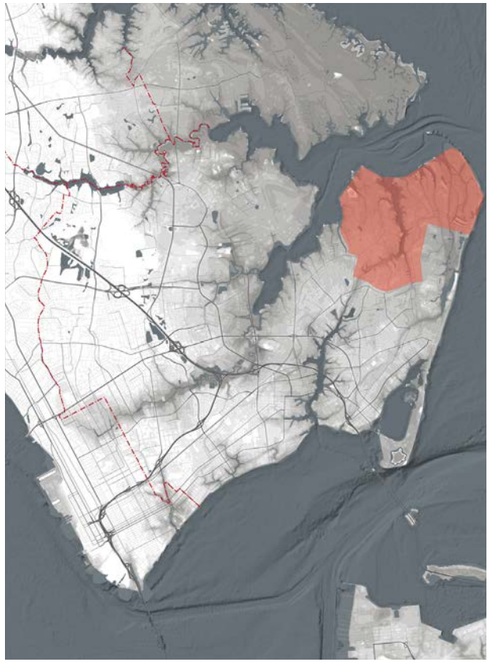
Newmarket Creek





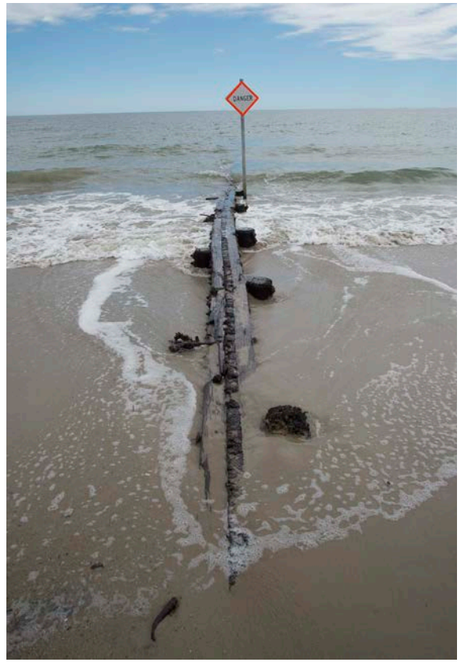
- Cultural heart of the city – many historic and cultural assets
- Economies tied to the seafood industry, tourism, institutions (Hampton University, VA Medical Center, etc.)
- Publicly-owned lands to use for demonstration projects
- Pilot green infrastructure (storage) solutions and urban river edge typology – applicable to Phoebus and Coliseum Central

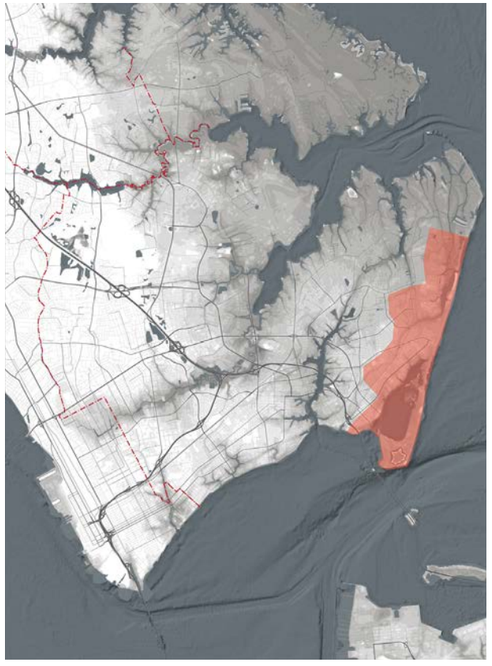
Downtown



- Potential solutions at the parcel scale
- Specific strategies for individual neighborhoods
- Increasing resiliency of critical infrastructure like roads and the power grid – process applicable to most neighborhoods (although specific solutions may be different)

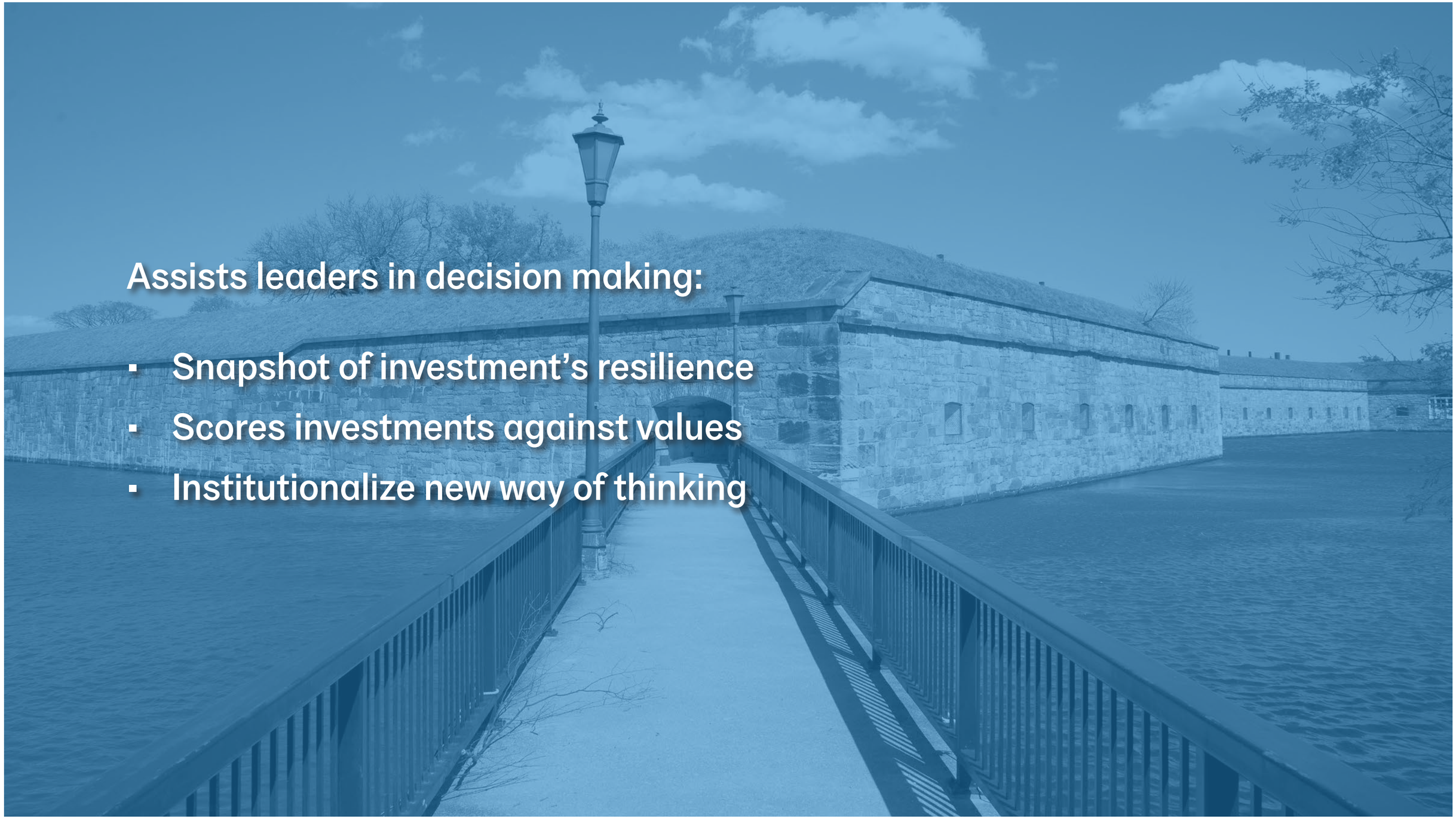
Fox Hill





- Recreational and tourism asset
- Hardened bay-facing edge typology – applicable to Fort Monroe
- Smaller scale – project based

Buckroe



Evaluation Tool

1. Safe

The City of Hampton needs to show current and prospective residents, industries, and employers that it has a strategy for addressing climate challenges. A safe community with reduced risk is the primary value for Hampton's future. The process of becoming a safer, more resilient place with lowered risk depends on a range of factors. Major elements – or attributes – of safety and risk reduction include options for shelter and egress; reliable utility systems such as power, energy, and water supply; better protection of critical infrastructure; reducing the number of structures in the floodplain; and improving emergency response. However, reduced risk is only one facet of resilience. Safety and risk reduction must not come at the expense of quality of life for both humans and the environment.

Egress, Maintenance

-	Repair (e.g. potholes) and extending existing street that has egress problems
N/A	Not a street, meets VDOT standards
+	Street construction to City Standard or higher
++	Creates complete street

Power

+	Uses renewable energy or otherwise has source undisrupted by weather (micro grids, located in safe area, buried utilities, etc.)

Critical Facilities

-	Locates or expands in vulnerable area, or using "business as usual" vulnerable technique
N/A	Not a critical facility
+	Retrofits existing facility, builds to higher standard, or improved emergency response capability

Floodplain Development

-	New vulnerable improvements in floodplain
+	Adaptation of existing structures in floodplain
++	Removes structures in floodplain, avoids floodplain, or builds appropriate things in floodplain (e.g. park)

Storm resistant structures

-	Builds to legal nonconforming standards
N/A	No structure, or meets existing building code
+	Meets standard higher than minimum (e.g. city adopted freeboard)
++	Meets best practices for hurricane/other natural disaster standard (higher than code)

Floodplain Development

- New vulnerable improvements in floodplain
+ Adaptation of existing structures in floodplain
++ Removes structures in floodplain, avoids floodplain, or builds appropriate things in floodplain (e.g. park)

Evaluation Tool

Egress, Maintenance

Intent
To effectively upgrade, or redesign and rebuild, roadways and their respective utilities in a resilient manner for use as egress routes, rather than a conventional roadway.

Examples
When a roadway becomes in need of repair, consider if it would make sense to function as an egress route. If so, redesign and rebuild the road and its utilities to be above the flood elevation until it connects to another egress route on higher ground.

Additional Information/Resources

Examples
The project directly connects to an existing egress route, or improves access to an existing one. The project could also include improvements to an existing egress route, including construction work, signage, or other wayfinding to promote accessibility. The project might also include a new safe egress route out of a flood prone area.

Additional Information/Resources
Links to projects that include raised egress, existing egress improvements, or egress route wayfinding. Some cities (like Portland, OR) have a web page on their evacuation plan, with documents, links, and other information

Energy and Power

Intent
To provide critical infrastructure with a reliable source of power or energy in case of an emergency.

Examples
The project includes a microgrid, a local utility system with the controlled capability to disconnect from the traditional power grid and operate autonomously, such as during a storm event. The project may also include only a backup power supply rather than a developed microgrid. The project could also be regenerative and produce its own energy on site with renewable sources such as photovoltaic solar panels, wind turbines, or geothermal power.

Additional Information/Resources
Links to information on microgrids, backup power systems, renewable energy

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damage. The project could also be new infrastructure, including buildings, sites, or utilities, designed to have a low level of risk and potential damage.

Additional Information/Resources
Links to projects or programs that minimize the risks and potential damage to critical infrastructure that is similar to what exists in Hampton.

Reduce/Adapt Floodplain Development

Intent
To create more space for water as a protective buffer to the city during flooding by limiting the number of structures in the floodplain, and adapting existing development to be more flood resistant.

- Identify focus area for Phase 2
- Amend the Community Plan
- Refine the “Evaluation Tool”
- Pursue changes to the legal framework as necessary
- Review and amend City codes and ordinances
- Set “resiliency targets”
- Develop a community education program
- Continue to work with our partners
- Develop JLUS Amendment with Langley AFB
- Establish and support a “Hampton Resilience Partnership”

Next Steps