Building Resilient Waterfronts and Coastal Communities

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Outline

• RI Context on marine trades
• SLR and Storms
• Initiatives underway to assess issues and opportunities to build resilience
Resilience = Both/and

**Adaptation**
- Change in land use, relocation
- Emergency & business continuity planning
- Upgrades or hardening of building and infrastructure
- Residential programs promoting adaptation
- Health programs

**Mitigation**
- Energy conservation and efficiency
- Renewable energy
- Sustainable transportation, improved fuel efficiency
- Capture and use of landfill and digester gas
- Carbon sinks

**Seal Buildings**
- Green Infrastructure
- Water and Energy Conservation
- Smart Growth
The RI Context

The marine trades and recreational boating generate
- $1.3 billion in direct spending
- 7,100 direct jobs,
- $327 million in direct wages

The total economic impact of the maritime trades cluster
- over $2.2 billion in sales for Rhode Island businesses,
- generates nearly $118 million in tax and fee revenue for state and local governments
Ports & Harbors Statewide Inventory (2008 - 2010)

1,568 Parcels
5,562 Acres
Approx. 10% (42 miles) of RI Coastline

http://seagrant.gso.uri.edu/coast/
Areas Zoned for Marine Commercial/industrial Uses

1,028 parcels (3,009 acres, or 66% of study area)

174 parcels (864 acres) - marine commercial/industrial (fishing piers, charter vessels, ship building or repair)

85 parcels (124 acres) - commercial marine recreation (marinas, public dockage)
Sandy, 2012

Newport Daily News, 2012

M. Devine, 2012

RIDOT
What will the future look like at high tide?

1’ above MHHW

E. Booth, Oct 2012

H. Hanka, Oct 2012
Extreme Tides
2’ above
MHHW
What will the future look at high tide?

Irene, 2010
2.7’MHHW
Adapted from:
http://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?stnid=8452660%20Newport,%20RI

Rate of Rise 1930-1996
9.4 +/- 1 inch/100 yr

Rate of Rise 1930-2013
10.8 +/- .7 inch/100 yr

HEIGHT NOW
> 1 foot above MHHW 130 times

Source: http://tidesandcurrents.noaa.gov/inundation/
What will the future bring in Sea Level?

US Army Corps of Engineers SLR Curves

http://corpsclimate.us/ccaceslcurves.cfm
Increasing sea level & storm surge

Schematic illustrating how sea level and storm surge act in concert under normal conditions (A) and with sea level rise and intensified storms (B).

http://centerforoceansolutions.org
Disasters are Increasing in Frequency and Cost

Natural Disasters in the United States, 1980 - 2012

Source: © 2013 Munich Re, NatCatSERVICE. As of January 2013.

Natural Catastrophe Losses in the United States, 1980-2012
(Overall and insured losses)
Utilization of Point Judith Waterfront

Utilization Parcel (Acres)
- Marine Commercial/Industrial: 58 (42.86)
- Com. Marine Recreation: 5 (.37)
- Marine Rec., Not Com.: 3 (19.76)
- Not water related: 30 (32.99)

July, 2008
MHHW +1'
MHHW +3′
MHHW +5’
What Can We Do?
State Planning & Policies

- Sea Level Rise Policy
- Executive Council on Climate Change
- Vulnerability maps informing permitting & decision making
- State Infrastructure Planning
  - Roads
  - Wastewater
  - Drinking water
- Open space acquisition – ID/prioritize lands for protection, salt marsh creation
- Low Impact Design – storm water and green infrastructure
- Shoreline Change SAMP
Adapting local North Kingstown’s Comprehensive Plans
All Parcels
MHHW +5’ SLR

North Kingstown
Study Areas

$80M
of property in Wickford
-150 parcels-
(Study Areas 5 & 6)
potentially
impacted by 2100

5%
of total
assessed property
values in NK
Local Applications

- **Regulatory** – zoning ordinance, comprehensive plan amendments
- **Hazard Mitigation Plan** – plan and implement actions; reduce rates
- **Incorporate into town GIS** – more accessible information
- **Transportation** – ID roads and infrastructure inundated
- **Transportation Improvement Program (TIP)** – incorporate into future funding program for state priorities
- **Capital Improvement Plan (municipal)** – infrastructure improvements (i.e. sewers, dams, roadways, water)
- **Building Code** – apply standards and identify incentives
- **Open space acquisition** – ID/prioritize lands for protection
- **Educating citizens and decision makers** – technical and public
What are the Maps Telling Us in Wickford?

- Many **properties exposed** with high assessed value
- Ingress/egress barrier @ Main St/ Brown St – **no alternate route** out of the neighborhood
- **Evacuation routes** out of this area are exposed to 3-foot SLR scenario

And we have many question:

- Many **septic systems** were recently upgraded – how do we include SLR assessment in future sewer planning?
- **Historic properties** – what are the options to retain historic listing?
From Map to Action

- Land Use
- Transportation & Circulation
- Building Stock
- Municipal Properties & Facilities
- Emergency Management Facilities
- Wastewater
- Stormwater Management
- Drinking Water
- Groundwater
- Wetlands
- Historic & cultural Resources
- Open Space, Recreation, Public Access
Municipal Adaptation Strategies

“Similar to individual bricks that make up a wall, Rhode Island needs to start implementing site-scale solutions in our cities and towns that build incrementally, so our state as a whole is more resilient to coastal hazards.”

Grover Fugate, Executive Director RICRMC

URI Landscape Architecture, Junior Studio, 2014
4. MUNICIPAL ADAPTATION STRATEGIES
BY SECTOR

4.3. BUILDING STOCK

81. For parcels identified in the risk assessment as within the sea level rise areas (or Sea Level Rise Overlay Zone, as described in Section 4.1, LU2) at MHHW + 1-foot, +3-feet, and +5-feet, evaluate the long-term viability of properties within the SFHA and projected sea level rise areas, contact the property owners and ensure they are notified of the town-wide sea level rise vulnerability assessment, and establish procedures to apply long-term maintenance plans for their individual properties and related structures. In addition, maintain a separate database of building permits for all properties within the SFHA and the projected sea level rise areas, or flag these properties as part of these zones.

82. Building on experience from other Rhode Island municipalities (i.e. Town of Westerly), and state agencies (i.e. CRMC), implement an emergency permit process in North Kingstown to expedite permit approvals for predetermed repairs or reconstruction immediately following a storm event. In addition, work closely with state agency partners to define, evaluate, and communicate rebuilding restrictions in these areas.

83. Create incentives for homeowners to elevate their homes and offer clearly defined and enforceable height restrictions if the elevation of the structure will exceed the local height restriction.

84. For new construction throughout North Kingstown, create incentives for builders to design and build structures that are resilient to storm impacts both within and outside of flood zones. Create incentives for developers of new structures to design buildings with freeboard above Base Flood Elevation (BFE). In coordination with private sector stakeholders (Rhode Island Builders Association, private insurers, etc.) explore incentive programs that highlight the tradeoff between increased freeboard in construction projects and savings on insurance premiums.

85. For existing structures on parcels in the SFHA and the Sea Level Rise Overlay Zone, define areas that fall within these categories: Protection Zones: that may be hardened to prevent or minimize floodwater intrusion, Accommodation Zones: that are designed to be temporarily flooded with a high tide or storm event, Retreat Zones: that have a master plan for managed retreat of structures and residents permanently out of the area, and Preservation Zones: that have an established management plan for natural or cultural resource preservation. [Insert citation]
Block Island: Adapting Transportation Systems

Engineering Solutions
- Marine Facilities
- Vulnerable Roadways

Emergency Contingency Planning
- Ferry Operations
- Public Safety/Emergency Response

http://necca.stormsmart.org/municipal-grants/block-island-rhode-island/
Building Resilience on the Newport Waterfront
Building upon Other Efforts

- Waterfront Access
- Economic Study
- Ports & Harbor Study

- City planning & outreach
- SLR mapping
- Local “heros” & stories
Water Dependency:

- **Water Dependent** – requires direct access to the water for viable operation

- **Water Related** – provide goods or services associated with water-dependant uses

- **Water Enhanced** – do not require direct access to the water for viable operation, but are enhanced by waterfront location
Water-dependent land uses in Newport Harbor contribute substantially more to municipal revenues on a per-acre of waterfront land utilized basis than other waterfront area commercial and residential uses.
Perrotti Park/Newport Visitors Center, Newport, RI
High Tide (3.8 ft)
Perrotti Park/ Newport Visitors Center, Newport, RI
Average Spring Tide 1997- 2007 (7.03ft)
plus 3 feet of SLR
Newport MHHW
Newport MHHW + 1’
Newport MHHW + 3’
Newport MHHW + 4’
Newport MHHW + 5’
Newport MHHW + 1938
Exposed Real Property & Infrastructure

Inundation Zones
- Mean Higher High Water (MHHW)
- MHHW plus 1' Sea Level Rise (SLR)
- MHHW plus 3' SLR
- MHHW plus 1' SLR and 3' Storm Surge
- MHHW plus 5' SLR
- Hurricane 1938 Flood Level

Real Property
- Commercial Property
- Public/Government Building
- Residential Property
- Parcel Boundary*

Infrastructure
- Pump Station
- Storm Water Discharge*
- Storm Water Manhole*
- Tidegate/Wide
- Wastewater Treatment*

Public Safety
- Fire Station
- Mobile Communication
- Police Station
- Police Station, State
- Emergency Shelter

Facilities
- Library
- Marina
- Commercial/Recreational Port or Harbor
- School
- Senior Center
- Town Hall

Transportation
- Bridge
- RiPTA Bus Stop
- RiPTA Park-n-Ride

Map E3
Towards Resilience

Engage waterfront businesses to explore strategies and actions to increase resilience to sea level rise & storms

• Identify relevant issues and stakeholder interests
• Learn current actions and needs
• Conduct a study tour / charrette
• Summarize best practices
• Identify early actions
Experience from Near and Far
Be Informed...Get Involved

http://seagrant.gso.uri.edu/climate

www.beachsamp.org

www.RIClimateChange.org
Putting all the Pieces in Place
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