Climate Adaptation for Coastal Communities

Engaging RI Local Governments in Mitigation and Resilience

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RIEMA Preparedness Conference

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Drivers to Plan for Natural Hazards & Climate Change

- **Public Health, Safety & Welfare**
- **Investment of Public Funds for Infrastructure**
- **State Mandate**
- **Impacts Felt at Local Level from Multiple Hazards**

Photo credit: Melissa Devine, Rhode Island Sea Grant

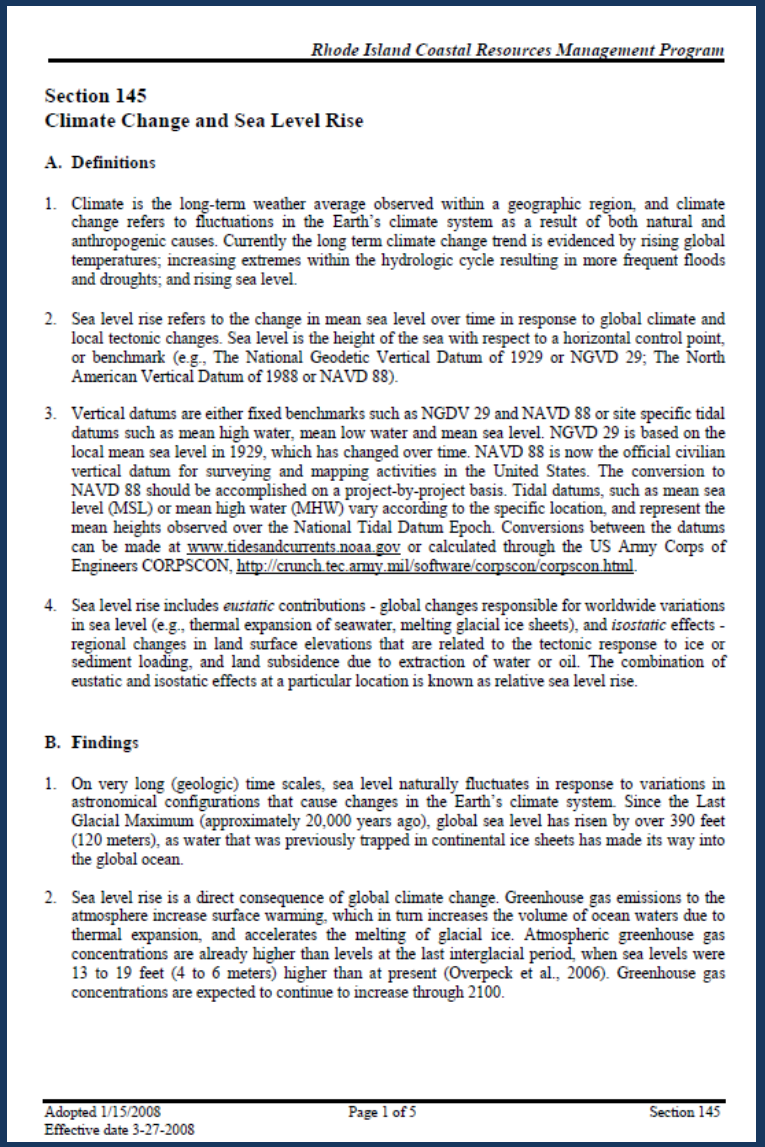
State Policies

RI Sea Level Rise Policy

- RI CRMC Red Book Section 145
- 3-5’ by 2100

Comprehensive Plans

- Rhode Island 2012 Comprehensive Planning and Land Use Act update
- Requirement for plans to address Natural Hazards



Section 145
Climate Change and Sea Level Rise

A. Definitions

1. Climate is the long-term weather average observed within a geographic region, and climate change refers to fluctuations in the Earth’s climate system as a result of both natural and anthropogenic causes. Currently the long term climate change trend is evidenced by rising global temperatures; increasing extremes within the hydrologic cycle resulting in more frequent floods and droughts; and rising sea level.

2. Sea level rise refers to the change in mean sea level over time in response to global climate and local tectonic changes. Sea level is the height of the sea with respect to a horizontal control point, or benchmark (e.g., The National Geodetic Vertical Datum of 1929 or NGVD 29; The North American Vertical Datum of 1988 or NAVD 88).

3. Vertical datums are either fixed benchmarks such as NGDV 29 and NAVD 88 or site specific tidal datums such as mean high water, mean low water and mean sea level. NGVD 29 is based on the local mean sea level in 1929, which has changed over time. NAVD 88 is now the official civilian vertical datum for surveying and mapping activities in the United States. The conversion to NAVD 88 should be accomplished on a project-by-project basis. Tidal datums, such as mean sea level (MSL) or mean high water (MHW) vary according to the specific location, and represent the mean heights observed over the National Tidal Datum Epoch. Conversions between the datums can be made at www.tidesandcurrents.noaa.gov or calculated through the US Army Corps of Engineers CORPSCON, http://crunch.tec.army.mil/software/corpscon/corpscon.html.

4. Sea level rise includes *eustatic* contributions - global changes responsible for worldwide variations in sea level (e.g., thermal expansion of seawater, melting glacial ice sheets), and *isostatic* effects - regional changes in land surface elevations that are related to the tectonic response to ice or sediment loading, and land subsidence due to extraction of water or oil. The combination of eustatic and isostatic effects at a particular location is known as relative sea level rise.

B. Findings

1. On very long (geologic) time scales, sea level naturally fluctuates in response to variations in astronomical configurations that cause changes in the Earth’s climate system. Since the Last Glacial Maximum (approximately 20,000 years ago), global sea level has risen by over 390 feet (120 meters), as water that was previously trapped in continental ice sheets has made its way into the global ocean.

2. Sea level rise is a direct consequence of global climate change. Greenhouse gas emissions to the atmosphere increase surface warming, which in turn increases the volume of ocean waters due to thermal expansion, and accelerates the melting of glacial ice. Atmospheric greenhouse gas concentrations are already higher than levels at the last interglacial period, when sea levels were 13 to 19 feet (4 to 6 meters) higher than at present (Overpeck et al., 2006). Greenhouse gas concentrations are expected to continue to increase through 2100.

New Federal Flood Risk Management Standard

Executive Order 11988 as amended by Executive Order 13690

- **Requires federal projects be constructed to a higher vertical elevation to address current and future flood risk and ensure that projects funded with taxpayer dollars last as long as intended.**
- **Draft standard - out for public comment until May 2015**
- **Applies to federal projects, including projects using federal funding**
- **Projects will need to comply with one of the following:**
  - **Conducting a full vulnerability assessment (using best available science);**
  - **Adding 2 or 3 feet of elevation/freeboard, (depending on criticality), above the 100-year, or 1% annual chance, flood elevation; or**
  - **Designing to the 500-year, or 0.2% annual chance, flood elevation.**

PLANNING FOR NATURAL HAZARDS AND CLIMATE CHANGE

EMBODYING STATE GOALS AND POLICIES

To be consistent with the State's many goals for planning for natural hazards and to receive State approval, comprehensive plans must include **goals, policies and implementation actions** that address:

- Avoiding or minimizing the effects that natural hazards pose to lives, infrastructure and property.

Municipal Comp Plan vs. Haz Mit Plan

Natural Hazards & Climate Change Component of Local Comprehensive Plan	VS.	Local Hazard Mitigation Plan
• Used to guide local development and infrastructure decisions • Must take a more holistic view • Should align land use, transportation, infrastructure and other goals and policies with natural hazards considerations • Should consider different aspects of natural hazards and climate change than what is typically found in a local hazard mitigation plan	• Both "identify policies and actions to reduce risk and future losses." • Info contained within HAZ MIT PLAN can serve as the basis for addressing natural hazards in the comprehensive plan • Goals, policies, and implementation program of the comprehensive plan can reinforce the strategies detailed within the hazard mitigation plan.	• FEMA focused • More detailed in emergency response & post storm recovery

UPDATING COMP PLAN & HAZ MIT PLAN

Some words of wisdom:

(1) When you update each plan, **consider integration of the plans from the beginning** of the process.

- *What are the target hazards?*
- *Which action items fall into both plans?*
- *What do you need in the Comp Plan to better enable action in your Haz Mit Plan?*
- *What will be the biggest obstacles to implementation?*
- *Goals/policies and actions can't conflict.*

(2) HELP is available! Ask for assistance from RI Statewide Planning (RISPP) and RI Emergency Management Agency (RIEMA)

Case Study: North Kingstown

- Adaptation to Natural Hazards and Climate Change in North Kingstown, RI
- Map Atlas
- SLAMM maps
- Data analysis
- Adaptation strategies
- Prioritization
- Comprehensive Plan, Goals & Objectives

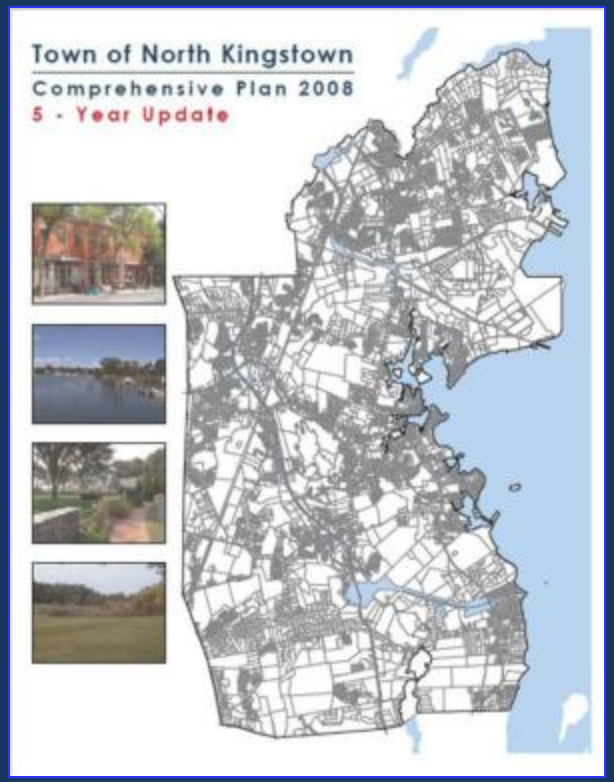
Photo: Teresa Crean

What is North Kingstown doing?

- **FEMA Community Rating System** **NK's Rating = 9**
  - Currently **5% reduction** on flood insurance premiums town-wide
  - NK taking steps to get down to an **"8" rating = 10% reduction**!

- **Hazard Mitigation Plan updated in 2014**, estimated adoption by end of year

- NK will incorporate natural hazards planning into **2015 rewrite of NK's Comprehensive Community Plan**



What can residents & businesses do?

- **Be informed.**
  - Know your risk
  - Know who to call & how to access resources
- **Make a plan.**
  - Comp Plans & Hazard Mitigation Plans locally
  - Elevate, relocate, or floodproof
- **Take action.**
  - Evacuate areas at risk
  - Get involved in Comprehensive Community Plan & Beach SAMP
- **Spread the word!**

Case Study: North Kingstown

1) STORMS:

When the next storm hits Rhode Island this year and in years ahead, how far will the storm surge reach inland roads and properties, and how will the coastline erode and change as the waters surge and recede?

2) SEA LEVEL RISE:

Over the next 20, 50, and 100 years, how will incremental sea level rise change the coastline of town, and what roads and properties will be inundated by two high tides per day at levels higher than we are seeing today?

Sea-Level Change Curve Calculator

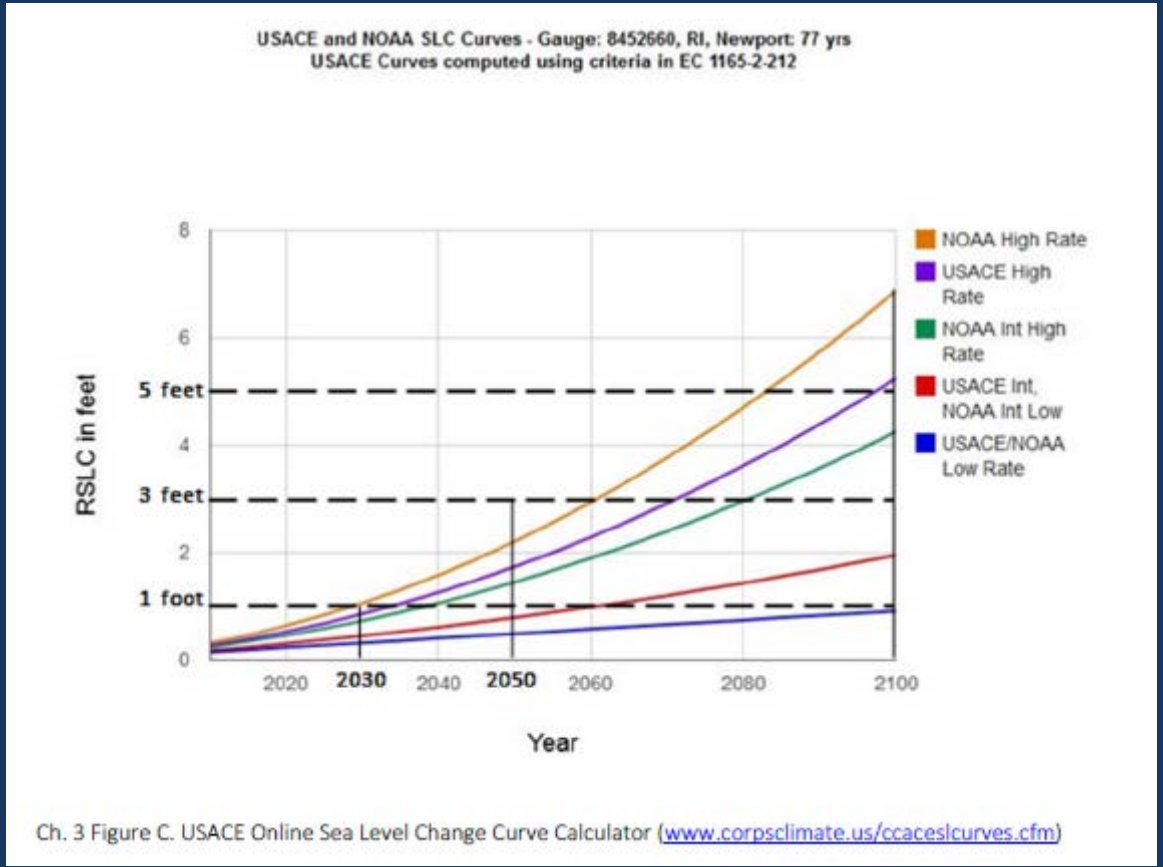
USACE Curves computed using criteria in USACE EC 1165-2-212

NOAA Curves computed using criteria in NOAA SLR Report 06-Dec-2012

Gauge: 8452660, RI, Newport: 77 yrs
All values are in feet

Year	NOAA Low	USACE Low	NOAA Int Low	USACE Int	NOAA Int High	USACE High	NOAA High
2010	0.15	0.15	0.18	0.18	0.24	0.27	0.32
2015	0.19	0.19	0.24	0.24	0.35	0.39	0.46
2020	0.24	0.24	0.31	0.31	0.46	0.53	0.64
2025	0.28	0.28	0.38	0.38	0.59	0.68	0.84
2030	0.32	0.32	0.45	0.45	0.73	0.86	1.06
2035	0.36	0.36	0.53	0.53	0.89	1.05	1.31
2040	0.41	0.41	0.61	0.61	1.06	1.26	1.58
2045	0.45	0.45	0.70	0.70	1.25	1.49	1.88
2050	0.49	0.49	0.79	0.79	1.45	1.74	2.21
2055	0.53	0.53	0.89	0.89	1.67	2.00	2.56
2060	0.58	0.58	0.99	0.99	1.90	2.29	2.94
2065	0.62	0.62	1.09	1.09	2.14	2.59	3.34
2070	0.66	0.66	1.20	1.20	2.40	2.92	3.77
2075	0.70	0.70	1.32	1.32	2.67	3.26	4.22
2080	0.74	0.74	1.43	1.43	2.96	3.62	4.70
2085	0.79	0.79	1.56	1.56	3.26	3.99	5.21
2090	0.83	0.83	1.68	1.68	3.57	4.39	5.74
2095	0.87	0.87	1.82	1.82	3.90	4.80	6.29
2100	0.91	0.91	1.95	1.95	4.25	5.24	6.87

Ch. 3 Figure B. USACE Online Sea Level Change Curve Calculator (www.corpsclimate.us/ccaceslcurves.cfm)

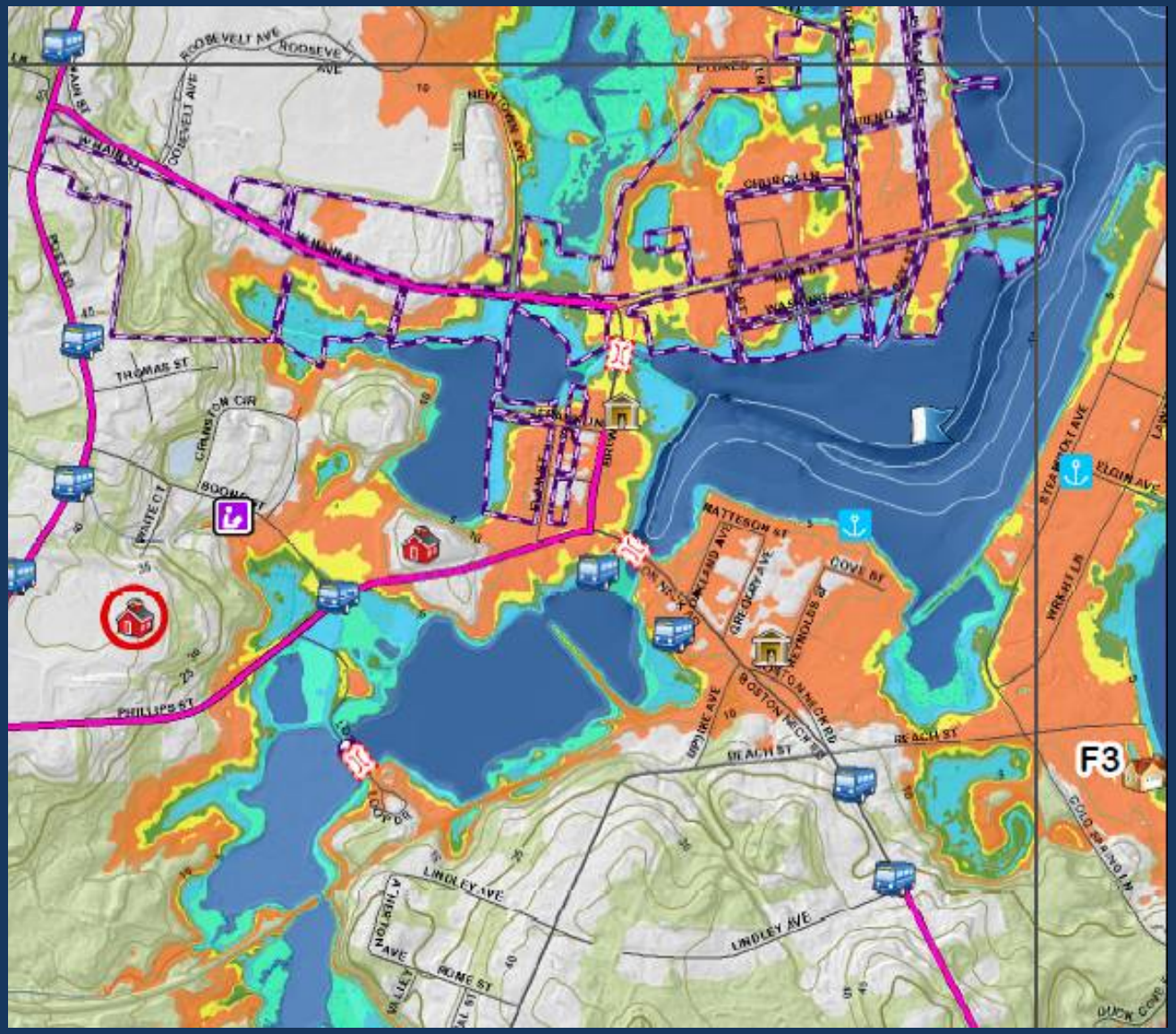


Ch. 3 Figure C. USACE Online Sea Level Change Curve Calculator (www.corpsclimate.us/ccaceslcurves.cfm)

www.corpsclimate.us

Historic Storm, 1938 Hurricane– Wickford

Mapping Sea Level Rise – Wickford – Infrastructure



Map Legend

Mean Higher High Water (MHHW)

Mean Higher High Water

- -96.14962006 - 1.81
- 1.810000001 - 11.27000046

MHHW plus 1ft Sea Level Rise (SLR)

MHHW plus 1ft Sea Level Rise

- -96.14962006 - 2.81
- 2.810000001 - 11.27000046

MHHW plus 3ft SLR

MHHW plus 3ft SLR

- -96.14962006 - 4.81
- 4.810000001 - 11.27000046

MHHW plus 1ft SLR and 3ft Storm Surge

MHHW plus 1ft SLR and 3ft Storm Surge

- -96.14962006 - 5.81
- 5.810000001 - 11.27000046

MHHW plus 5ft SLR

MHHW plus 5ft SLR

- -96.14962006 - 6.81
- 6.810000001 - 11.27000046

Hurricane of 1938 Surge Height

Hurricane of 1938 Surge Height

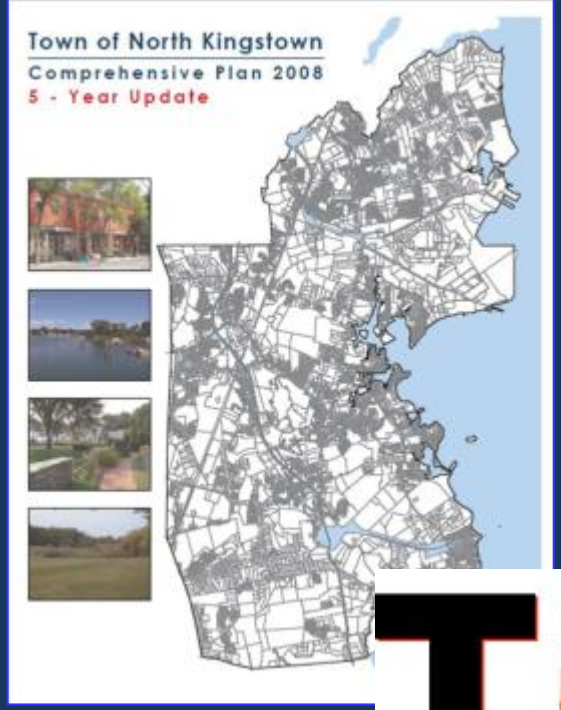
- -96.14962006 - 11.27000046

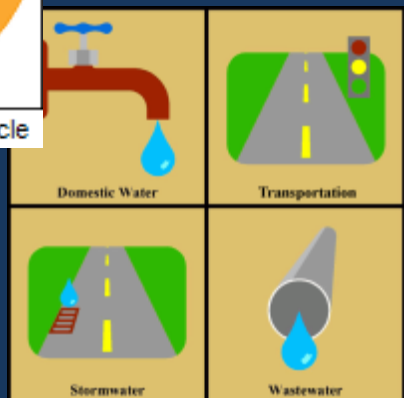
Elevation and Bathymetry

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

Local Applications

- Comprehensive Plan / Regulatory
- Hazard Mitigation
- Municipal Capital Improvement Plan
- State of RI Transportation Improvement Program (TIP)
- Building Code
- Open space acquisition
- Incorporate into town GIS and IMS
- Community Rating System (CRS)





Wickford Sea Level Rise Scenarios: 1 foot, 3 feet, and 5 feet

The three maps on the right illustrate sea level rise scenarios for the Wickford Historic area of North Kingstown, RI using a digital elevation model and an aerial photograph with a "bathtub model" approach to show the projected boundaries of two high tides per day on the municipal landscape.

The accompanying illustrated maps (underneath each SLR scenario map) show the individual parcels and properties that intersect each sea level rise scenario, as well as specific segments of roads and bridges that are projected to be at risk from projected sea level rise scenarios in North Kingstown.

The green map below shows the FEMA flood zones for the Wickford Historic area.

These draft maps are intended for illustrative purposes only.

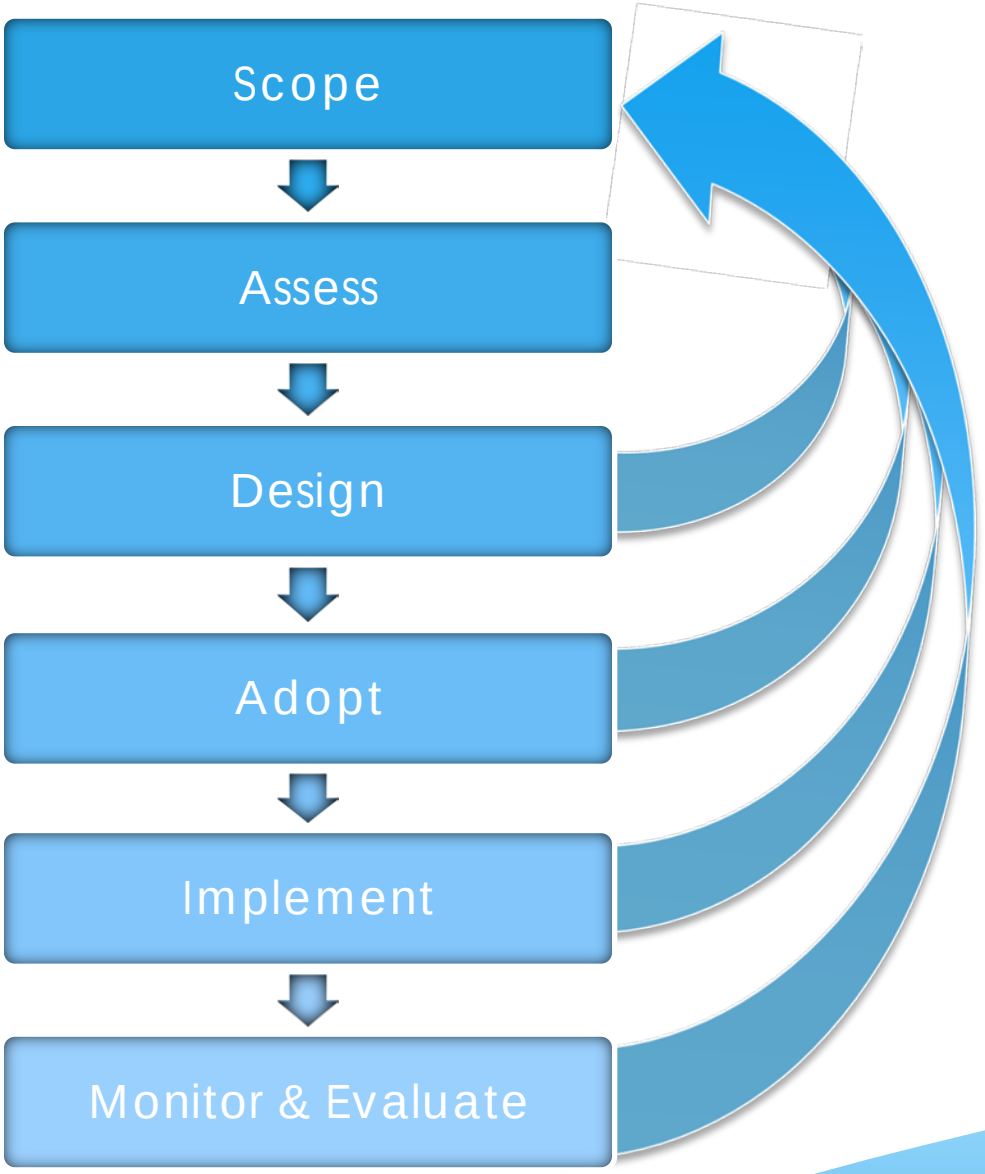
MUNICIPAL ADAPTATION STRATEGIES BY SECTOR

1. Land Use
2. Transportation & Circulation
3. Building Stock
4. Municipal Properties & Facilities
5. Emergency Management Facilities
6. Wastewater
7. Stormwater Management
8. Drinking Water
9. Groundwater
10. Wetlands
11. Historic & Cultural Resources
12. Contaminated Sites
13. Open Space, Recreation, & Public Access
14. Vulnerable Populations
15. Greenhouse Gas Reduction (CO_2 Mitigation)
16. Utilities and Other Infrastructure
17. Communications
18. Municipal Operations

Wickford Village, MHHW+5 ft

Sea Level Rise, MHHW+5 ft

Sea Level Affecting Marshes Model, MHHW+5 ft



- ✓ Stakeholder engagement throughout
- ✓ Each step should be reviewed to see how it compares to initial scope & assessment

Process

SCOPE

- Identify Goals
- Clarify Assessment Outcome
- Define Scale
- Data Needs and Sources
- Select a Planning Team
- Outline Public Process
- Capacity Building
- Prioritize Moving Forward

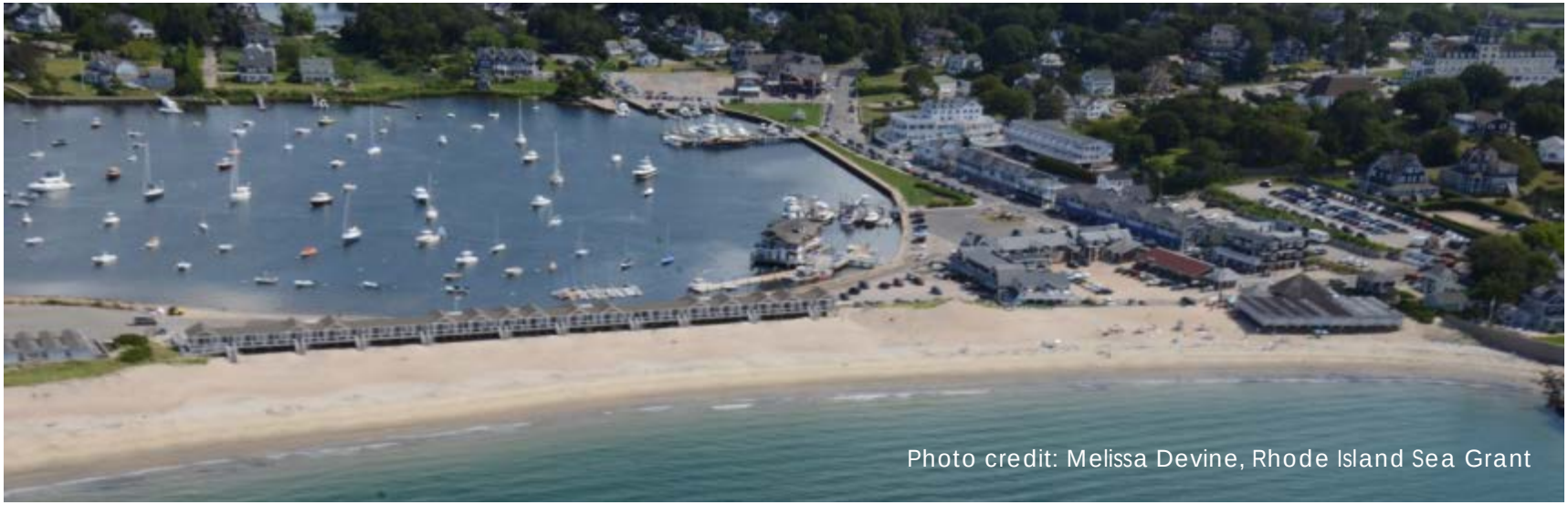


Photo credit: Melissa Devine, Rhode Island Sea Grant

SCOPE

Natural Hazards

Flood-Related	Riverine flooding Coastal flooding Flash, urban and stormwater- based flooding Storm surge Coastal erosion and shoreline change Sea Level Rise
Heat-Related	Drought; Wildfire; High Heat Days; Extreme Heat Waves
Wind-Related	Hurricanes; Tornadoes; Thunderstorms/Wind-Storms; Hail; Lightning
Winter-Related	Heavy Snow; Ice Storms; Blizzards; Extreme Cold
Earthquakes	

Infrastructure, Assets, Resources and Populations

Building and Infrastructure	Residential neighborhoods & homes Commercial & Industrial areas & businesses Historic and cultural sites or structures Public or Emergency facilities Healthcare facilities, nursing homes & assisted living facilities Municipal buildings Major roads and evacuation routes Public Transportation routes, stops or hubs Rail lines and stations; Airports Water supply infrastructure Wastewater infrastructure Stormwater drainage Natural Gas, Electricity or Energy Production infrastructure Marine Facilities; Dams Solid waste transfer stations Telecommunication infrastructure
Natural Resources	Parks and recreation facilities Lakes, rivers and other water bodies Reservoirs Wetlands (coastal and freshwater) Coastal barriers (dunes, marshes, coastal ponds) Wildlife and endangered species Forests; Undeveloped and/or conservation lands
Special Populations	Senior citizens Young children Low-income, unemployed or under-employed Renters

SCOPE

Flood Risk:

1% and 0.2% storm (also known as the 100 and 500 year storm event)

Special Flood Hazard Areas using the most recent Federal Emergency Management Agency's Flood Insurance Rate Maps

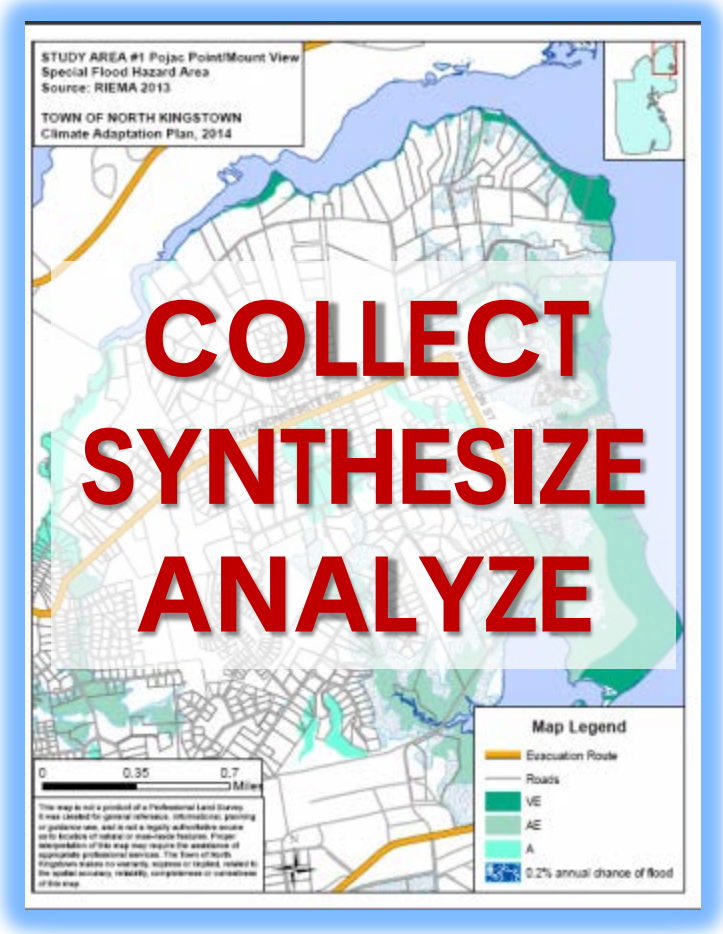
Projected areas inundated due to sea-level rise:

1 foot

3 feet

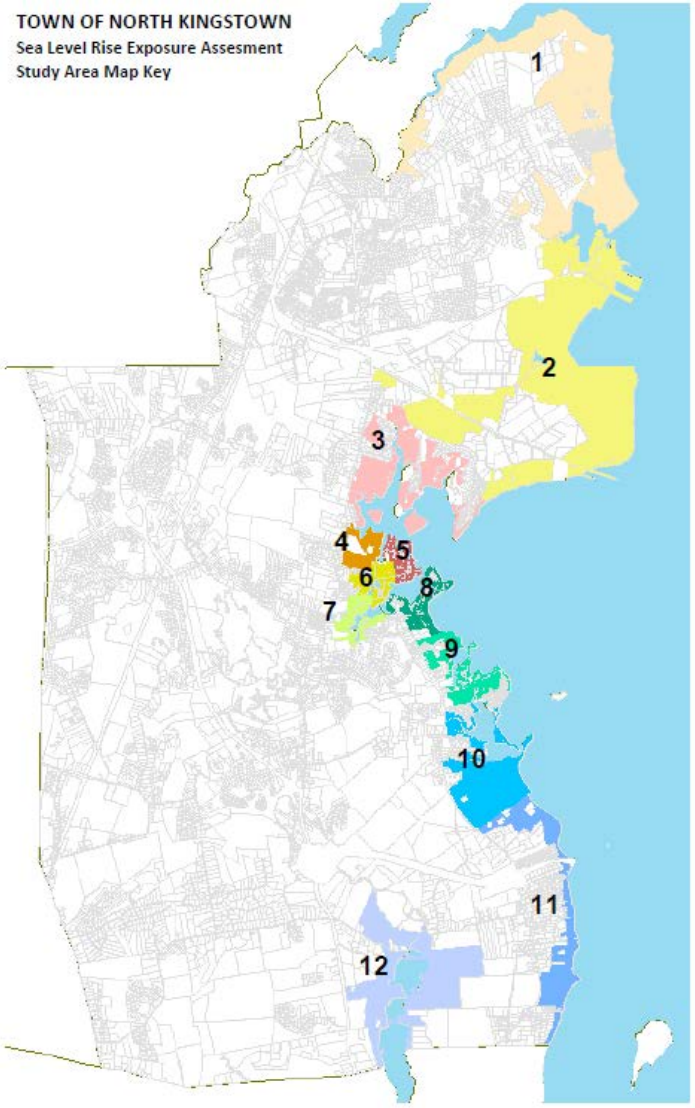
5 feet

ASSESS



- Compile Data and Maps
- Identify Exposed Assets
- Determine the Vulnerability of Exposed Assets
- Identify Priority Impacts
- Compare Results to Other Planning Efforts
- Stakeholder Review

ASSESS

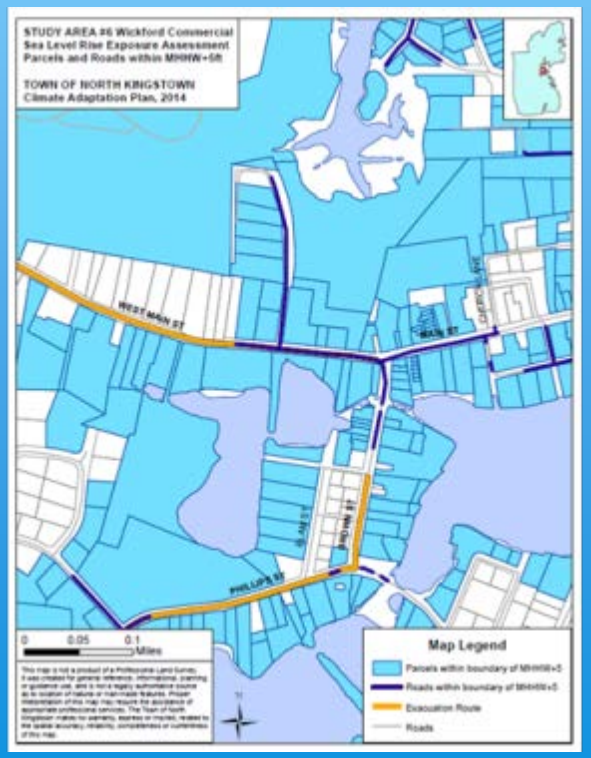


- Compile Data and Maps
- **Identify Exposed Assets**
- Determine the Vulnerability of Exposed Assets
- Compare Results to Other Planning Efforts
- Stakeholder Review

One potential process to identify vulnerable properties

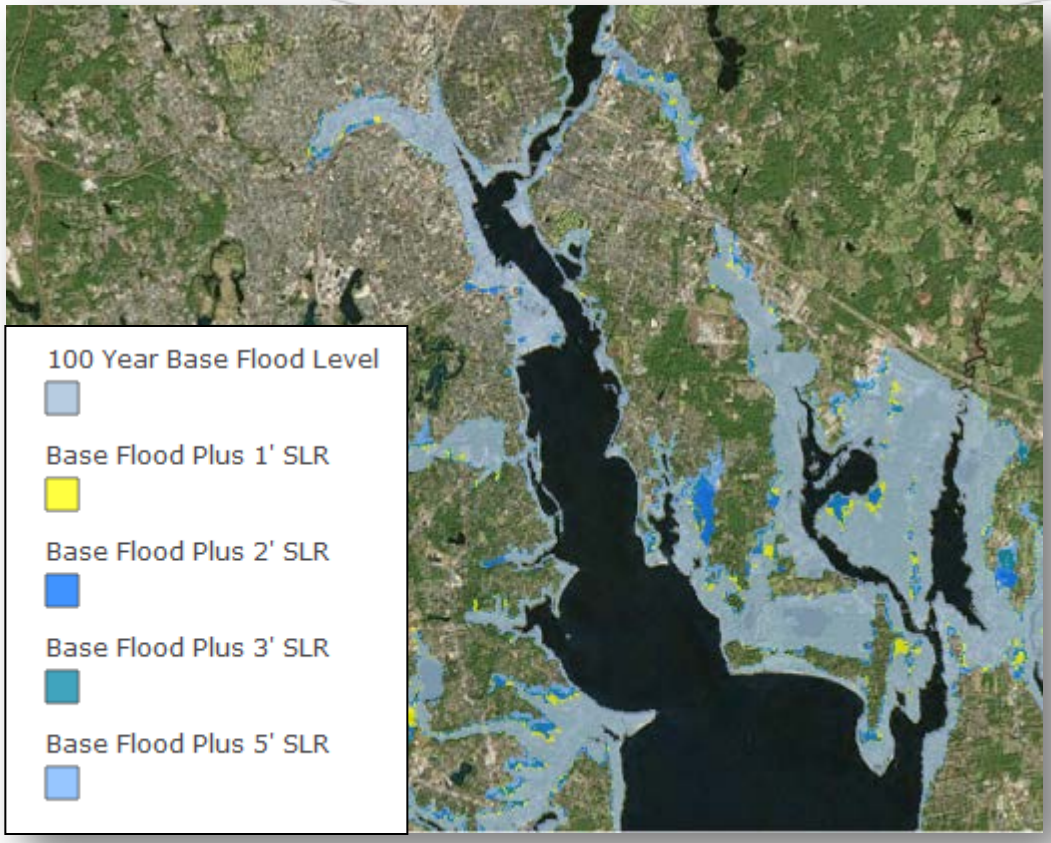
- **Creating a series of sea level rise maps for each study area**

- **"Lighting up" the parcels that are flooded under each scenario**



STORMTOOLS:

Maps of Storms + Sea Level Rise



Visualizations

Maps flooding from a 25, 50, 100-year storm PLUS Sea Level Rise

*****More accurate depiction of future flooding risk***

Applications

Day-to-Day operations

Long term planning/financing

http://www.beachsamp.org/resources/understand-risk/

Vulnerability of Critical Facilities

STORMTOOLS
25-year Storm Event +SLR

Police /Fire / EMA
- **First responders**
- **Recovery efforts**

http://www.beachsamp.org/maps/stormtools

STORMTOOLS:
Maps of Storms + Sea Level Rise

Water Depths for a 100 Year Storm Event Plus the Influence of 1', 2', 3' and 5' of Sea Level Rise

Also provides flooding depth at specific points

http://www.beachsamp.org/resources/understand-risk/

www.beachsamp.org

CRMC Coastal Resources Management Council

Coastal Resources Center

Sea Grant Rhode Island

The University of Rhode Island Graduate School of Oceanography

Eastern Connecticut State University

Rhode Island Geological Survey

The University of Rhode Island College of the Environment and Life Sciences

DESIGN

- **Craft Adaptation Strategies**
  - Review Adaptation Options
  - Identify Opportunities to Mainstream Adaptation into Municipal Processes
  - Select Strategies and Actions
- **Prioritize Actions**
- **Integrate Adaptation into Planning Programs**
- **Stakeholder Review**

SAMPLE GOALS, POLICIES AND IMPLEMENTATION ACTIONS FOR NATURAL HAZARDS AND CLIMATE CHANGE

SAMPLE GOALS

- Our community will act in an integrated manner to implement a standard of resilience from natural hazards.
- Systems will be in place to minimize impacts from natural hazards in our vulnerable areas.

SAMPLE POLICIES

- Plan to accommodate a base rate of 3 to 5 foot rise in sea level by 2100 in the siting, design, and implementation of public and private coastal activities.
- Require municipal departments to incorporate climate change in all long-range planning and critical public infrastructure projects.
- Ensure that the local Hazard Mitigation Plan is up-to-date and utilizes the most recent available technical data for natural hazards and climate change.
- Ensure consistency between the Hazard Mitigation Plan, the Comprehensive Plan, SAMP plans, the city's land use regulations and the local Harbor Management Plan.
- Ensure that existing critical facilities are protected or otherwise improved to function in hazard and disaster situations.
- Ensure that new facilities are sited in areas that are not prone to flooding or other hazards.
- Improve the municipality's stormwater management system to enhance infiltration and expand stormwater retention areas.
- Ensure that there is adequate funding and administrative support to implement the recommendations in the local Hazard Mitigation Plan.
- Educate the public to better understand the concept of community resilience and the meaning of probabilities and risk, especially for stream and coastal flooding.
- When making improvements to parks, playgrounds and other open spaces, include improvements so that these areas can function as stormwater retention areas.
- Encourage stormwater drainage improvements that reduce runoff and increase the permeability of the built environment.
- Expand the tree canopy in urbanized areas of the community to reduce heat impacts.
- Continue to improve community resilience in order to maintain the municipality's Community Rating System score.
- Encourage reduction of carbon emissions in the municipality through improved transportation efficiency, reduction of traffic congestion, encouragement of alternative transportation options (rail, bike, pedestrian infrastructure), and implementation of an anti-idling ordinance for trucks, buses, and other vehicles.
- Ensure that public facility improvements necessary for increasing resliency have priority placement on the municipal Capital Improvement Program.

SAMPLE IMPLEMENTATION ACTIONS

- Define areas of the municipality 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.
- Provide incentives for achieving a higher level of flood protection when designing and constructing municipal infrastructure.
- Update the local Hazard Mitigation Plan on a minimum of every 3 years and as needed after natural hazard events.
- Complete vulnerability assessments of all municipal infrastructure to determine priorities for adaptation.
- Complete an assessment to identify the vulnerability of all critical public facilities such as police and fire stations, hospitals and schools, and other services.
- Develop a priority list of facilities that need to be hardened or otherwise improved and seek funding for improvements.
- Determine an appropriate funding source for acquisition of properties in the municipality's most vulnerable areas.
- Revise local subdivision and land development regulations to require the incorporation of natural drainage systems, such as rain gardens and other small water management infrastructure, in private development.
- Design all new public buildings to include stormwater management best practices including the use of pervious materials, green roofs, and natural drainage systems.
- Undertake a study, working with the local land trust, to identify high priority water-adjacent land that could be designated as permanently protected open space.
- Review land uses in exposed areas to determine whether restrictions are necessary to prevent or lessen potential losses during large storm events.
- Develop design guidelines with examples of attractive design solutions for elevating existing buildings and for development of new elevated buildings.
- Develop and implement a street tree program in the municipality's most urbanized areas.
- Identify tree species that will be most resilient to climate change and use these species in public landscaping projects.
- Develop and disseminate an educational campaign for the public on reducing risks to private property.
- Create an Emergency and Disaster Preparedness section on the municipal website with information on minimizing risk to private property and on general preparedness.
- Work with the state and FEMA to make brochures and other information available on the City website, in the library, and at other city destinations, such as community centers.
- Hire a Community Rating System (CRS) coordinator to assist in implementing measures to increase the community's rating for the CRS program.
- Implement use restrictions within the Special Flood Hazard Area (SFHA) ,as well as in coastal areas projected to be inundated by future sea level rise scenarios.
- Create a Sea Level Rise Overlay Zone in a defined area along the coast that restricts or prohibits development of new structures and outlines plans for managing parcels and properties after storm events (i.e. debris management, removal requirements of damaged/ abandoned structures, etc.).
- Establish a process to reexamine the science and sea level rise projections and estimated timeframes for rise to maximize protection of assets and public safety within impacted areas.
- Coordinate with RI CRMC and RI DEM to establish clear and consistent setback requirements from boundaries of projected sea level rise scenarios or salt marsh migration areas for any structure proposed within the Special Flood Hazard Areas.

DESIGN

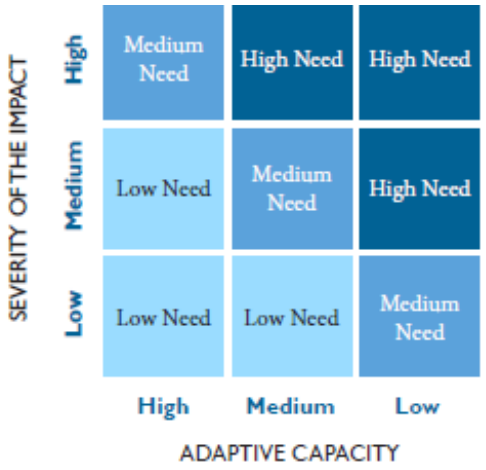
- Craft Adaptation Strategies
- **Prioritize Actions**
- Integrate Adaptation into Planning Programs
- Stakeholder Review

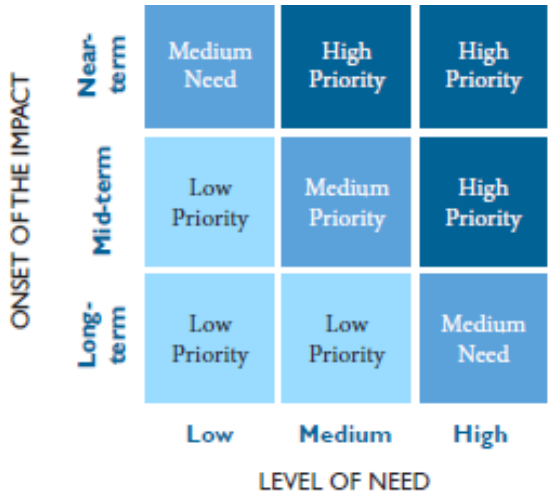
DESIGN

IMPACT PRIORITIZATION TOOL - SAMPLE

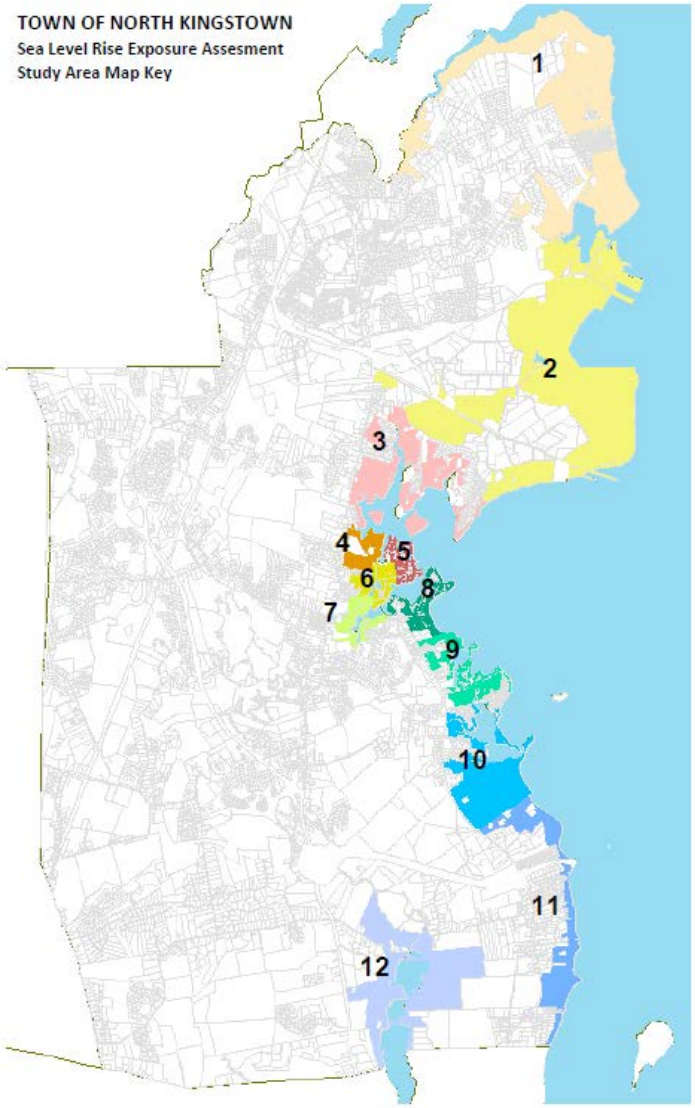
Impact Statement: *"Bayfront Park" will be impacted by coastal erosion.*

IMPACTS	IMPACT SEVERITY (high, medium, low)	ADAPTIVE CAPACITY (high, medium, low)	LEVEL OF NEED (high, medium, low)	ONSET	PRIORITY (high, medium, low)
Loss of bayfront walkway	Medium	High	Low Need	Near-term	Low
Loss of fishing area	Low	Low	Medium Need	Near-term	High
Interrupted use of only park in neighborhood	Medium	Low	High Need	Near-term	High





DESIGN



NORTH KINGSTOWN Sea Level Rise Scenarios - Study Area Prioritization Worksheet

STUDY AREA NUMBER	STUDY AREA NAME	Evacuation Route Impacted?	Barrier to Ingress/Egress?	Public Facilities Impacted?	State Roads impacted by 1' OR 3' SLR	State Roads impacted by 5' SLR	Local Roads impacted by 1' OR 3' SLR >0.1mi	Local Roads impacted by 5' SLR >0.1mi	Historic District Impacted?	TOTAL
	POINT VALUE	*2*	*2*	*2*	*1*	*1*	*1*	*1*	*1*	*11*
6	Wickford Commercial	2	2	2	1	1	0	1	1	**10**
5	Wickford Historic	2	2	0	0	0	1	1	1	**7**
7	Phillips / Loop	2	2	0	1	1	0	1	0	**7**
9	Duck Cove / Earle Drive	0	2	0	0	0	1	1	0	**4**
8	Poplar Point	0	2	0	0	0	1	1	0	**4**
10	Hamilton / Bissell Cove	0	0	0	0	0	0	1	0	**1**
1	Pojac Point / Mount View	0	0	0	0	0	0	1	0	**1**
2	Quonset / Davisville	0	0	0	0	0	0	1	0	**1**
3	Mill Cove / Shore Acres	0	0	0	0	0	0	0	0	**0**
4	Intrepid Drive	0	0	0	0	0	0	0	0	**0**
11	Plum Point / Plum Beach	0	0	0	0	0	0	0	0	**0**
12	Gilbert Stuart / Walmsley Lane	0	0	0	0	0	0	0	0	**0**

Wickford Village, MHHW+5 ft

Sea Level Rise, MHHW+5 ft

Sea Level Affecting Marshes Model, MHHW+5 ft

INTEGRATE ADAPTAION INTO PLANNING PROGRAMS

- Plan Implementation Timeline and Identify Responsible Party
- Day to day, and long term
- Share with Stakeholders

Local Adoption of Vulnerability Assessments & Adaptation Measures:

- Formal Adoption Options
- Guidance
- Incorporation into Standard Operating Procedures

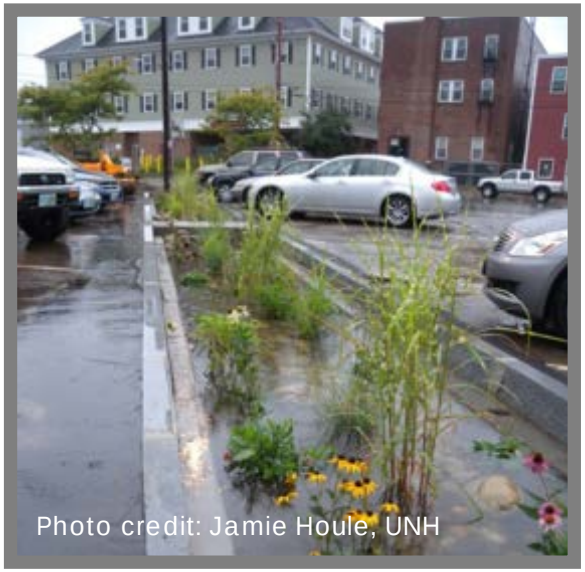


Photo credit: Jamie Houle, UNH


Photo credit: Save the Bay


Photo credit: Pam Rubinoff, RISG

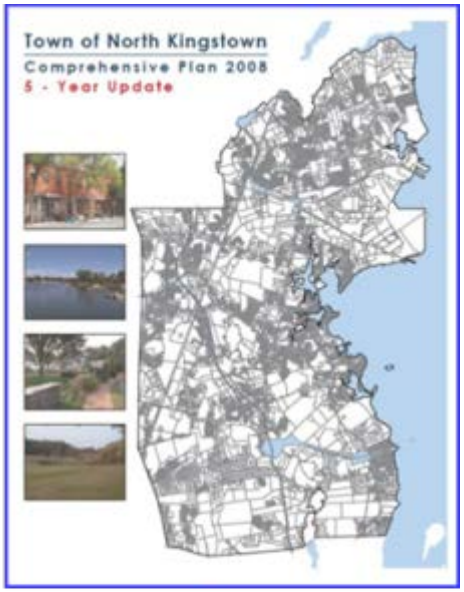

Photo credit: Pam Rubinoff, RISG

IMPLEMENT

Implementing Adaptation Measures:

- Adaptation Funding
- Governance
- Leadership
- Local Capacity Building
- Modify Municipal Operations, Departmental Duties & Processes

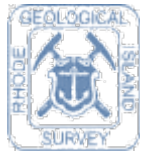
Emergency Management Cycle



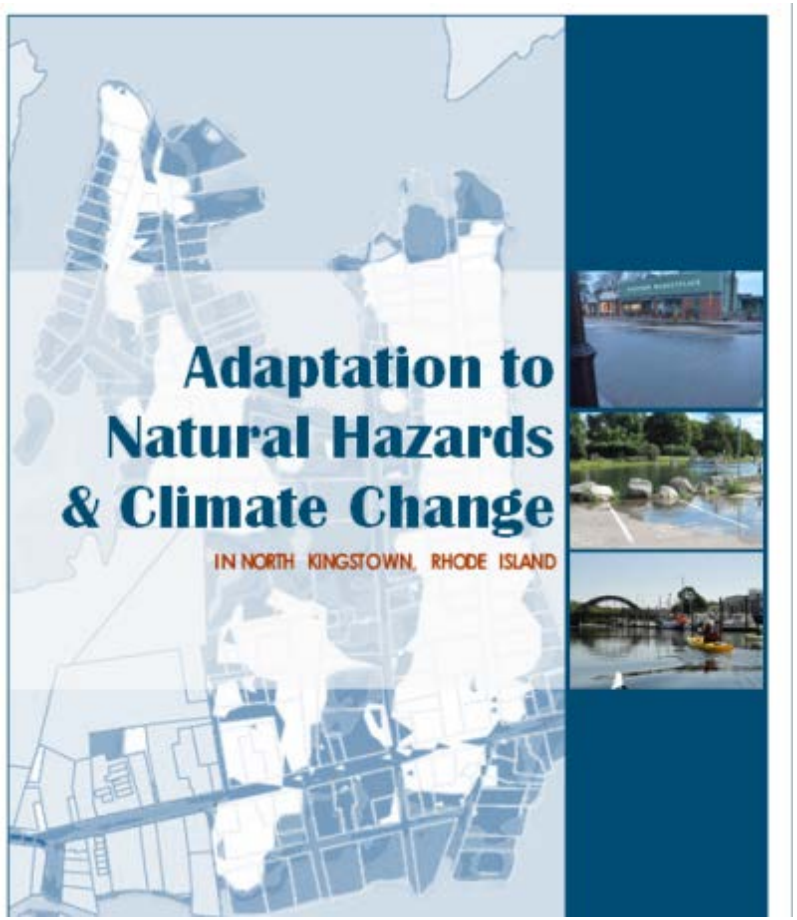
MONITOR & EVALUATE

- **Mainstream Into Annual/Regular Updates**
  - ***Annual CIP or Biannual TIP, Hazard mitigation priorities***
  - ***5 year Comprehensive Plan Implementation Report***
  - ***Hazard Mitigation Review***
  - ***NFIP Community Rating System (CRS) Audit***
- **Capture Lessons Learned**
- **Compare to State Policy**
- **Create database of impacts & losses**

Building Tools in Partnership



Resources



http://rhody.crc.uri.edu/accnk/

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RHODE ISLAND STATEWIDE PLANNING PROGRAM

U.S. Department of Transportation
Federal Highway Administration

Sea Grant Rhode Island

CRC Coastal Resources Center

The University of Rhode Island Graduate School of Oceanography

RIGIS