Climate
Conversations

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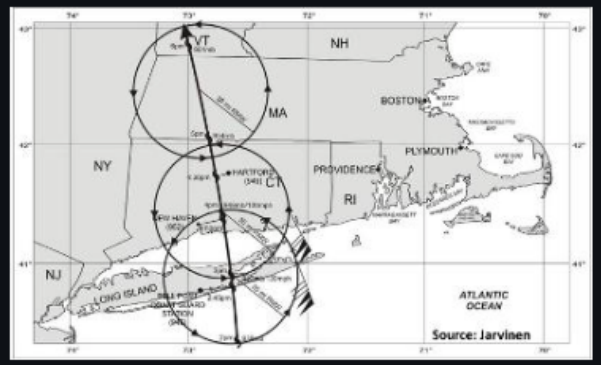
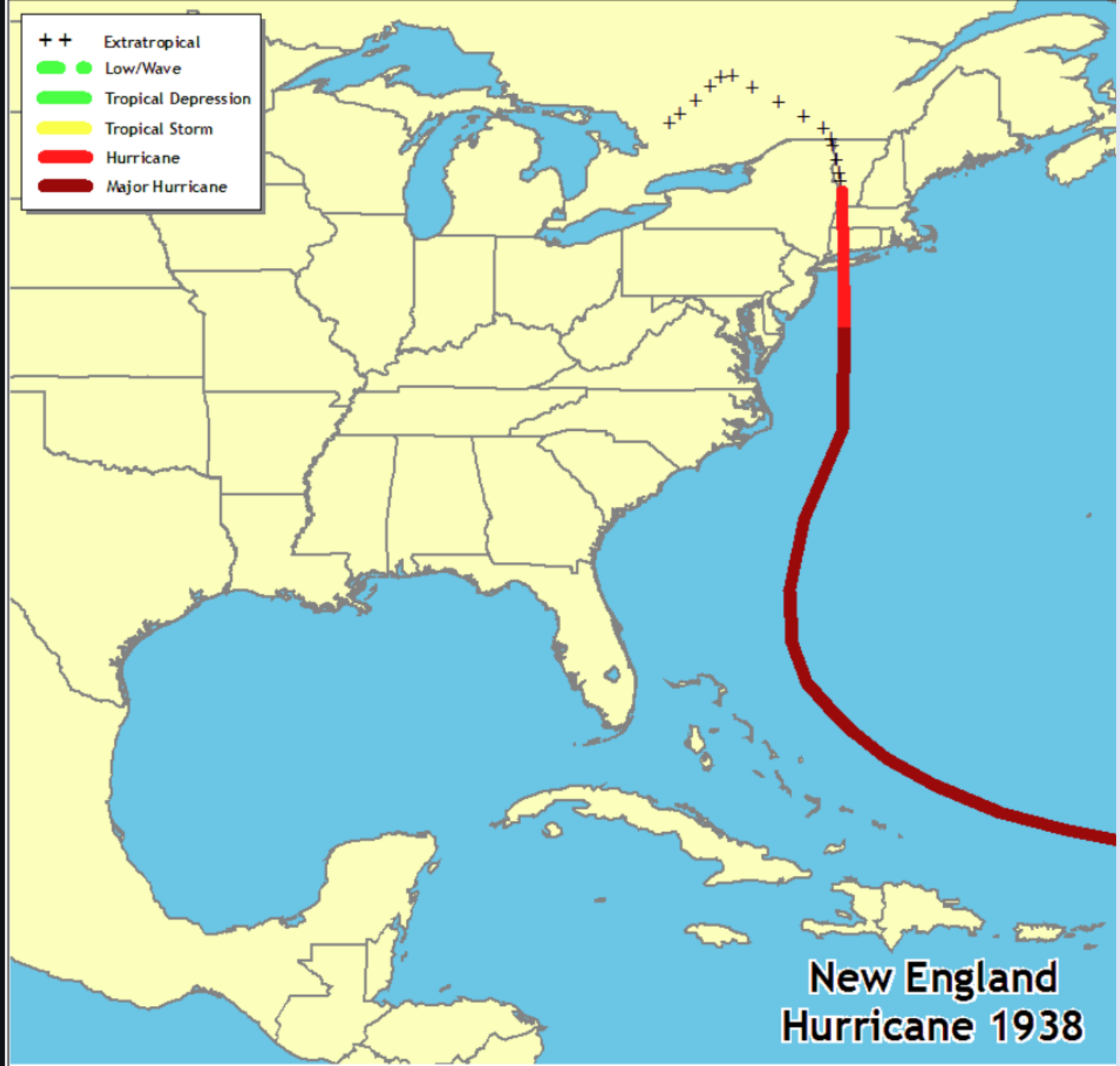
Teresa Crean, AICP, NK (Davisville) Resident since 2015
Barrington Director of Planning, Building & Resilience

The Great New England Hurricane

The Great New England Hurricane, also known as the "Long Island Express" passed north of Puerto Rico on September 18th and 19th and was likely at Category 5 at the time. It picked up speed as it moved northwards, barreling towards New England at 60-70 miles per hour. It made landfall over Long Island on the afternoon of the 21st.



1938 Hurricane Hitting the Northeast (NHC, NOAA)



WEATHER
Forecast
Fair and Cooler Today;
Fair and Warmer Tomorrow

The Evening Bulletin

EMERGENCY EDITION

PROVIDENCE, THURSDAY, SEPTEMBER 22, 1938 — 12 PAGES — PRICE THREE CENTS

HURRICANE KILLS AT LEAST 125 IN STATE; 29 DEAD, 52 MISSING IN WESTERLY; LOSS PUT IN MILLIONS

WESTERLY AREA TOLL IS 29 DEAD AND 52 MISSING

Many Cottages at Beaches Swept Into Ocean Carrying Occupants to Death

Cottages Swept Away

Trapped by Waves

Boat Party Missing

Rescues Five Persons

Two Crushed to Death

RULES LISTED IN PROCLAMATION

Precautions Include Boiling of All Drinking Water, Clearing Debris

As Hurricane-Swept Wave Flooded Providence

Backed up by a howling hurricane, tidewaters of the Providence river swept over downtown Providence yesterday. This view of Exchange Place, with the Biltmore Hotel on the left, shows the downtown district entirely flooded. Thousands who use the Mail when going home were left stranded. There was no traffic—autos here may be seen almost completely covered.

BRITON, HITLER CONFER; CZECH

HURRICANE CASUALTIES

KNOWN DEAD IN RHODE ISLAND

FLOOD WATERS SWEEP CENTRE OF PROVIDENCE

Roofs Blown Off, Communications Cut, Power Dead, Traffic Stalled

BRIDGES OUT, BOATS ARE WASHED ASHORE

At least 125 persons died, many millions of dollars of property damage was wrought, and the normal life of Rhode Island was completely crippled yesterday when a tropical hurricane swept the State, driving before it an incoming tide that piled the waters of Narragansett Bay 10 to 12 feet deep in downtown Providence.

Standing directly in the path of the 76-mile-an-hour fury, this State of all the New England States bore the brunt of a swift and savage sweep that brought fantastic scenes beyond the wildest imagination to the old streets of Providence and to those towns particularly that line the shores of the Bay.

ROOFS BLOWN OFF

Men and women swam and drowned in water that flooded Providence from the foot of College Hill to La Salle Square, water that was lashed to white caps by a wind that tore the roofs from business blocks and dwellings, that uprooted trees of great girth by the hundreds, and lifted coal barges out of the harbor and flung them into Fox Point Square.

It was and is the greatest disaster of any nature that has ever befallen this State, and no 24-hour attempt can produce in its entirety a picture of the awful devastation of life and property.

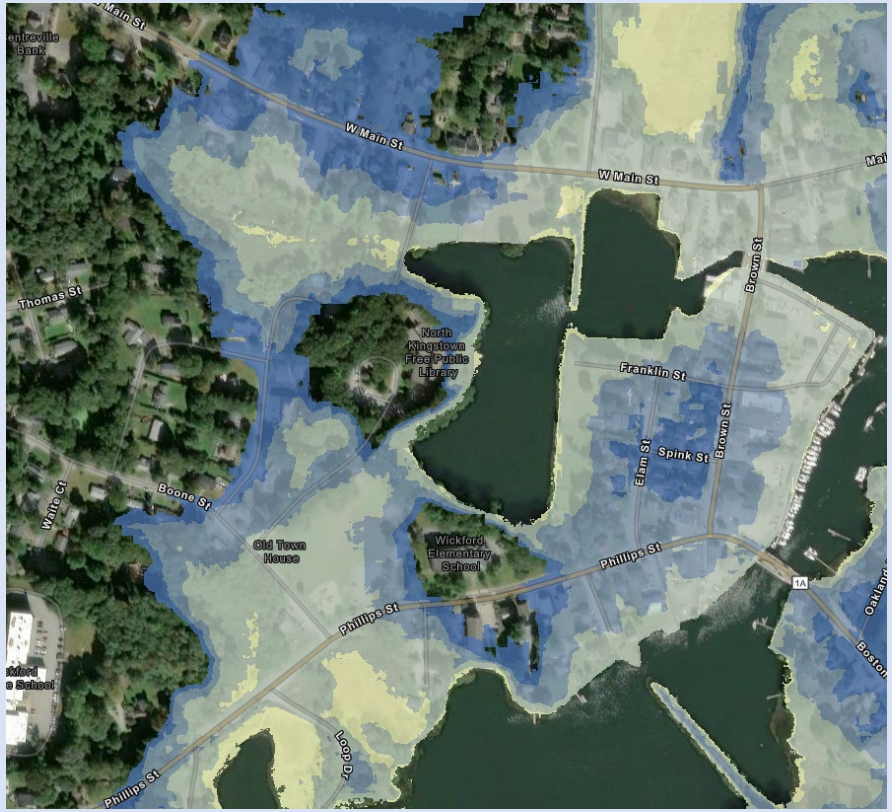
COMMUNICATIONS CRIPPLED

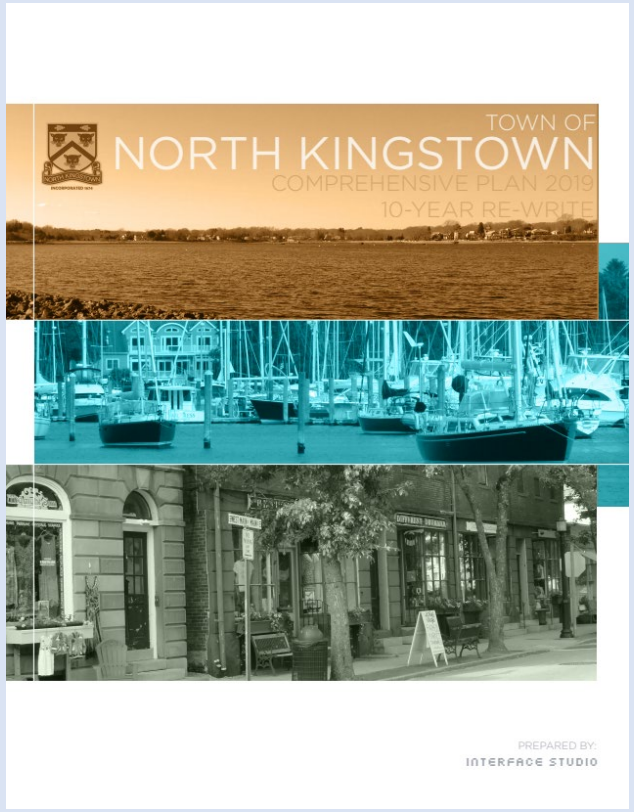
At the moment, Rhode Island is crippled in its communications, its lighting, its transportation and much of its business. The National Guard, with bayonetted rifles, is patrolling the stricken worst hit, and particularly those business areas where, as in downtown Providence, a host of looters and scavengers descended upon the stricken spots even while the storm raged, to pilfer and thieve from businesses that already had received a staggering blow.

The tale, as it unfolded, was one of swift and relentless destruction, and although Providence was buried beneath a heaving blanket of water, and people were drowned and crushed to death beneath falling trees and walls, it was Westerly that apparently suffered the greatest blow in the form of deaths.

Today is the anniversary of the Hurricane of 1938 which wreaked havoc throughout the state leaving 125 dead and millions of dollars in damage.

The Providence Journal



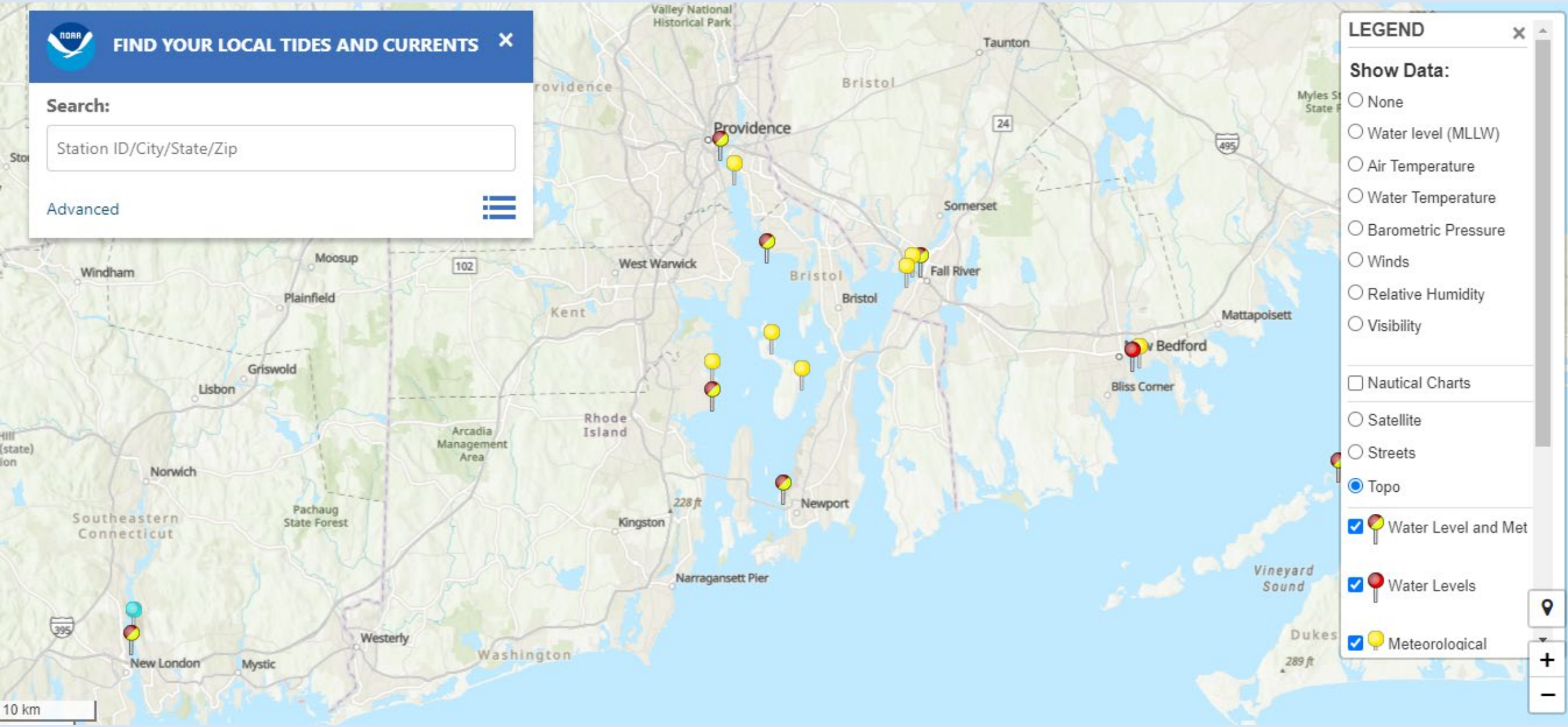


KNOW YOUR RISK

MAKE A PLAN

TAKE ACTION

SOURCE – NOAA Tides & Currents - https://tidesandcurrents.noaa.gov/



SOURCE – NOAA Tides & Currents - https://tidesandcurrents.noaa.gov/map/index.html?region=Rhode%20Island

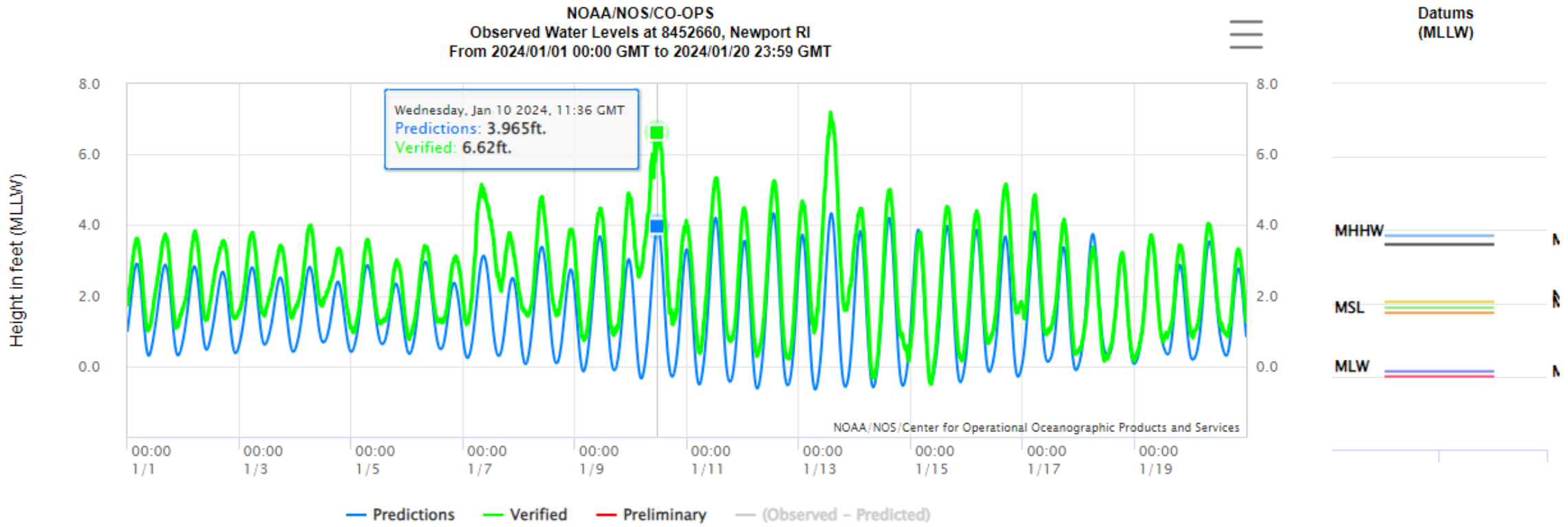
2.66-foot storm surge – January 10, 2024, 7:36 a.m.

https://tidesandcurrents.noaa.gov/waterlevels.html?id=8452660&units=standard&bdate=20240101&edate=20240120&timezone=GMT&datum=MLLW&interval=6&action=

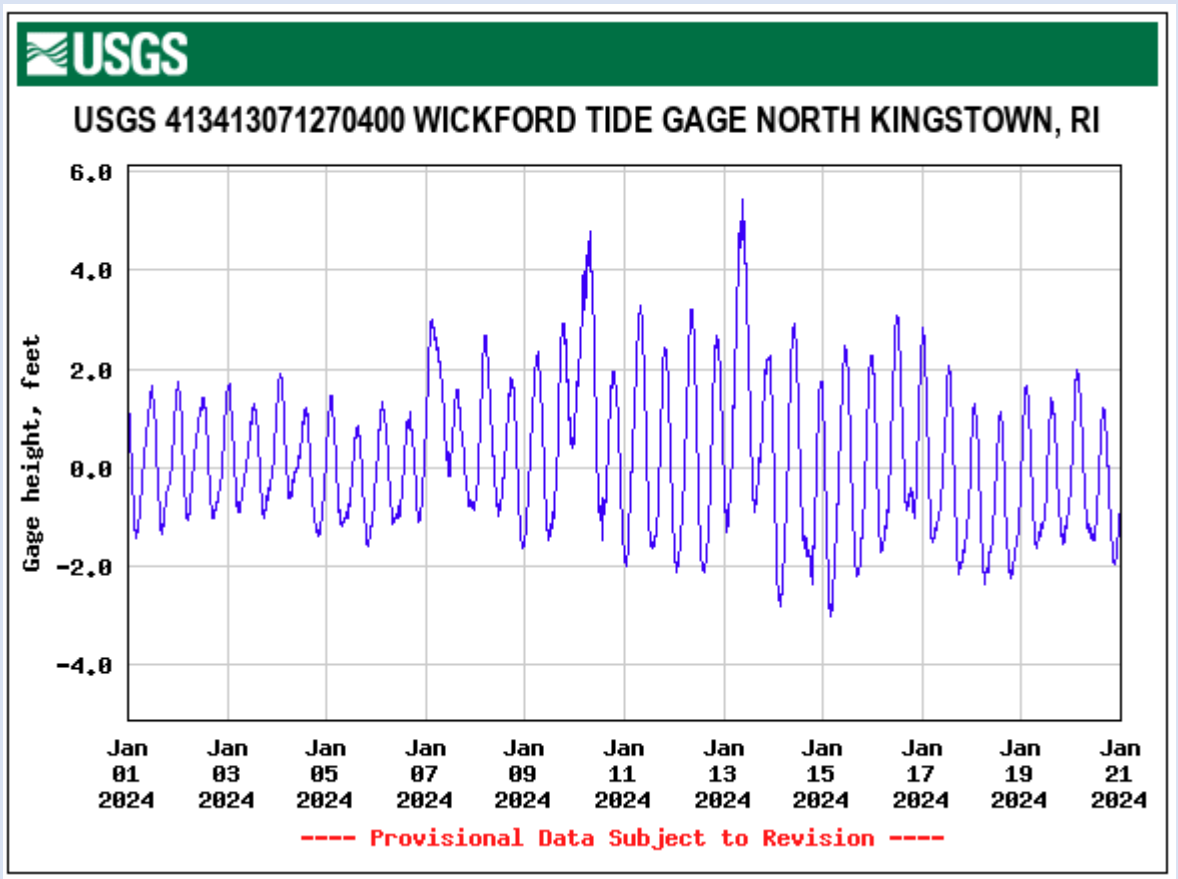
Home / Products / Water Levels / 8452660 Newport, RI Favorite Stations

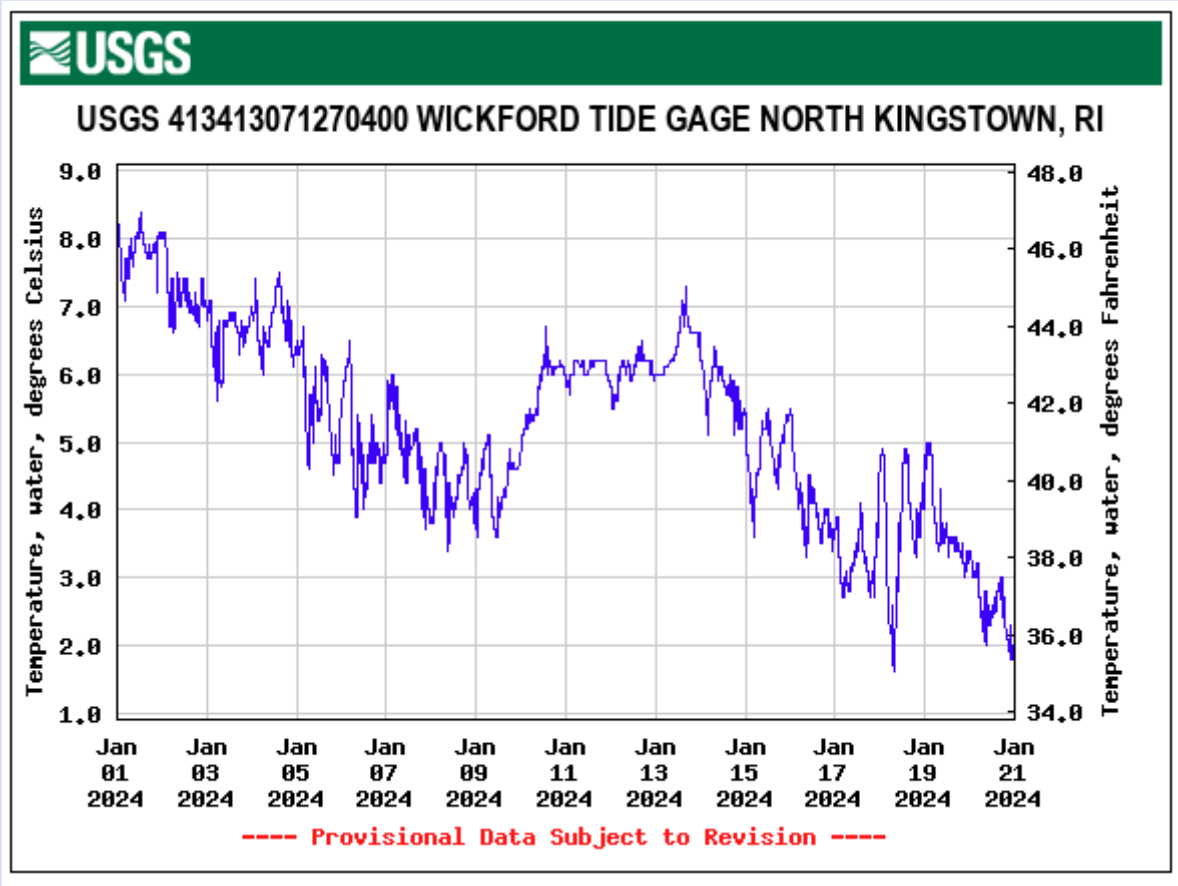
Station Info | Tides/Water Levels | Meteorological Obs. | Phys. Oceanography | PORTS®

Notice: This station is currently in high water condition.



Wickford Tide Gauge, North Kingstown, RI
January 10th & 13th Storm Surge





Wickford Tide Gauge, North Kingstown, RI

- US Geological Survey (USGS) deployed a tide gauge in Wickford Harbor for an entire year and readily has the data available to the public (https://waterdata.usgs.gov/nwis/uv?site_no=413413071270400&legacy=1).
- The role of this gauge is to continuously record the water level.
- Recording the level every ten minutes, these continuous measurements will be valuable for improving our understanding of Wickford Harbor's general hydrodynamics, navigation, and the potential local impacts of sea level rise over time.

SOURCE - https://www.northkingstownri.gov/DocumentCenter/View/8102/USGS-Tide-Gauge-Nov_Jan24

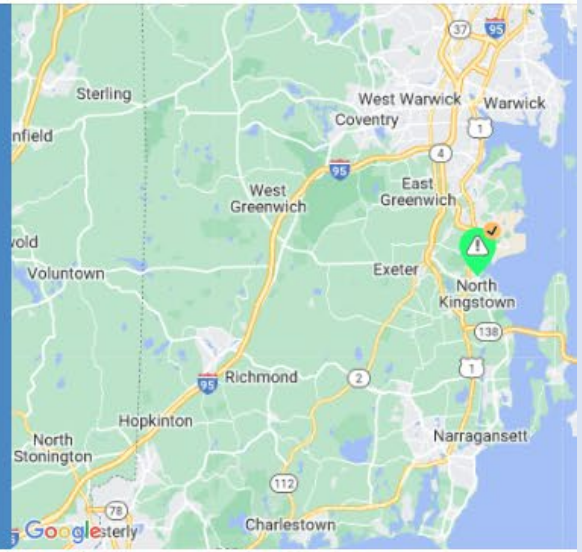
Wickford
North Kingstown, RI

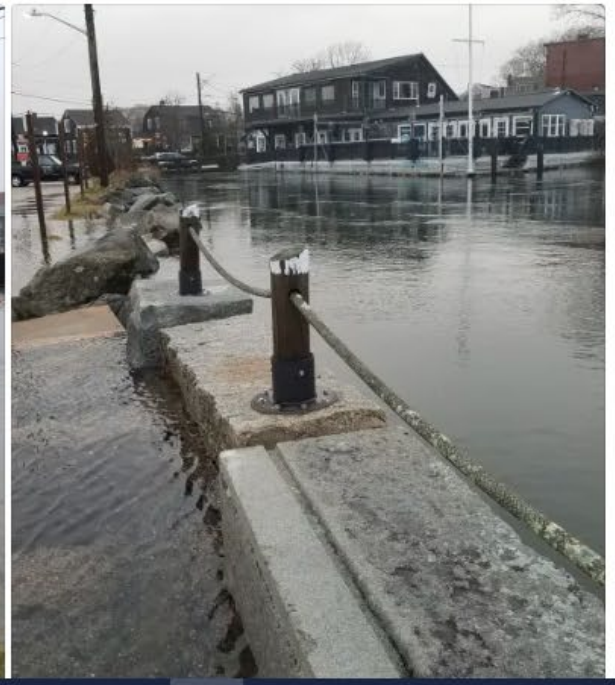
Storm Reporter Report
by Celia Gelfman

01/10/2024 | 8:01 am

No Damage Reported

View on STORMTOOLS





01/10/2024 | 8:01 am

Tidal Overview

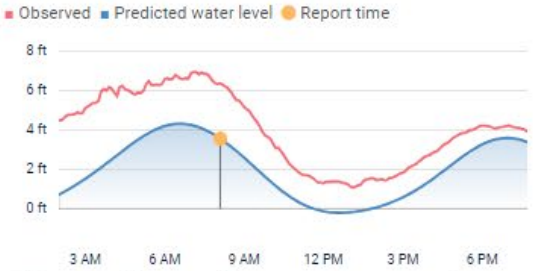
1 hours 19 minutes after high tide

Data from QUONSET POINT (2.5 miles away)

Water Level (at time of report): 8:01 am, 6.4'

High Tide (Predicted): 6:35 am, 4.3'

High Tide (Observed): 7:24 am, 6.9'



(Click here for full tide details from NOAA Tides & Currents)

Interagency Sea Level Rise Scenario Tool

The sea level scenarios and information contained in this tool originate from a 2022 technical report produced by the Sea Level Rise and Coastal Flood Hazard Scenarios and Tools Interagency Task Force. This report provides the most up-to-date sea level rise scenarios, available for all U.S. states and territories, out to the year 2150. It is the latest product from the Task Force, which includes the National Aeronautics and Space Administration, the National Oceanic Atmospheric Administration, Environmental Protection Agency, U.S. Geological Survey, and U.S. Army Corps of Engineers, along with partners in academia. The information in the report and this tool is intended to inform coastal communities and others about current and future sea level rise to help contextualize its effects for decision making purposes.

View the Report ›

START | ABOUT THE TOOL

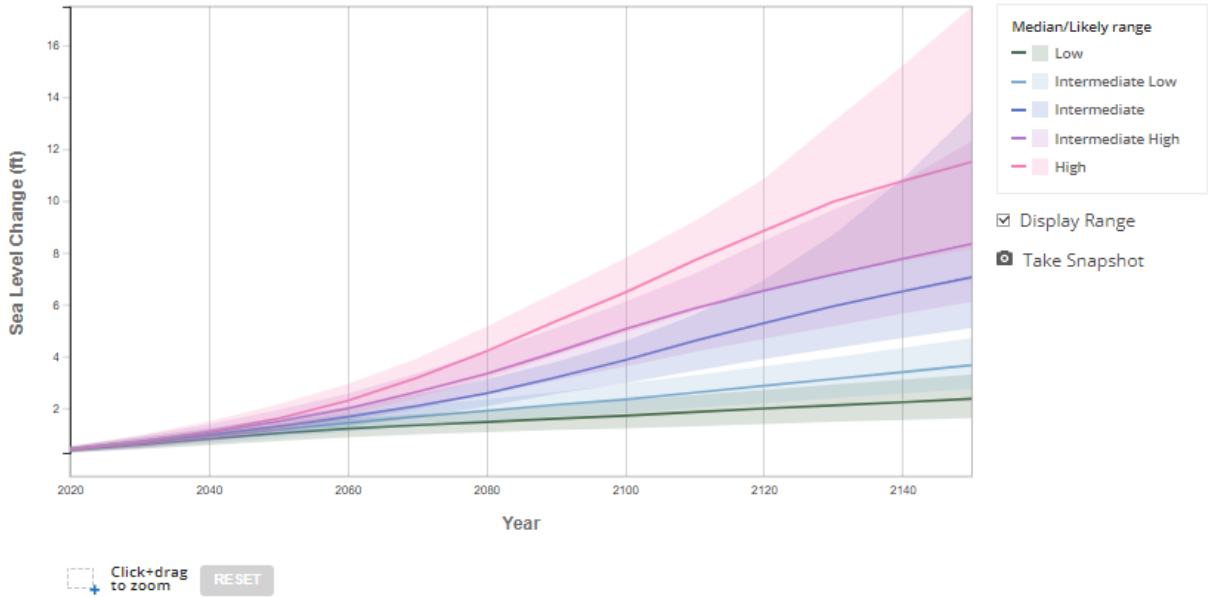
NEWPORT

← RETURN TO MAP

UNITS English

Sea Level Rise for Different Sea Level Scenarios

Depicted here are sea level change time series for the 5 sea level scenarios: low, intermediate-low, intermediate, intermediate-high and high. These scenarios are defined by a target global mean sea level (GMSL) values in 2100. Median values are provided for each scenario, along with likely ranges represented by shaded regions showing the 17th-83rd percentile ranges. For comparison to the model-based scenarios and as an additional line of evidence, extrapolations of available tide gauge observations are also provided. Rates and accelerations are estimated from tide gauge observations from 1970 to 2020 and then extrapolated to 2050 (see here for more info). For individual tide gauges, unresolved local variations or gaps in the tide gauge sampling may cause substantial departure from the modeled-scenarios in some locations. For tide gauges with record lengths shorter than 30 years, observation extrapolations are not shown. All values are relative to a baseline year of 2000. Data for the individual contributions can be downloaded under 'Get Data'.



SOURCE: Interagency Sea Level Rise Scenario Tool, https://sealevel.nasa.gov/task-force-scenario-tool/

2022 Sea Level Rise Technical Report

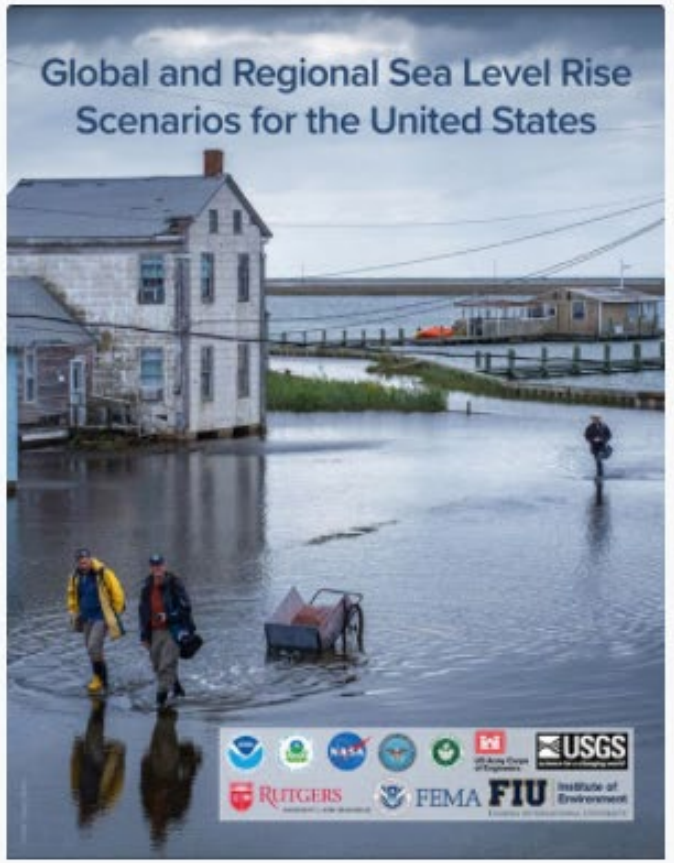
Download Full Report

Download Report by Section

- Cover, Table of Contents, List of Figures, List of Tables
- Executive Summary
- Section 1: Introduction
- Section 2: Future Mean Sea Level: Scenarios and Observation-Based Assessments

Section 2 includes:

- 2.1. Overview of Regional and Global Sea Level Rise



SOURCE: NOAA Ocean Service, https://oceanservice.noaa.gov/hazards/sealevelrise/sealevelrise-tech-report-sections.html

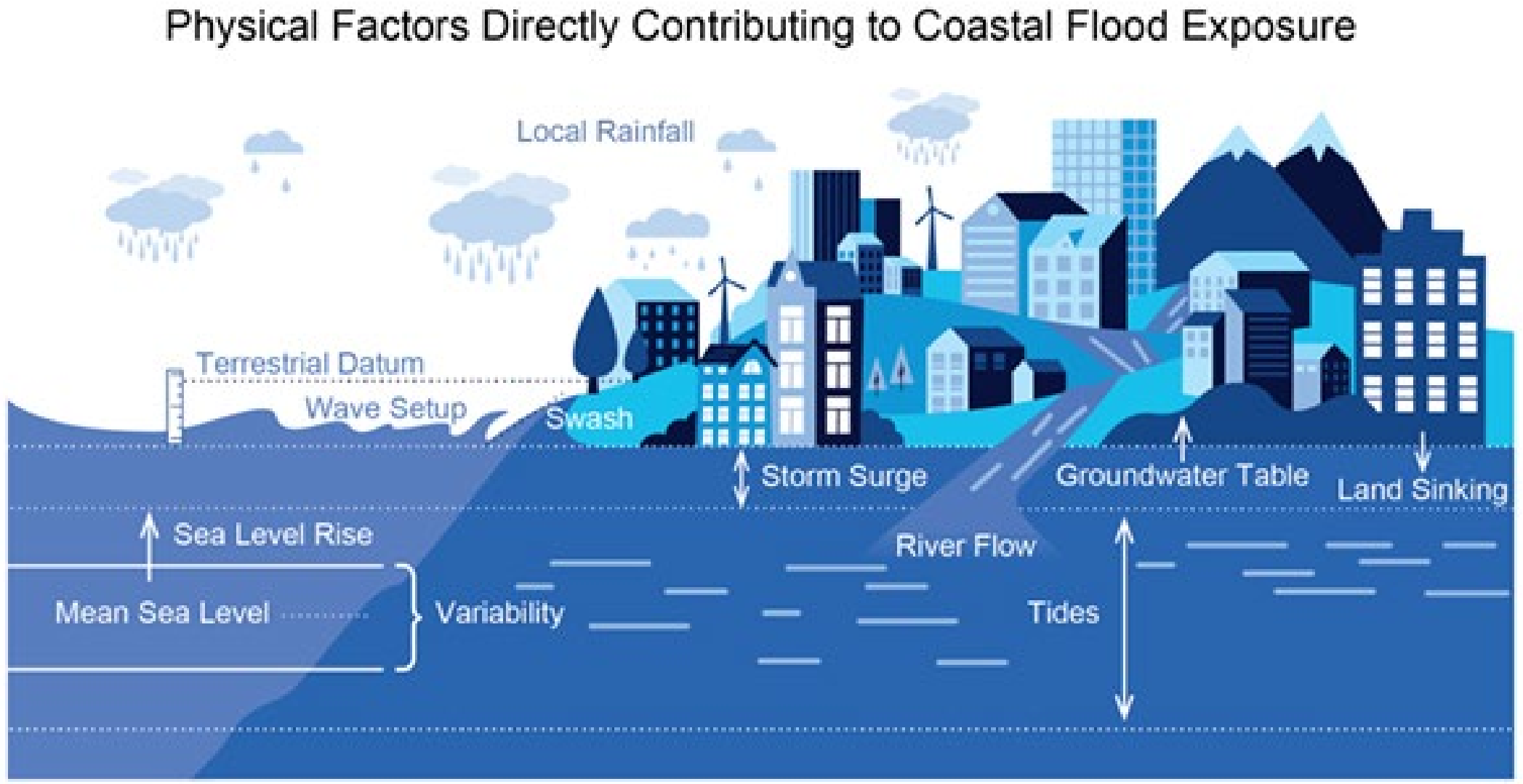


Figure 1.1: Schematic (not to scale) showing physical factors affecting coastal flood exposure. Due to the clear and strong relative sea level rise signal (i.e., combination of sea level rise and sinking lands), the probability of flooding and impacts are increasing along most U.S. coastlines.

SOURCE: NOAA Ocean Service, https://oceanservice.noaa.gov/hazards/sealevelrise/sealevelrise-tech-report-sections.html

Four key takeaways from the report:

1

The Next 30 Years of Sea Level Rise

Sea level along the U.S. coastline is projected to rise, on average, 10 - 12 inches (0.25 - 0.30 meters) in the next 30 years (2020 - 2050), which will be as much as the rise measured over the last 100 years (1920 - 2020). Sea level rise will vary regionally along U.S. coasts because of changes in both land and ocean height.

2

More Damaging Flooding Projected

Sea level rise will create a profound shift in coastal flooding over the next 30 years by causing tide and storm surge heights to increase and reach further inland. By 2050, "moderate" (typically damaging) flooding is expected to occur, on average, more than 10 times as often as it does today, and can be intensified by local factors.

3

Emissions Matter

Current and future emissions matter. About 2 feet (0.6 meters) of sea level rise along the U.S. coastline is increasingly likely between 2020 and 2100 because of emissions to date. Failing to curb future emissions could cause an additional 1.5 - 5 feet (0.5 - 1.5 meters) of rise for a total of 3.5 - 7 feet (1.1 - 2.1 meters) by the end of this century.

4

Continual Tracking

Continuously tracking how and why sea level is changing is an important part of informing plans for adaptation. Our ability to monitor and understand the individual factors that contribute to sea level rise allows us to track sea level changes in a way that has never before been possible (e.g., using satellites to track global ocean levels and ice sheet thickness). Ongoing and expanded monitoring will be critical as sea levels continue to rise.

SOURCE: NOAA Ocean Service, https://oceanservice.noaa.gov/hazards/sealevelrise/sealevelrise-tech-report-sections.html

OFFICE FOR COASTAL MANAGEMENT
DIGITAL COAST

Home / Tools / Catalog / Sea Level Rise Viewer

Sea Level Rise Viewer

NOAA Office for Coastal Management

Launch | Download Data | Access Map Services

GEOGRAPHY
Coastal contiguous U.S. (excludes Great Lakes), HI, and territories

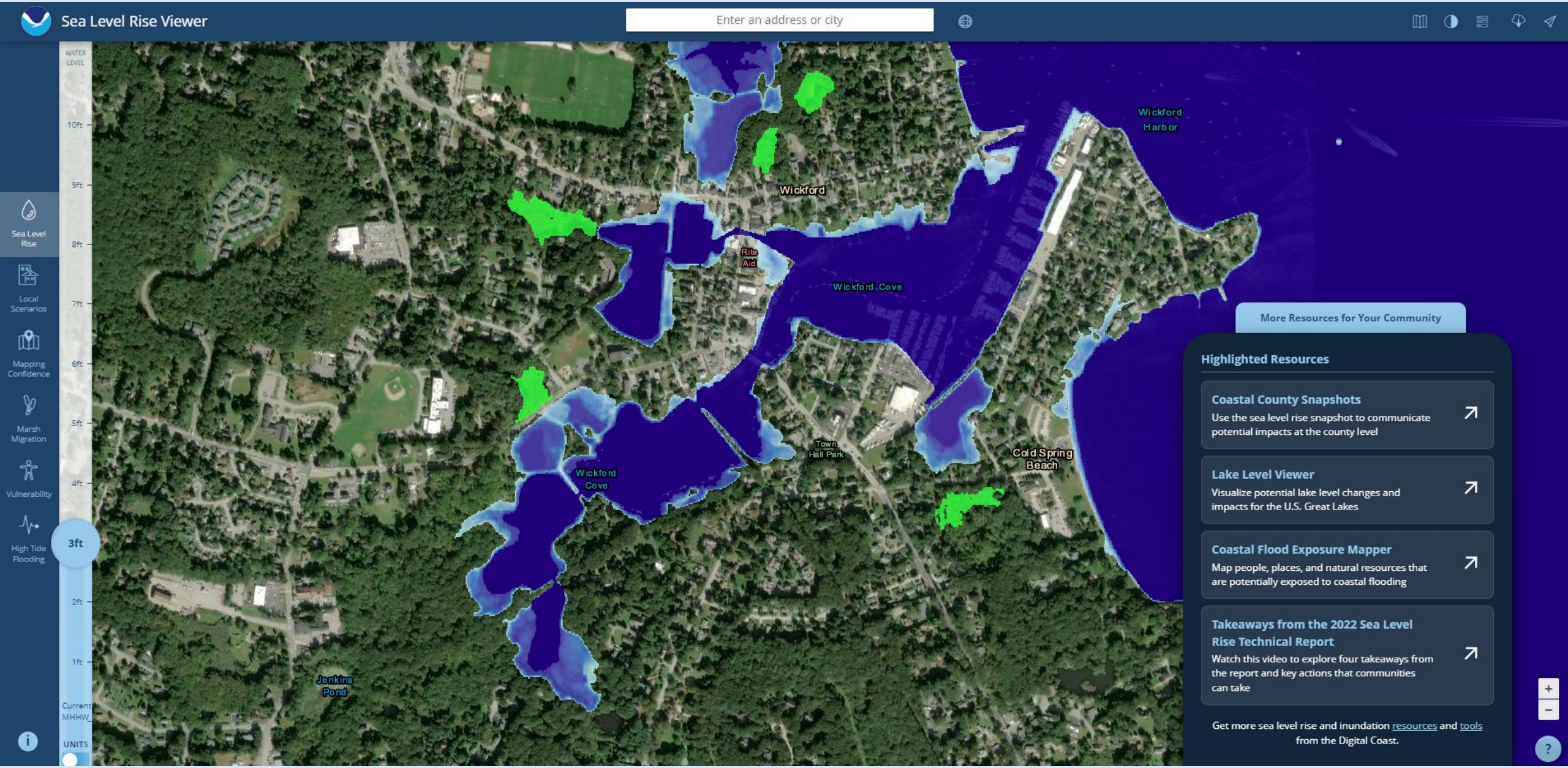
PLATFORM
Web-based

LEVEL OF EFFORT
Low

Overview

Use this web mapping tool to visualize community-level impacts from coastal flooding or sea level rise (up to 10 feet above average high tides). Photo simulations of how future flooding might impact local landmarks are also provided, as well as data related to water depth, connectivity, flood frequency, socio-economic vulnerability, wetland loss and migration, and mapping confidence.

SOURCE: https://coast.noaa.gov/digitalcoast/tools/slr.html



SOURCE: https://coast.noaa.gov/digitalcoast/tools/slr.html

Statement from RI CRMC on NOAA sea level rise report

The CRMC has been planning for sea level rise in Rhode Island for many years, and has been utilizing NOAA et al.'s 2017 "high curve" projections to inform our coastal policies and planning efforts.

The CRMC, in partnership with URI, developed STORMTOOLS to show people how their property might be impacted by different sea level rise scenarios. CRMC developed the Coastal Hazard Application to require coastal permit applicants complete an assessment of the exposure and risk to their property or structure resulting from storm surge and sea level rise, both now and in the future. These findings related to storm risk and sea level rise implications for properties in Rhode Island are included as part of permit approval and recorded in land evidence records.

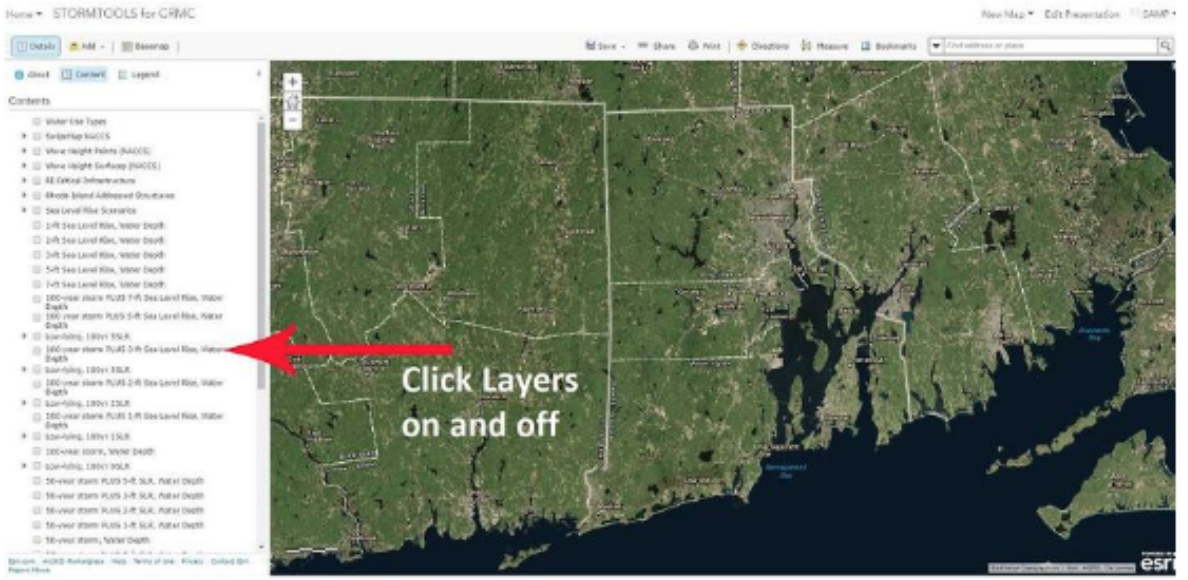
While the 2022 NOAA high curve projections appear to have decreased for 2050 (see REPORT), there is far more certainty with these future sea level rise projections based on multiple lines of evidence, and the CRMC and RI must remain vigilant in its planning for coastal adaption and resiliency.

RI CRMC STORMTOOLS

STORMTOOLS is a method to illustrate and display storm inundation, with and without sea level rise, for different types of storms that could occur along Rhode Island's coast line.

What is STORMTOOLS?

STORMTOOLS is a method to map storm inundation, with and without sea level rise, for varying return period storms that covers all of Rhode Island's coastal waters. Predictions are provided that show water extent and depth at any given point for nuisance floods (1, 3, 5, and 10 year recurrence intervals) and 25, 50, 100, and 500 year storm scenarios at a 95% confidence interval. Sea level rise of 1, 2, 3, 5, and 7 feet on their own on their own as well as combined with each storm scenario are also modeled. Flood maps are also provided for historical hurricanes to include 1938, 1954 (Carol), 1991 (Bob), and 2012 (Sandy).



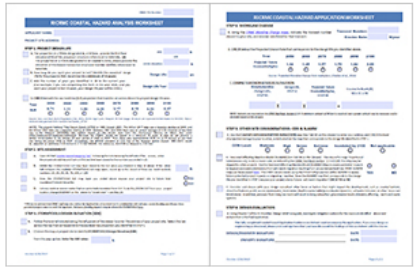
RI CRMC Coastal Hazard Analysis

Coastal Hazard Analysis Worksheet

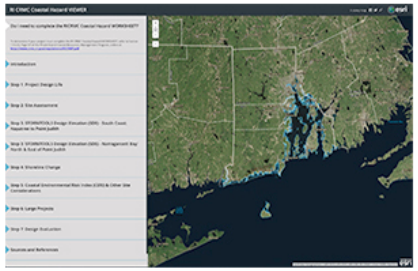
Welcome to the RICRMC Coastal Hazard Analysis WORKSHEET and ONLINE VIEWER!

Download and print the **RICRMC Coastal Hazard Analysis WORKSHEET from the link below**, and use the **ONLINE VIEWER** to access the maps and other information required for completion of the **WORKSHEET**.

Also view **Structural Shoreline Protection Measures: Guidance for the Waterfront Property Homeowner** for additional information.



Coastal Hazards Analysis Interactive Worksheet (PDF)

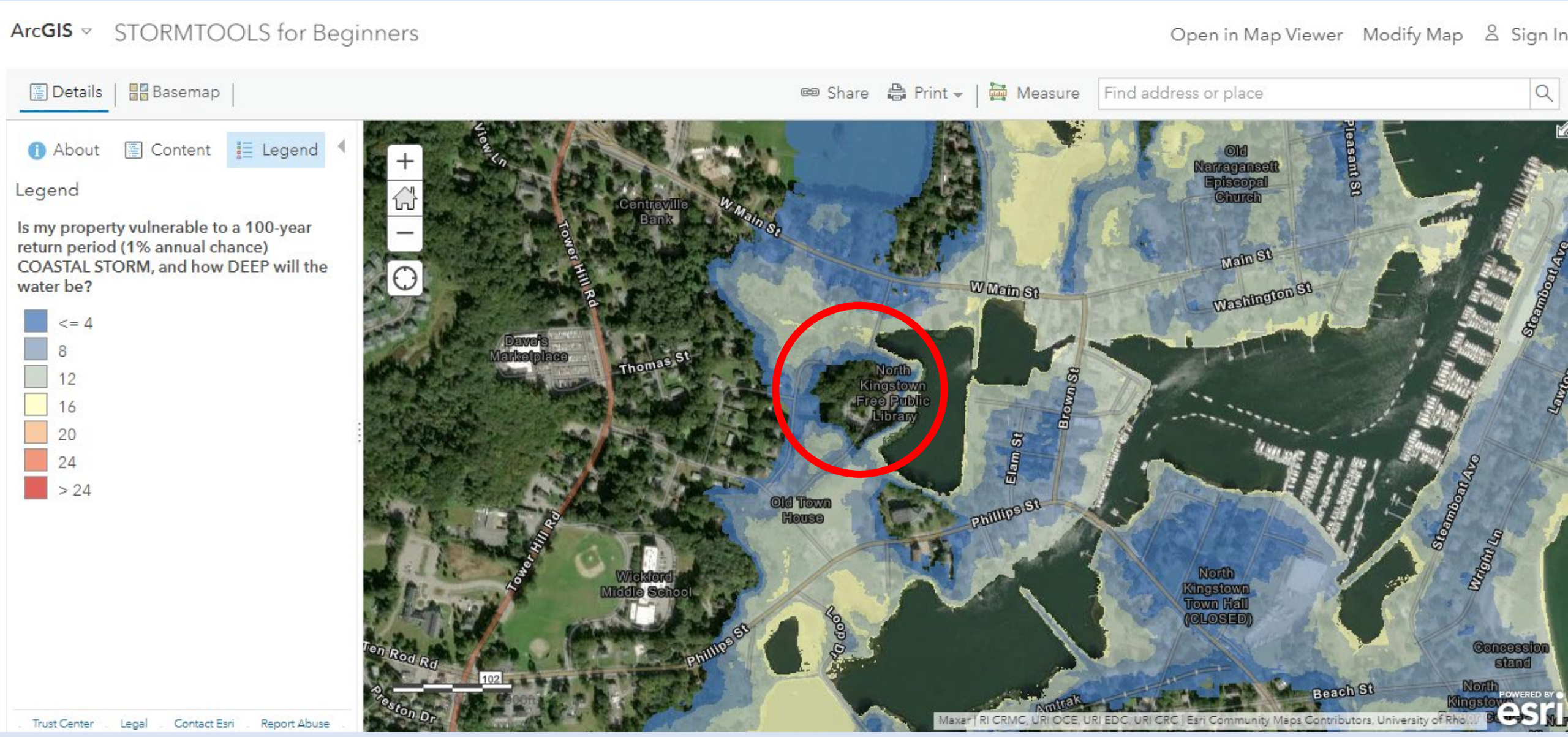


Coastal Hazards Analysis Online Viewer

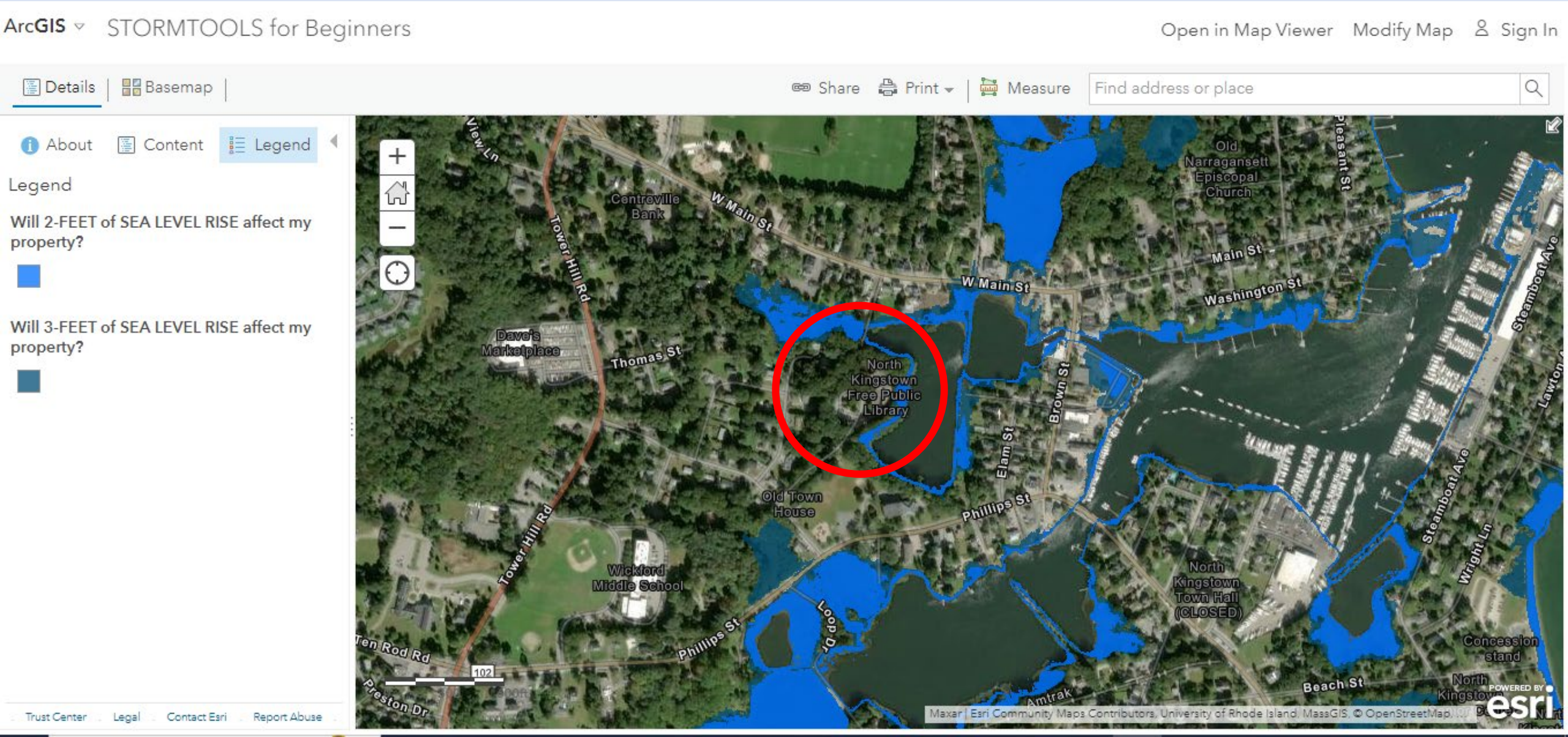
A note to applicants: The primary purpose and use of the Coastal Hazard Analysis (CHA) Worksheet and Viewer is to notify the applicant of potential coastal hazards that should be taken into consideration when planning shoreline development. These hazards include sea level rise (SLR), storm surge and associated flooding and shoreline erosion. The CRMC's goal is to increase understanding and awareness of these potential hazards among the development community (property owners, builders, realtors, financial institutions and insurers) with the hope of guiding development and investment away from vulnerable areas. While the CHA is required for projects meeting specific thresholds (see below), the CRMC encourages all applicants to consider using the CHA process to assess future risks to their proposed projects.

Our understanding of the impacts of climate change and the pace at which these changes are likely to occur is constantly evolving. Adaptation to these impacts will require frequent adjustment as conditions and our understanding of those conditions change. The Coastal Hazard Analysis Worksheet and Viewer are a first step to educate applicants and increase understanding of present and future coastal hazard risks.

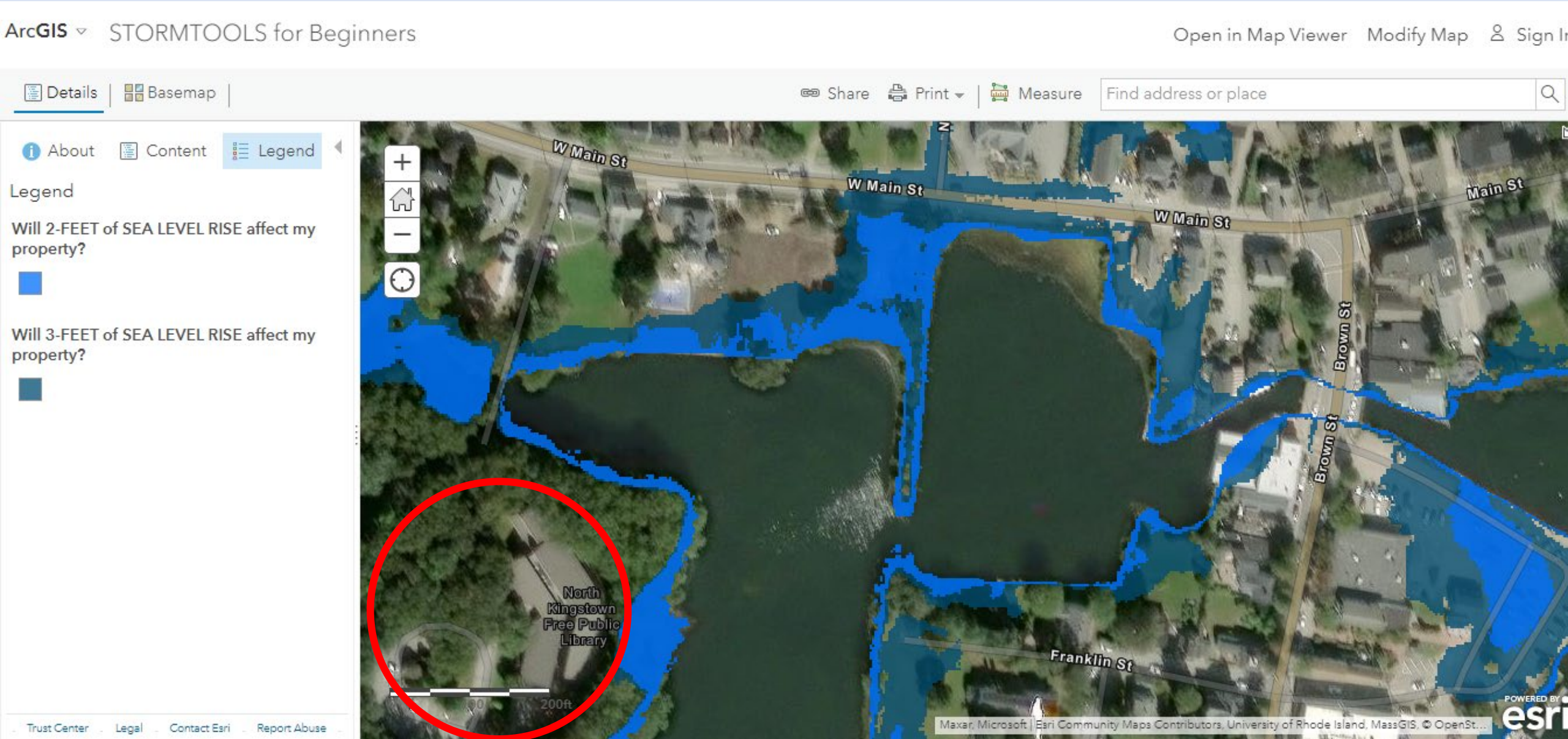
RI CRMC STORMTOOLS
1% Annual Chance (100-year return period) Storm
(similar to 1954 Hurricane Carol)



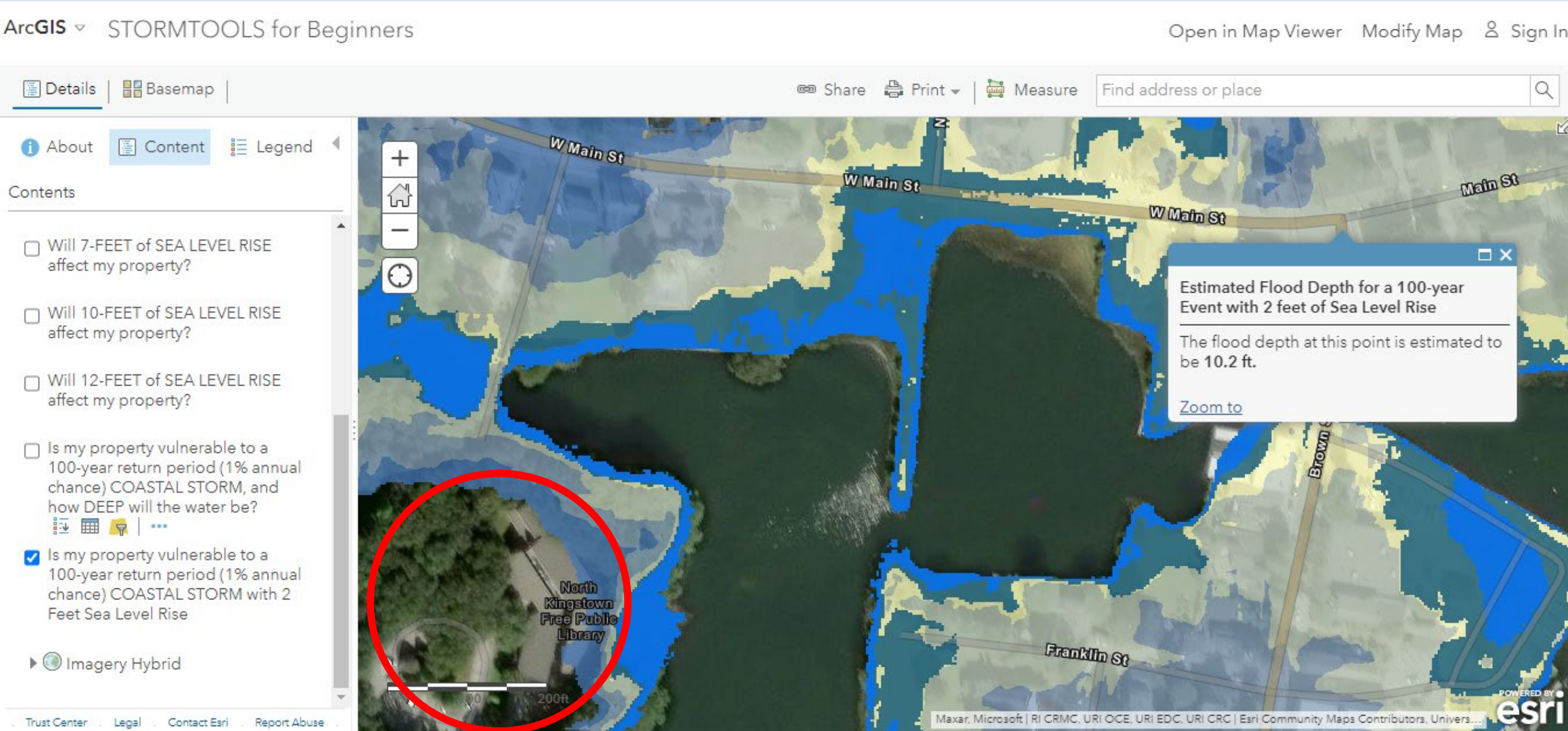
RI CRMC STORMTOOLS
2-ft and 3-ft Sea Level Rise (2050)

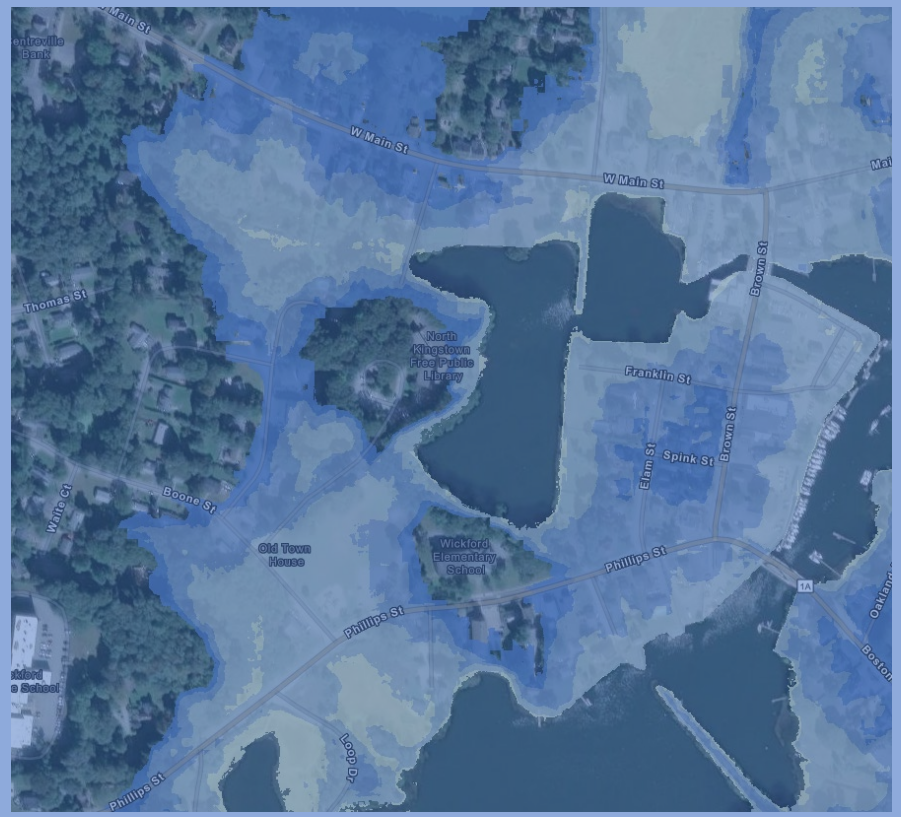


RI CRMC STORMTOOLS
2-ft and 3-ft Sea Level Rise (2050)

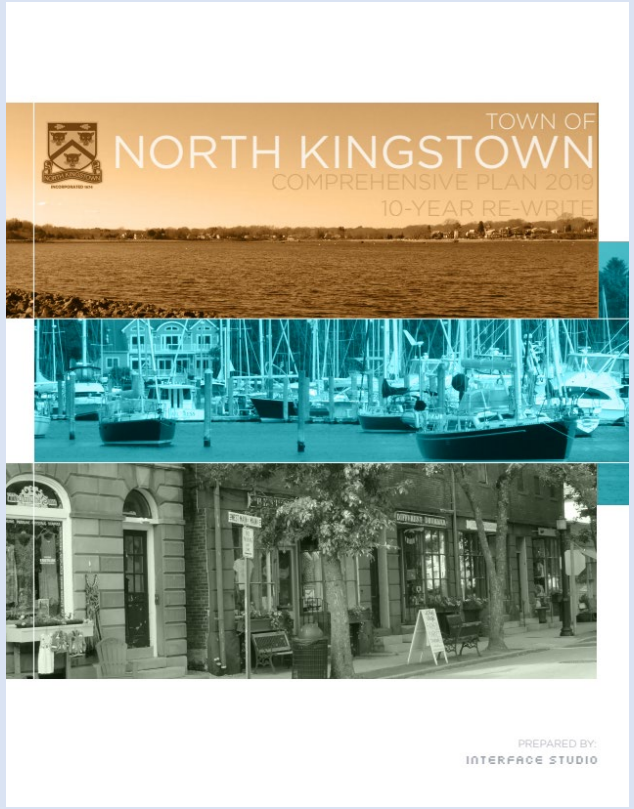


RI CRMC STORMTOOLS
2ft Sea Level Rise + 1% Annual Chance Storm (1954 Hurricane Carol)





KNOW YOUR RISK



MAKE A PLAN

TAKE ACTION

North Kingstown



Photo Credits: southcountyri.com, youtube.com, pinterest.com, North Kingstown

Municipal Resilience Program

Community Resilience Building Process & Workshop

Summary of Findings

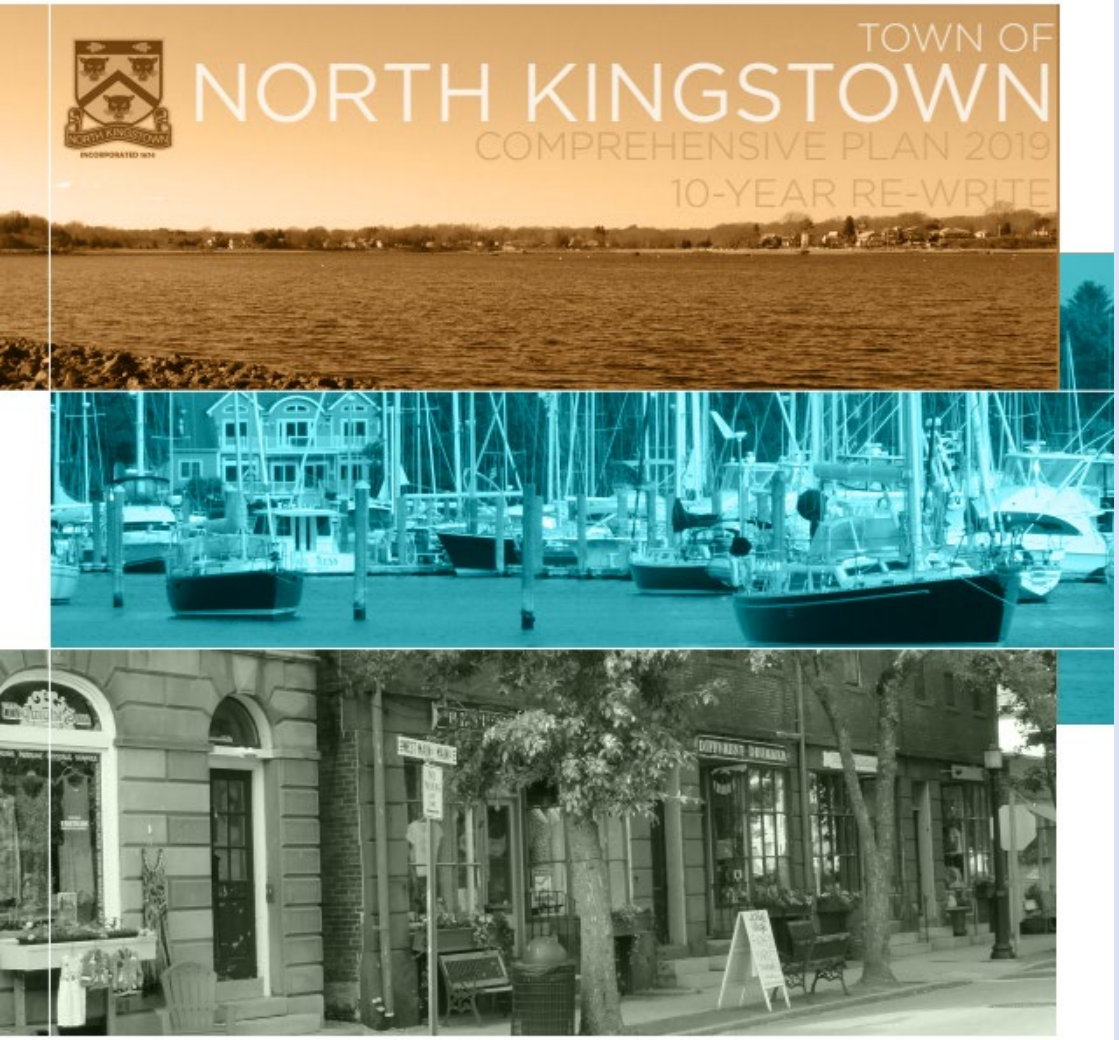
August 2021

Recommendations to Improve Resilience

A common theme among workshop participants was the need to continue community-based planning efforts focused on developing adaptive measures to reduce North Kingstown's vulnerability to extreme weather, climate change and other common concerns raised. To that end, the workshop participants reached agreement on several priority topics requiring more immediate and/or ongoing attention including:

- **Long-term Vision and Growth** (i.e. development/redevelopment, conservation, transportation, commerce/economic growth, diverse demographics, volunteerism, open space protection, affordability);
- **Infrastructure Improvements** (i.e. wastewater treatment systems and facilities, stormwater management systems, impervious cover, low-impact development, utility infrastructure reliability, nature-based solutions (living shorelines), roads);
- **Resilient Community Support** (i.e. affordable/accessible housing, sustainability, green infrastructure, tree management, business and residential recovery, community support);
- **Emergency Management** (i.e. communications, outreach, education, continuation of services, coordinating and exercise plans, sheltering facilities/centers)

In direct response, the workshop participants developed the following priority and other action list. Mitigation actions from the North Kingstown's Local Hazard Mitigation Plan (2019) are provided in Appendix A for cross reference. In addition, actions previously identified in the North Kingstown's Comprehensive Plan (2019) were reviewed for consistency with input from workshop participants.



PREPARED BY:
INTERFACE STUDIO

ELEMENT 7

A RESILIENT TOWN

A plan for NATURAL HAZARDS and CLIMATE ADAPTATION

VISION

We are a **resilient** town that is prepared to meet the challenges of natural hazards and climate change.

North Kingstown will promote resilience and adaptation to natural hazards and the potential impacts of climate change to protect the town today and ensure the town's future.

GOALS

1. Promote resilience and adaptation to natural hazards and a changing climate to protect lives, infrastructure, resources, and property

ADAPTATION STRATEGIES

Future planning and discussions among North Kingstown's municipal staff, volunteer boards and commissions, and residents are likely to center around three key concepts for coastal resilience and adaptation. The following figures illustrate concepts of protection, accommodation/preservation, and managed relocation of assets, with two call-out boxes focused on the "Protection" strategy. Other strategies are being compiled by the RI CRMC as part of the Shoreline Change SAMP, and will be available to North Kingstown for future decision making.

DESIGN

[HARD PHYSICAL DESIGN]
SEAWALL
MOTORWAY DIKE

[SOFT PHYSICAL DESIGN]
LIVING SHORELINES AS AN OPTION TO PROVIDE EROSION CONTROL WHILE ALLOWING NATURAL COASTAL PROCESSES TO REMAIN.

DESIGN

FLOATING BRIDGE AND HOUSE.

CREATE DUNE SYSTEM.

RIPARIAN BUFFER - A VEGETATED AREA NEAR A STREM TO HELP PROTECT A STREAM WHILE INCREASING WATER QUALITY.

ELEVATE BUILT STRUCTURES ABOVE EXPECTED SEA LEVEL RISE HEIGHT

UPGRADE SEWER AND PUMPING FACILITIES.

DESIGN

IDENTIFY THE HISTORICAL STRCUTURES WITHIN THE AREA VULNERABLE TO SEA LEVE RISE.

RELOCATE CRITICAL BUILDINGS TOWARDS AREAS AT HIGH ELEVATION.

RELOCATE CRITICAL INFRASTRUCTURE AWAY FROM SHORELINE.

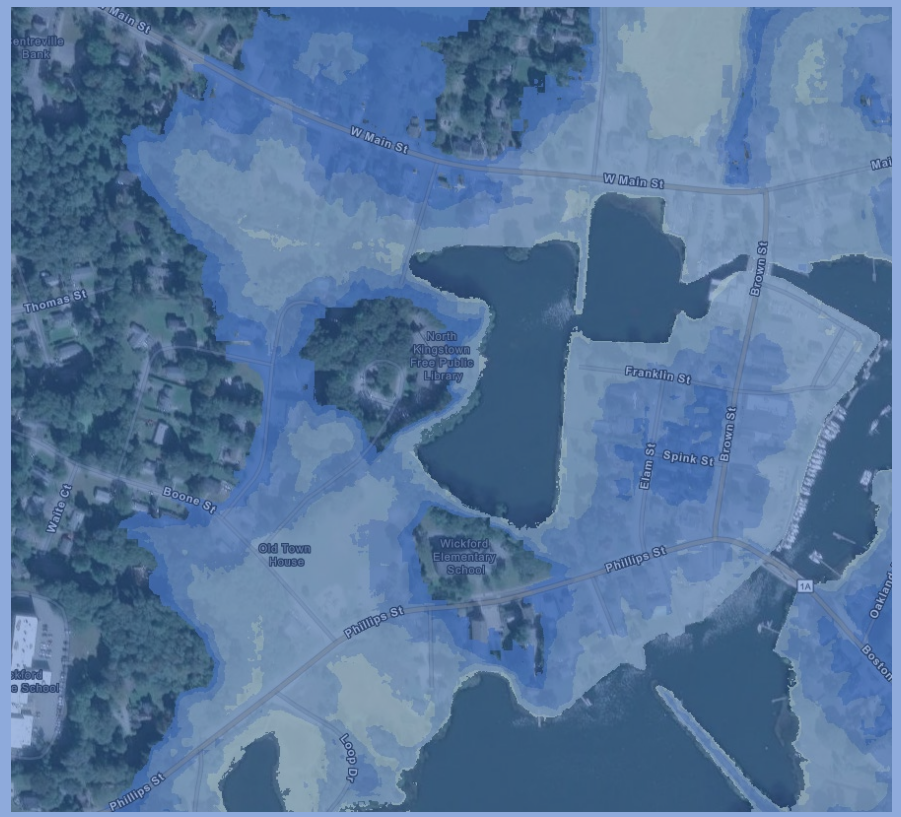
Figure 65. Flood resilience and adaptation measures

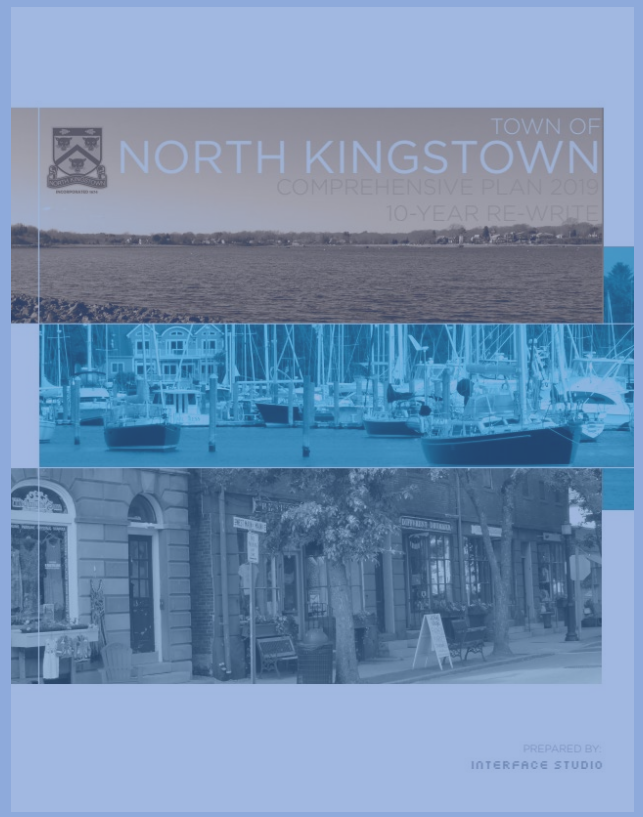
Comprehensive Plan

7.3 Consider natural hazards and potential climate change impacts in all long-range planning and critical public facilities and infrastructure projects.

PRIORITY	ACTION #	ACTIONS	RESPONSIBLE PARTY	TIMEFRAME	PARTNER AGENCIES
★	7.3.a	Create a database of municipal properties and structures within the SFHA or projected sea level rise areas and record of flood impacts.	Building Official	1 to 3 years	Staff time
★	7.3.b	Request RIDOT conduct a feasibility study to identify strategies to protect evacuation routes and state roadways from storm damage and projected sea level rise inundation. Evaluate the necessity and feasibility of elevating low points along evacuation routes.	RIDOT, DPW	1 to 3 years	RIDOT, Staff time
★	7.3.c	Prioritize public facility improvements that are necessary for increased resiliency on the town Capital Improvement Program and roads currently and potentially impacted by a sea level rise or coastal flooding for inclusion on the state Transportation Improvement Program (TIP) and town Capital Improvement Program.	RIDOT, DPW	1 to 3 years	Staff time
	7.3.d	Restrict development of new roads in areas exposed to coastal flooding and sea level rise scenarios.	DPW, RIDOT, Planning Commission	7 to 10 years	Staff time
	7.3.e	Update and continue to implement the town's Hazard Mitigation Plan with regard to town-owned transportation infrastructure.	Planning Dept, DPW	7 to 10 years	Staff time, RIEMA

RIDOT=Rhode Island Department of Transportation, DPW=Department of Public Works, RIEMA=Rhode Island Emergency Management Agency.





KNOW YOUR RISK

MAKE A PLAN

TAKE ACTION

“Nothing’s happening.”

Clarify your statement with:

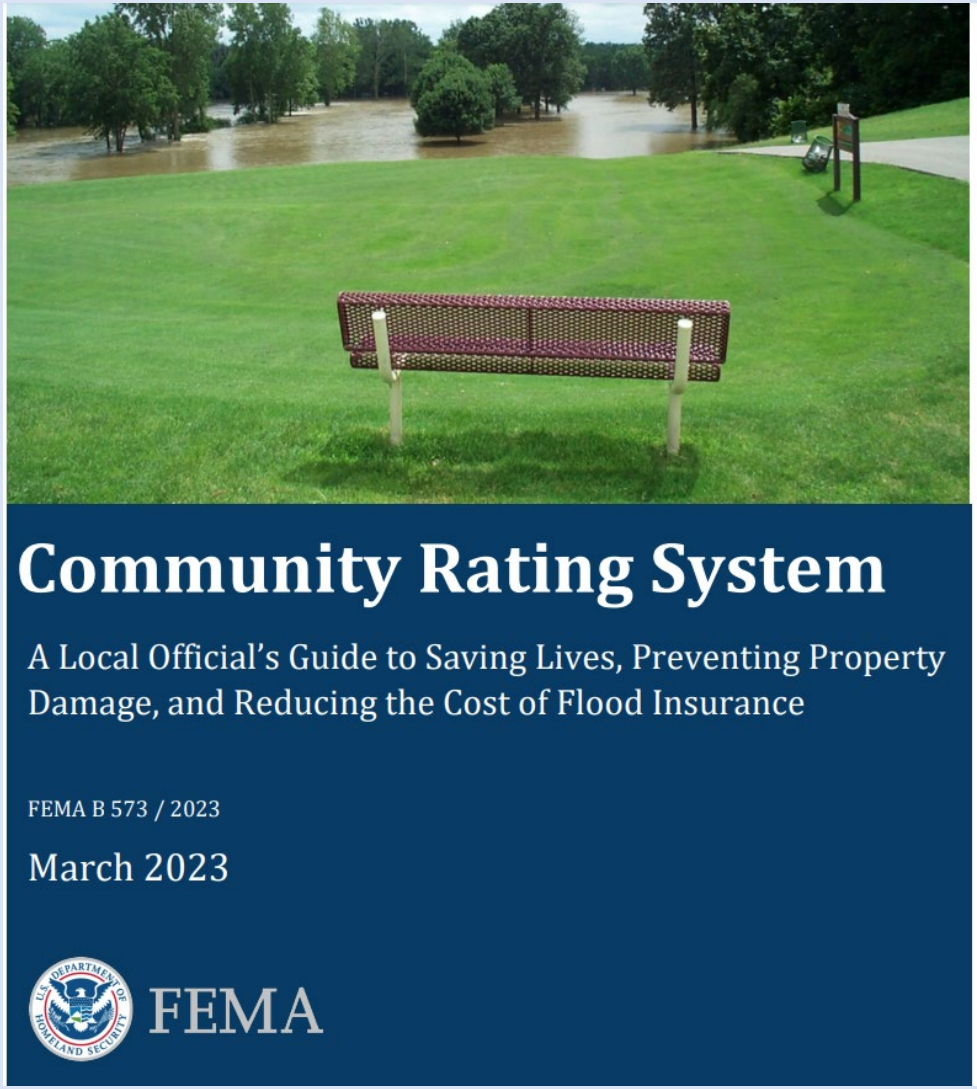
- Which thing?
- What isn’t happening?
- What is the expectation?
- Who is responsible?

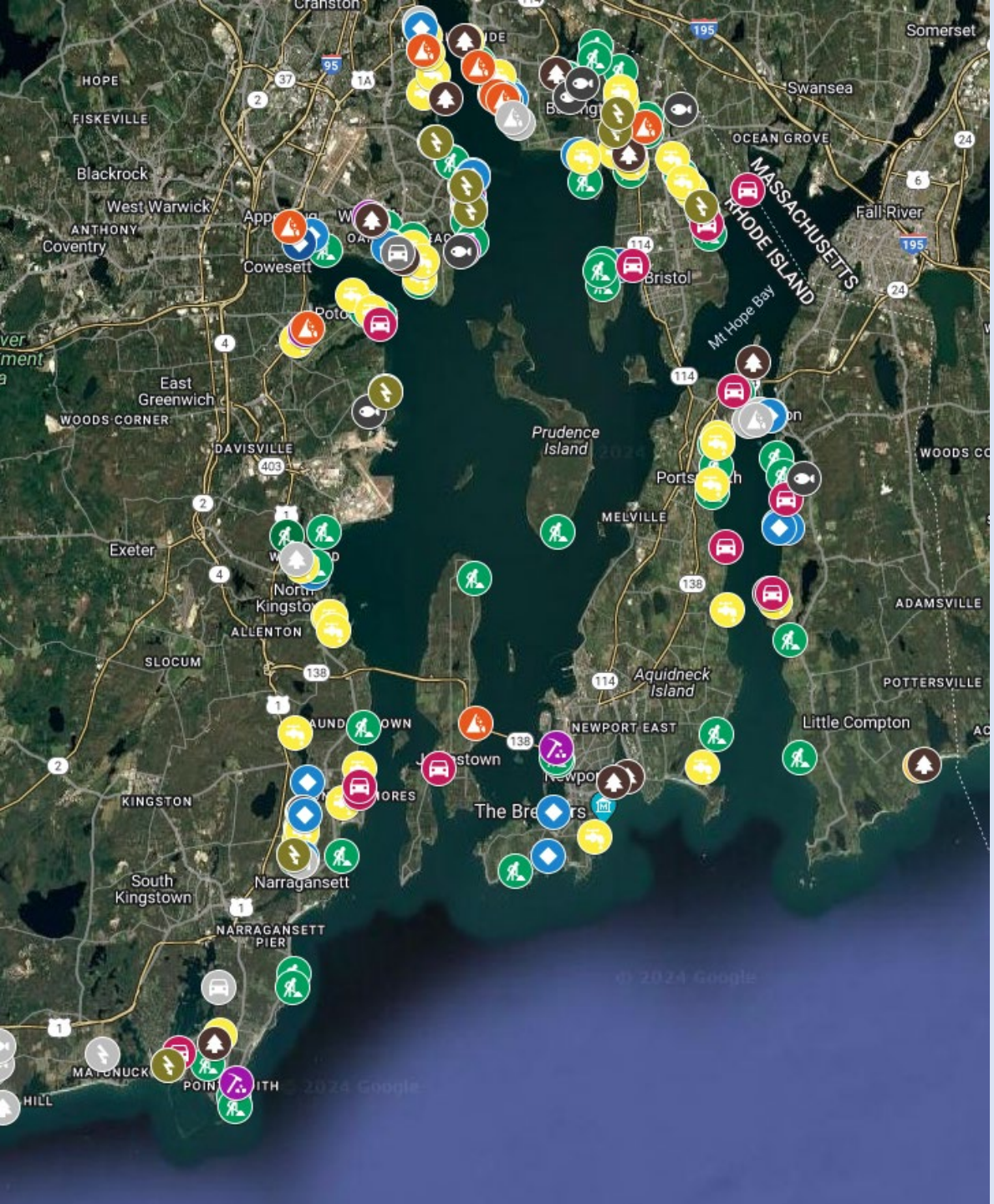
TAKE ACTION

FEMA Community Rating System (CRS)

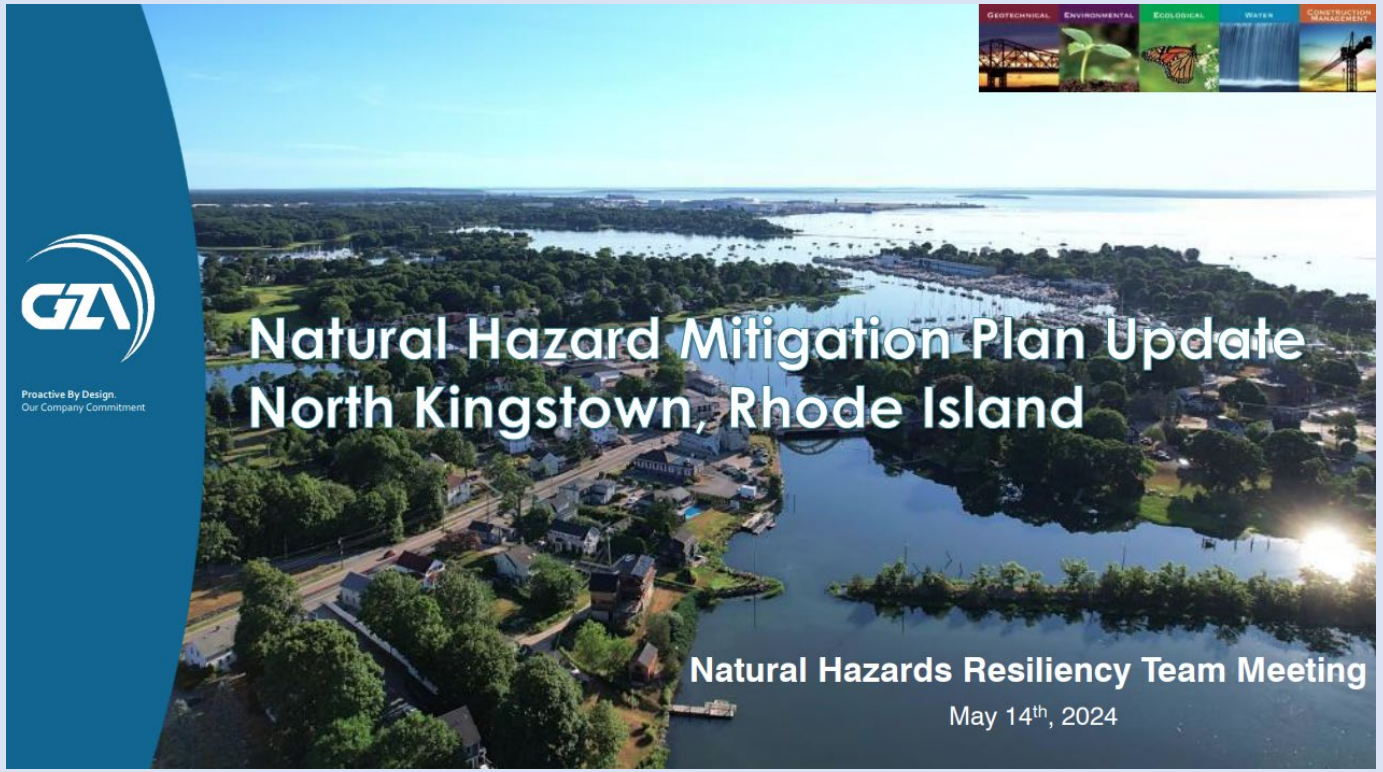
North Kingstown = CRS 9

5% savings to every NFIP Flood Insurance Policy holder in NK



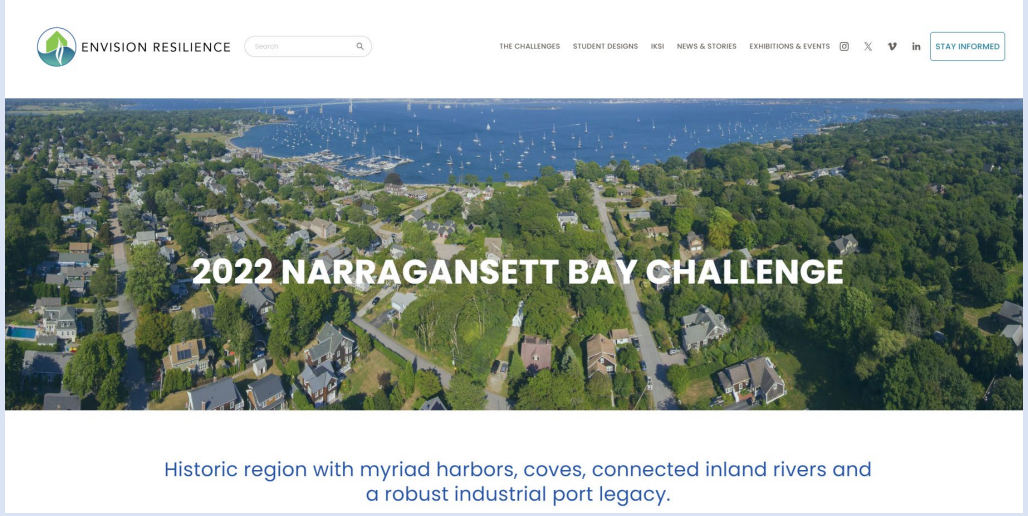


- Roger Williams Way retrofit for shoreline adaptation
- Study and analysis/technical work so far in order to propose beach wall reno
- Wickford parking lot retrofit
- Allowing/requiring innovative OWTS systems and pervious road design
- Mill Cove footbridge
- Army Corps of Engineering projects
- Town solar projects
- Completed detailed energy audits of municipal buildings
- EV charging stations efforts, partnered with state on application as a pilot community
- Rodman Mill Damn efforts for reconstruction
- Continued discussions on Wickford Junction improvements
- Revolution Wind
- Continued RIDOT partnerships on sidewalks, bike lanes, alternatives
- Continued conversations and work with RIPTA/DOT for encouragement of alternatives (lower greenhouse gases)
- Tide gauge and continued efforts with EPA/USGS on both Wickford tide gauge and their research and work on Academy Cove (nutrient loading, septic, sewer analysis)



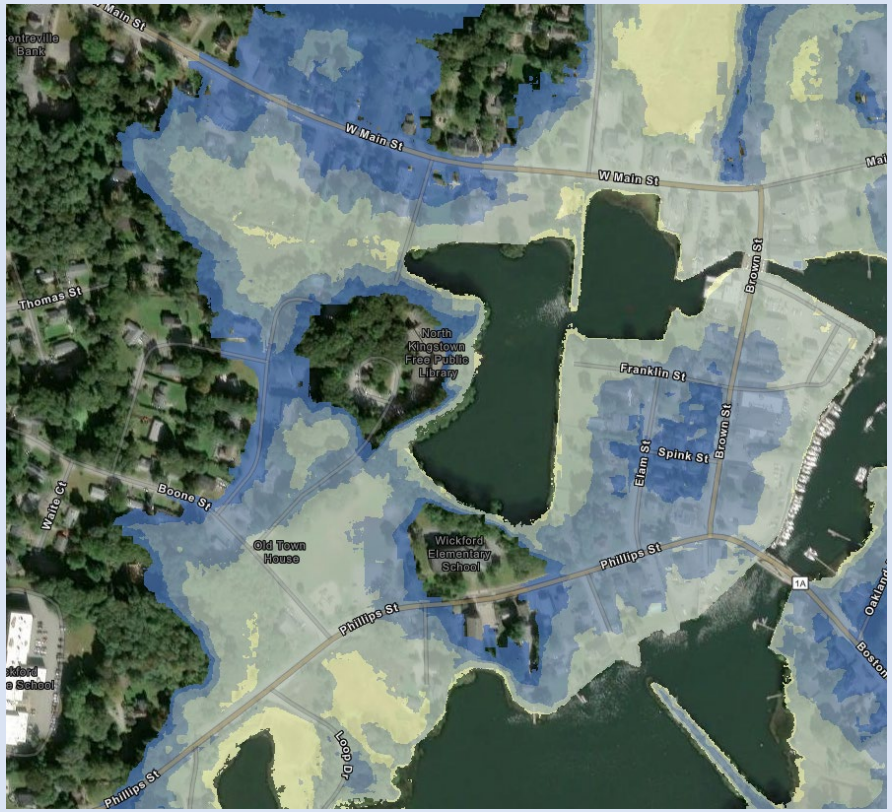
- Town's growth management strategies – sewer district locations, water service area, growth centers (PR and Wickford Junction)
- All development/project review by PC/ZBR
- Amended groundwater ordinance
- Property acquisitions like Cruikshank

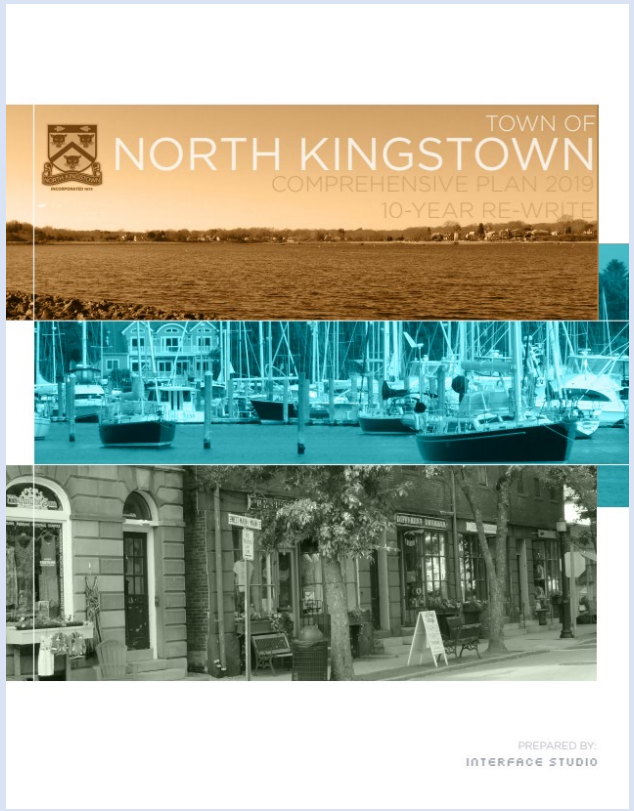
•Continued participation in the Municipal Resilience Program (MRP) (program, project identification, identified resilience actions)
•Assisted Casey Farm in application for stormwater project
•CRS submission every year
•SNEP grant for decentralized wastewater program
•Continued efforts to apply for grants like NFWF, SNEP
•Obtained RIDEM climate resilience funding
•Participation and partnerships with RIIB – septic and sewer loa
CPACE education



- Participation in Envision Resilience
- Participation in the RI Climate Resilience Learning Network
- Hosted Arbor Day celebration, continued work with conservation on groundwater, trees, pollinators etc
- Main participant in EPA Planning Framework for a Climate Resilient Economy
- Eating with Ecosystems work/signs at Gardner's Wharf
- Aquaculture review and discussions (CC/HMC/staff)
- Soil Health Stewards
- Support to local farms
- 350th tree planting project in collaboration with residents and boards
- Projects in works to distribute rain barrels
- Planning Department outreach at Art Festival etc, with brochures and information
- Hosted Stormwater Innovation Center Training
- Continued work on including environmental/climate friendly information in "The Puddle" plastic bag ordinance
- Collaborations with RI Sea Grant to pilot project map assets of town vulnerable to sea level rise
- GRIP (Green and Resilient Infrastructure Program -target sites
- Input on Shoreline Change (Beach) SAMP
- Landscape Architecture students in Wickford/collaboration with URI
- Collaboration with Roger Williams University architecture students
- Priority Climate Action Plan/CPRG implementation (SRPEDD)
- Participation in RIFMA

QUESTIONS / DISCUSSION





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