

# MUNICIPAL RESILIENCE PLANNING ASSISTANCE PROJECT

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# Project Deliverables

- Projections of Long Island Sound sea level rise
- Models and maps of combined coastal storm surge and riverine flooding that consider sea level rise and climate change
- Methods and tools for municipal infrastructure flooding vulnerability assessments
- Legal and policy options for municipal resilience

# CEEL Tasks

- Survey sea level rise adaptation laws and policies in other oceanfront states
- Identify legal and policy issues that frustrate sea level rise adaptation efforts
- Prepare white papers on sea level rise law and policy issues not adequately addressed by others
- Conduct outreach events

# But Not . . .

## Duplicating the work of others:

- DEEP
- CIRCA
- The Nature Conservancy
- CLEAR / Adapt CT
- COGs
- Georgetown Climate Center
- Marine Affairs Institute (RWU, URI)
- National Association of Floodplain Managers

# Regional Flood Mitigation Rating System

A program implemented by Western Connecticut Council of Governments (WestCOG) with supporting funds from the Connecticut Institute for Resilience and Climate Adaption (CIRCA)

## The Community Rating System (CRS)

The CRS program is an incentive program for municipalities to go above and beyond federal requirements for flood mitigation activities.

Communities receive credits for the number of additional flood mitigation activities they perform and those credits translate into reduced premiums for flood insurance policy holders within the community.

Example topics of activities include: public outreach, public education, mapping, and protected flood zones.

Documentation of these activities are monitored annually. Table 1 illustrates the level of flood insurance savings and the corresponding points to reach that goal.

## Implementation challenges

As a region, Western Connecticut is impacted by both riverine and coastal flooding. A number of critical assets including public safety and sanitation facilities, transportation corridors, employment centers, and affordable housing are located on or near the coast or the region's many inland waterways. Given the region's role as an economic engine of Connecticut, damage and loss of these facilities would create economic impacts that would reverberate far beyond the region's borders.

FEMA's Community Rating System (CRS) Program has an intensive startup and maintenance cost (Staff time) which deters a number of municipalities from participating. WestCOG aims to address the start up and maintenance burden with a regional approach.

Community	# Policies	Premiums	Projected CRS Discount**	CRS % Discount
<b>Communities currently involved with the CRS Program</b>				
Stamford*	2,393	\$ 2,196,492	\$349,474	16%
Westport*	1,339	\$ 2,093,832	\$209,383	10%
Norwalk*	95	\$ 965,273	\$14,814	1%
<b>Potential CRS communities</b>				
Norwalk	2,447	\$ 3,375,379	\$108,769	3%
Greenwich	1,739	\$ 1,578,848	\$128,942	8%
Darien	632	\$ 965,784	\$48,289	5%
Danbury	320	\$ 618,687	\$30,834	5%
Williston	195	\$ 311,389	\$15,569	5%
New Milford	120	\$ 166,879	\$8,354	5%
Bethel	209	\$ 190,668	\$19,538	10%
New Canaan	195	\$ 465,827	\$8,291	2%
Weston	164	\$ 164,208	\$8,210	5%
Ridgely	109	\$ 103,554	\$5,178	5%
Brockfield	66	\$ 80,399	\$4,020	5%
Reading	45	\$ 52,043	\$2,602	5%
New Fairfield	31	\$ 25,843	\$1,192	5%
Sherman	20	\$ 19,674	\$9,84	5%
Bridgewater	8	\$ 6,754	\$3,38	5%
<b>Region</b>	<b>7,402</b>	<b>\$ 13,242,232</b>	<b>\$198,452</b>	

\* Currently not part in the CRS program.

\*\* Required discounts include maximum municipal open space credits, based off a preliminary GIS analysis. Actual savings may vary and are contingent upon more detailed and localized analysis.

Source: DEEP 12/15/2014, CRIS, CT State Profile 1/2014

Table 2: Anticipated Savings Table. Demonstrates the number of flood insurance policies within the WestCOG region, the amount of premiums paid out, and anticipated savings resulting a 10% reduction. The table also highlights the four communities which are currently active in the CRS program.

## A regional approach

Traditionally communities participating in the CRS program do so individually. WestCOG believes it can reduce the municipal burden by performing many of the credit earning activities for multiple towns simultaneously.

WestCOG's regional services in GIS, Hazard Mitigation Planning, and stormwater management apply to all communities and can likely earn enough credits for at least the first tier in flood insurance savings.

## Project overview

The Regional CRS program anticipates 5% savings representing around \$380,000 in projected savings annually across the four participating communities in the WestCOG region (see table 2 for more details). WestCOG implements this project with the following strategy in mind for its project implementation.

**Maximize cost benefit:** The program targets communities which have the most to gain from the CRS program, while maintaining a manageable amount of municipal outreach (4 municipalities.). These communities include Greenwich, Darien, Norwalk, and Danbury.

**Target new communities:** The selected 4 communities are currently not involved in the CRS program. As to not disrupt currently successful CRS communities. Following a successful implementation, WestCOG will consider opening the service to additional communities including those who are currently active in the CRS process.

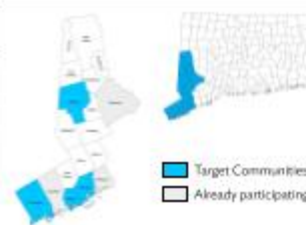
**Reduce municipal effort:** Recognizing that towns are currently maximizing resources as is, WestCOG aims to take on much of the CRS workload from prepping for reviews with FEMA and serving as the town's CRS coordinator.

**Leverage existing WestCOG Resources:** WestCOG's existing resources in GIS mapping, stormwater management, hazard mitigation planning, and public outreach will serve as a baseline of CRS credits to bring communities into the first tier of the CRS program (5% savings).

**Keep it going:** Following a successful implementation WestCOG plans on providing the regional program as an ongoing regional service beyond the timeline of the grant program. The four communities should be up and running by October 2017, with much of the leg work completed by the end of June.

CRS Class	Credit Points	Premium Reduction In SFHA	Outside SFHA
1	4,500+	45	30
2	4,000-4,499	40	30
3	3,500-3,999	35	30
4	3,000-3,499	30	30
5	2,500-2,999	25	30
6	2,000-2,499	20	30
7	1,500-1,999	15	30
8	1,000-1,499	10	30
9	500-999	5	30
10	0-499	0	30

Table 1: CRS Incentive Table. Demonstrates the necessary credits for the various levels of savings in flood insurance premiums.



## Special Flood Hazard Area (SFHA) Maps



## What's a WestCOG?

The Western Connecticut Council of Governments (WestCOG) consists of 18 member towns. It is dedicated to preserving and improving the quality of life and economic vitality in Western Connecticut. WestCOG works on topical areas such as transportation, economic, environmental and emergency management planning. WestCOG also provides a forum for municipalities to communicate and collaborate in addressing inter-municipal issues and needs.



## Works Cited

CRS Manual, AROGIS, DEEP, FEMA, WestCOG website

# Sea Level Rise In Connecticut

Rise in Sea Level  
*or*  
Sea Level Change  
*or*  
UConn Projections?



# P.A. 12-101 - Rise in Sea Level

“Rise in sea level” means the arithmetic mean of the most recent equivalent per decade rise in the surface level of the tidal and coastal waters of the state, as documented in the National Oceanic and Atmospheric Administration online or printed publications for said agency’s Bridgeport and New London **tide gauges**.

# Rise in Sea Level (Tide Gauge)

- 22a-92** States that is a general policy and goal of the legislature to consider a rise in sea level in “the planning process”
- 22a-93 Defines “rise in sea level”
- 22a-363h Authorizes DEEP studies and pilot programs and UConn support to improve coastal community resilience to a rise in sea level
- 22a-478 Requires DEEP to consider a rise in sea level when establishing priorities for eligible water quality projects. (P.A. 13-15)
- 25-157t Requires a Blue Plan that adapts to a rise in sea level. (P.A. 15-66)

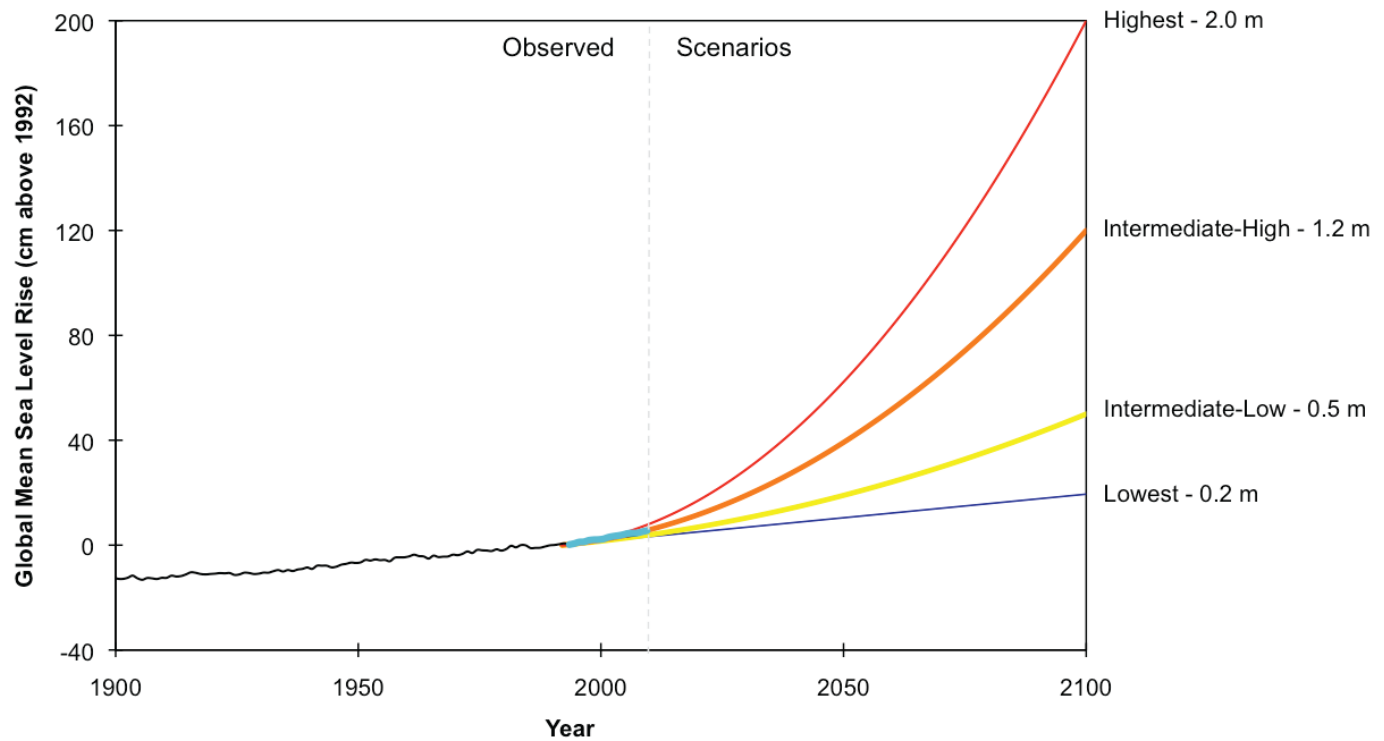


# P.A. 13-179 - Sea Level Change

Sea Level Change scenarios published by the National Oceanic and Atmospheric Administration in Technical Report OAR CPO-1.

# Sea Level Change (NOAA Projections)

- 8-23** Municipal Plan of Conservation & Development
- 16a-27** State Plan of Conservation & Development
- 25-68o** Municipal evacuation and hazard mitigation plans.
- 28-5** State civil preparedness plan and program



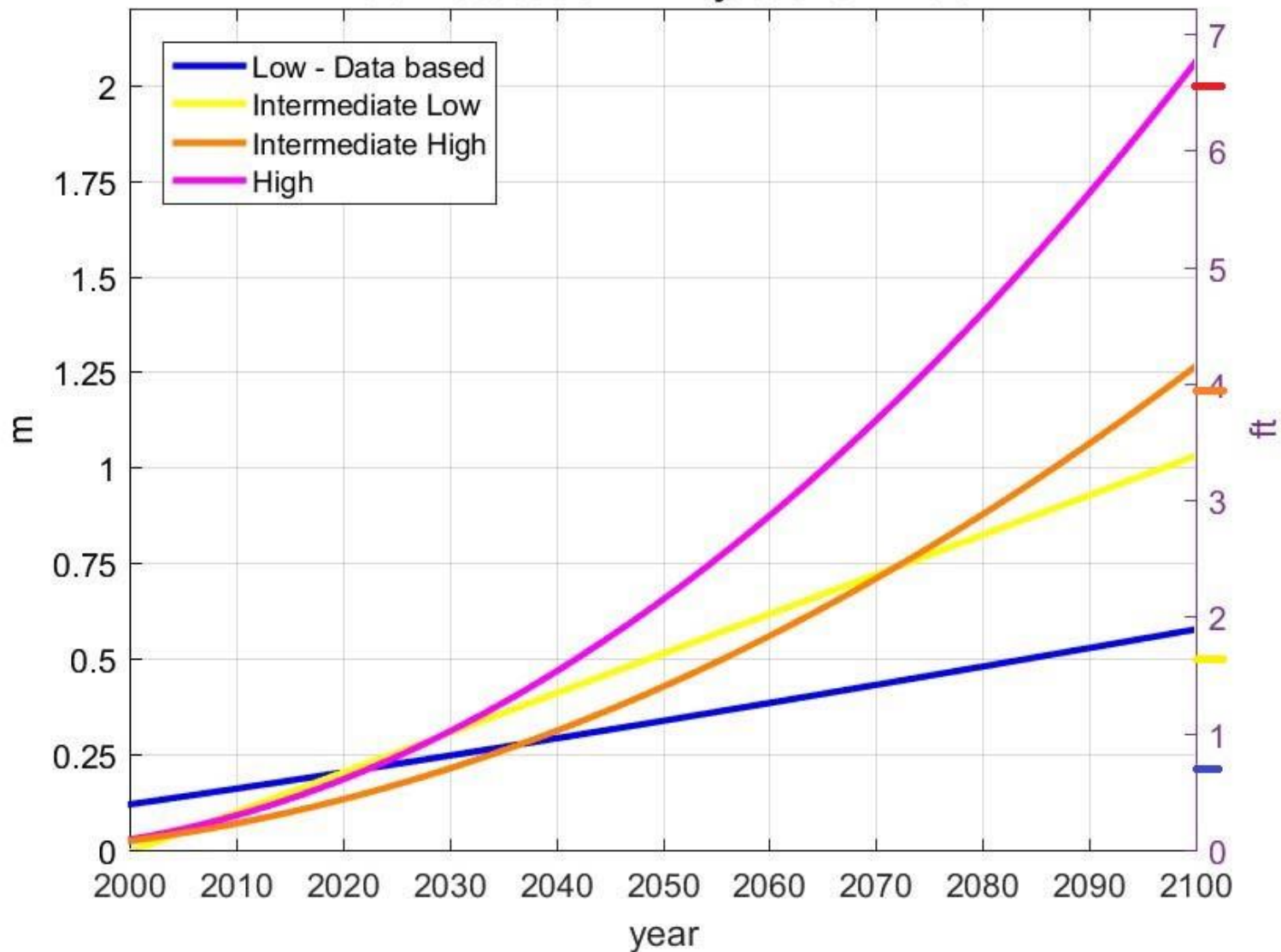
Scenario	SLR by 2100 (m)*	SLR by 2100 (ft)*
Highest	2.0	6.6
Intermediate-High	1.2	3.9
Intermediate-Low	0.5	1.6
Lowest	0.2	0.7

\* Using mean sea level in 1992 as a starting point.

# Sea Level Change (NOAA Projections)

**25-68o** UConn must update the NOAA sea level change scenarios every 10 years.

## Connecticut SLR Projections - Draft



# CIRCA SLR Recommendation

- Plan for **50 Centimeter** Sea Level Rise by **2050**

( **50 CM = 1 Foot 8 Inches** )

# Sea Level Change (NOAA Projections)

- 25-68o** UConn must update the NOAA sea level change scenarios every 10 years.
- **But** there is no statute that requires the UConn updates to be used where the NOAA scenarios or tide gauge data are specified
  - CEEL will encourage a legislative initiative to make the latest **UConn Updates** the sole statutory standard for Connecticut Sea Level Rise.



# How Do Connecticut Sea Level Rise Statutes Compare Other Oceanfront States?

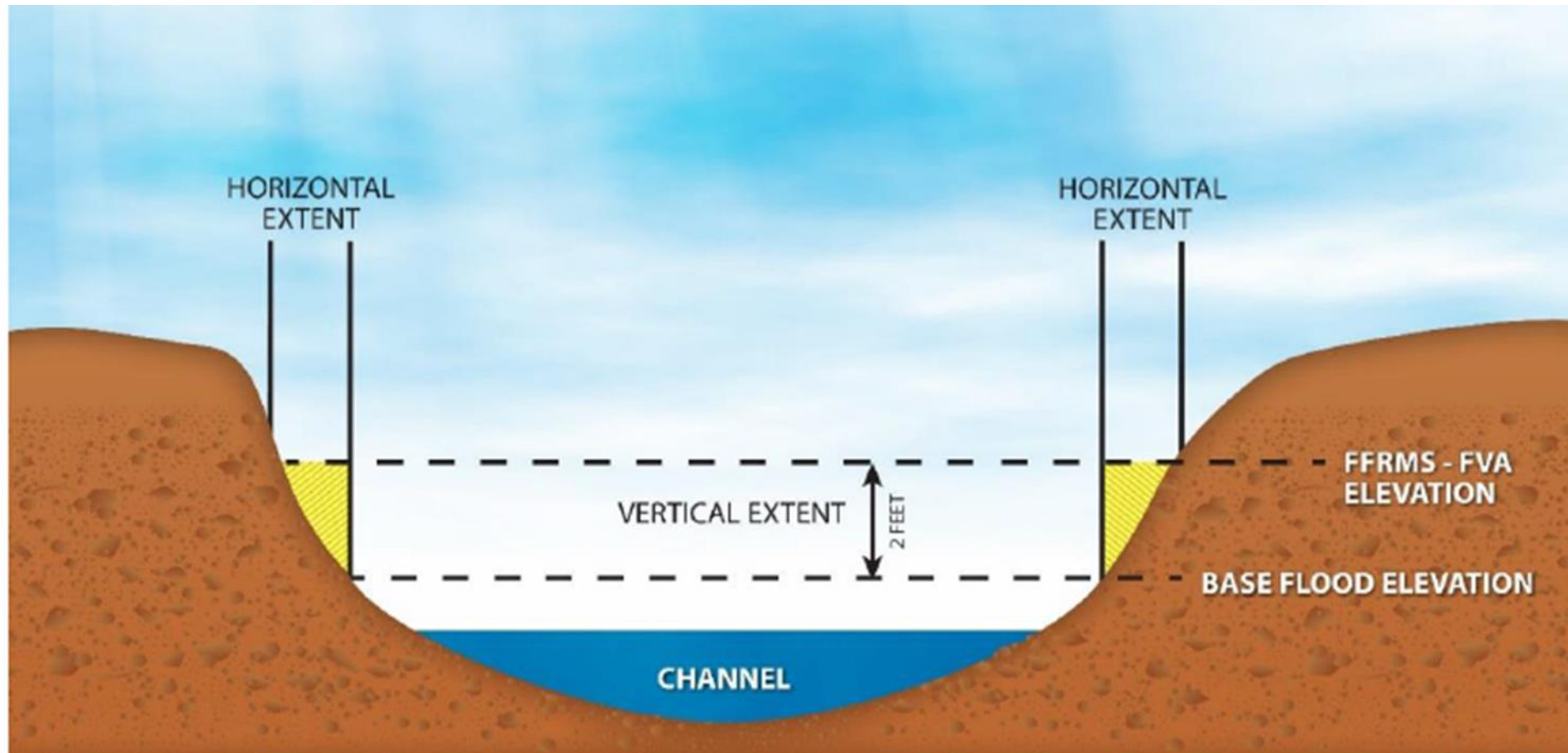
# Of the 23 Oceanfront States, Connecticut is . . .

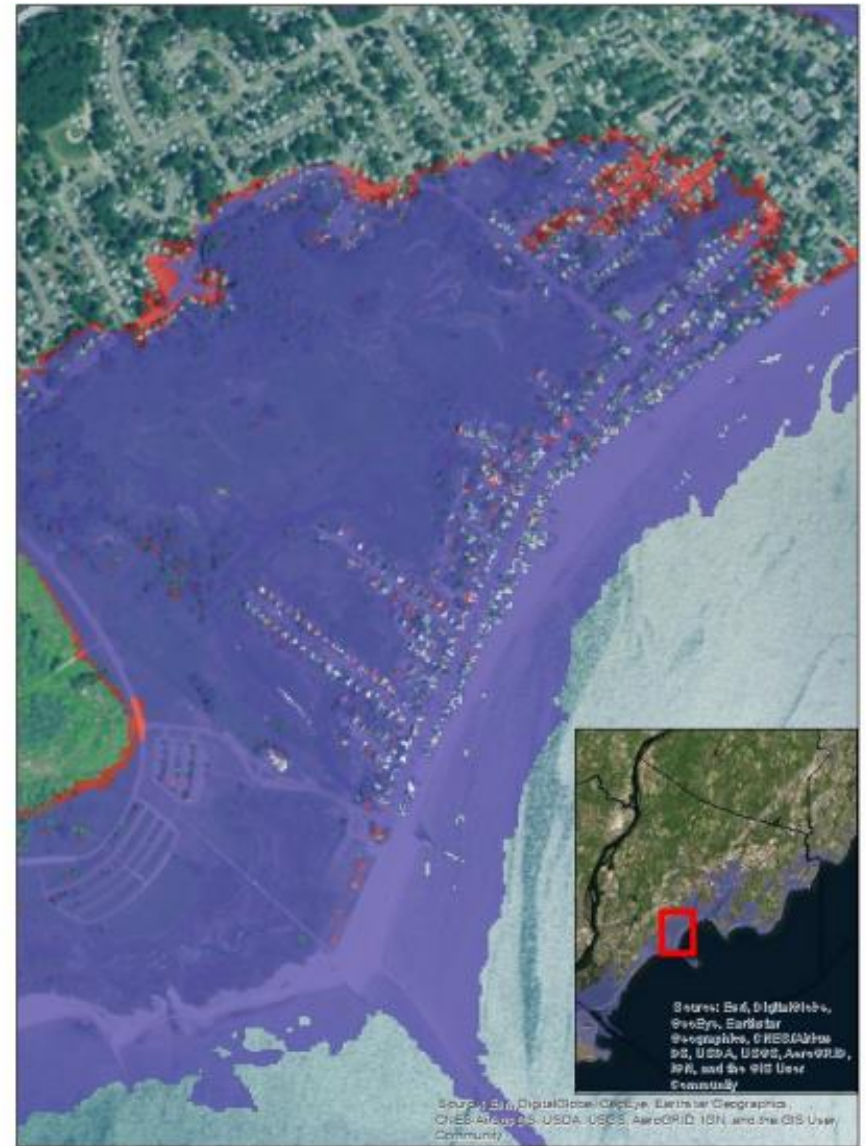
- **One of 11** with state SLR statutes
  - **Three** States Consider SLR in **All** Coastal Management Decisions
  - **Four** States Consider SLR In **Some** Coastal Management Decisions
  - **Four** States - Including Connecticut - Consider SLR Only During **Planning Processes**

# Effects of Sea Level Rise

# When Sea Level Rises, the Existing Floodplain Gets

- Deeper
- Wider



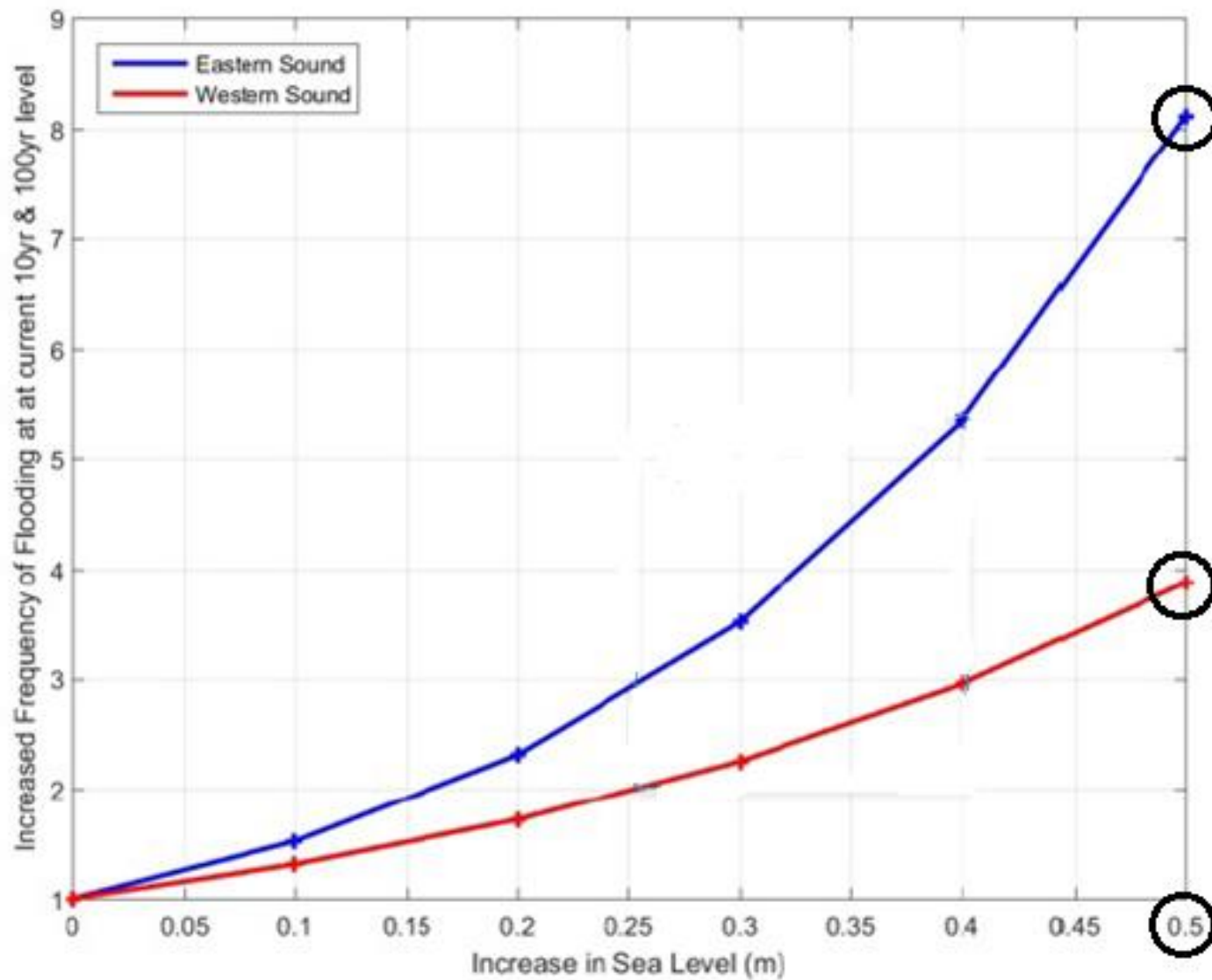


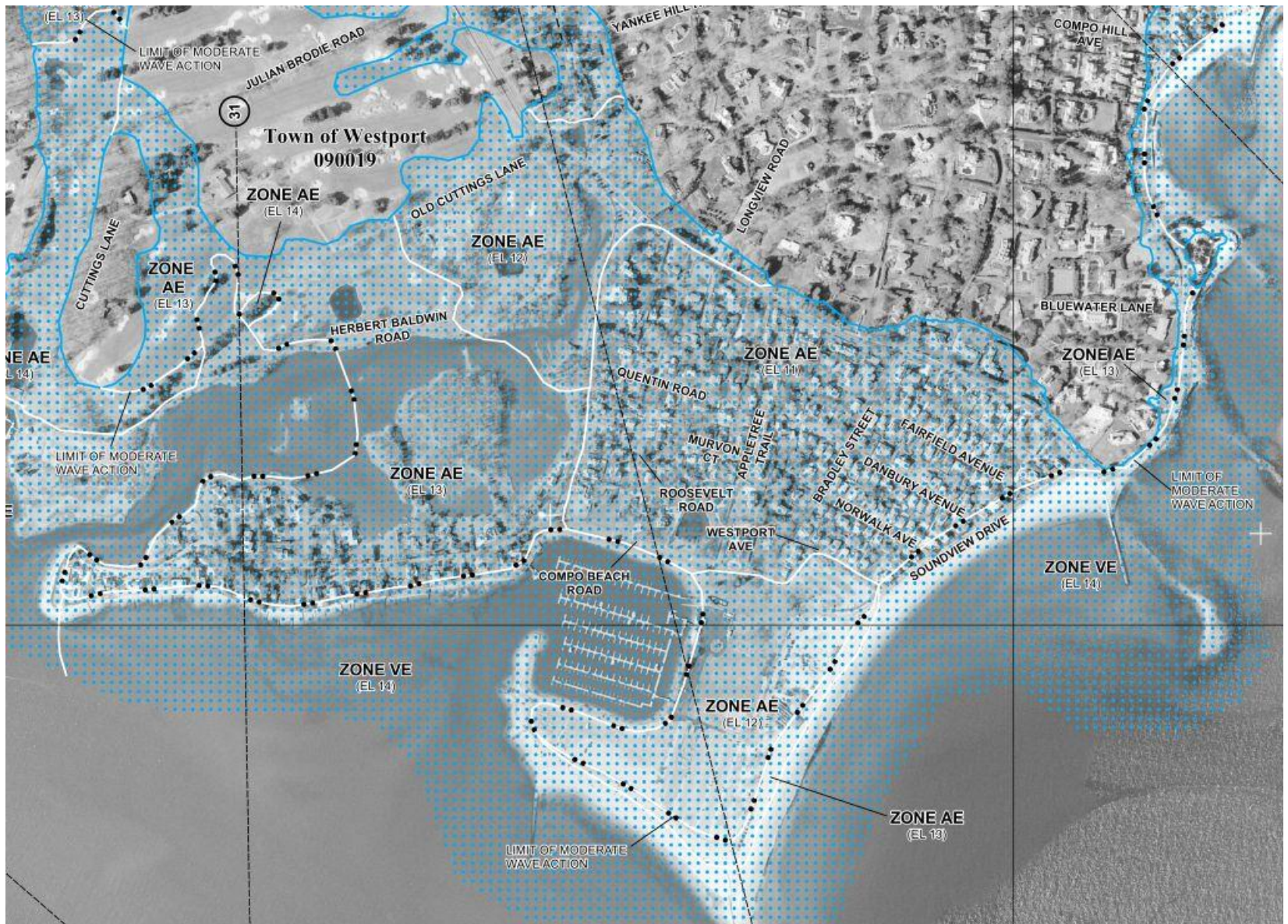
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# Shoreline Regulatory Environment

## Coastal Management Programs

- Protect and restore coastal resources
- Manage coastal development, prioritize water-dependent uses
- Facilitate access to public trust beaches, waters and submerged lands.

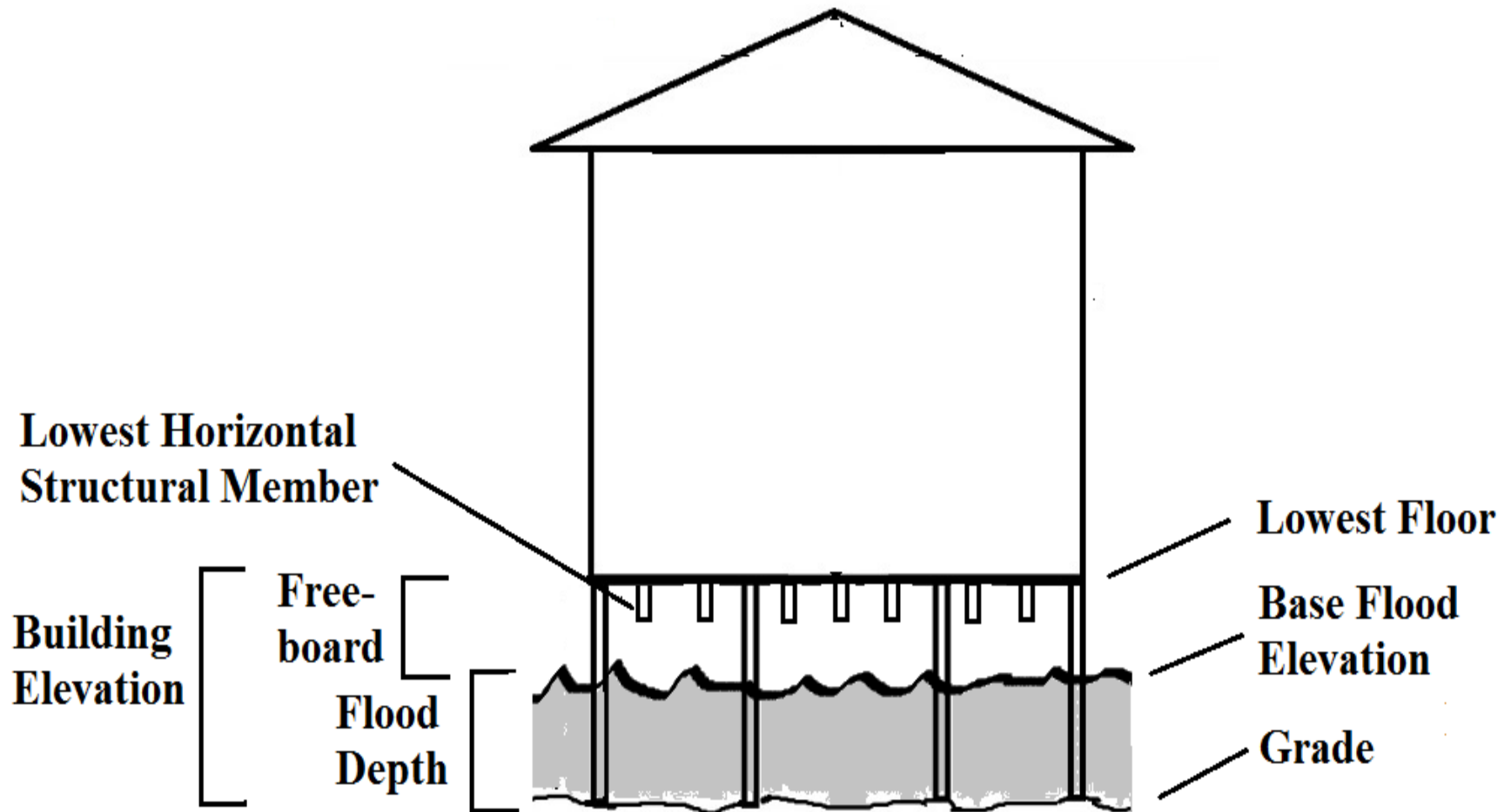
## Floodplain Management Programs

- Promote public health, safety and general welfare in floodplain areas.
- Minimize public and private losses from floods in floodplains areas.

# CEEL Analysis of Local Programs

- Floodplain Building Elevation Requirements in Connecticut Shoreline Municipalities
- Height Restrictions on Elevated Residential Buildings in Connecticut Coastal Floodplains
- Seawall Exemptions from Municipal Coastal Site Plan Review
- Incorporating Sea Level Rise into Existing Coastal and Floodplain Management Programs

# Elevated Shoreline House



The diagram consists of a horizontal line with a slight upward slope from left to right. Below this line, the text "Return Rate of Current 100 Year Flood Levels" is centered. To the left of this text is a left-pointing arrow followed by the text "4X Return Rate". To the right of the text is the text "8X Return Rate" followed by a right-pointing arrow. Below these two phrases, the text "With 1 Foot 8 Inch Rise by 2050" is centered. The entire diagram is enclosed in a rectangular frame.

Return Rate of Current 100 Year Flood Levels

4X Return Rate      8X Return Rate

With 1 Foot 8 Inch Rise by 2050

Return Rate of Current 100 Year Flood Levels

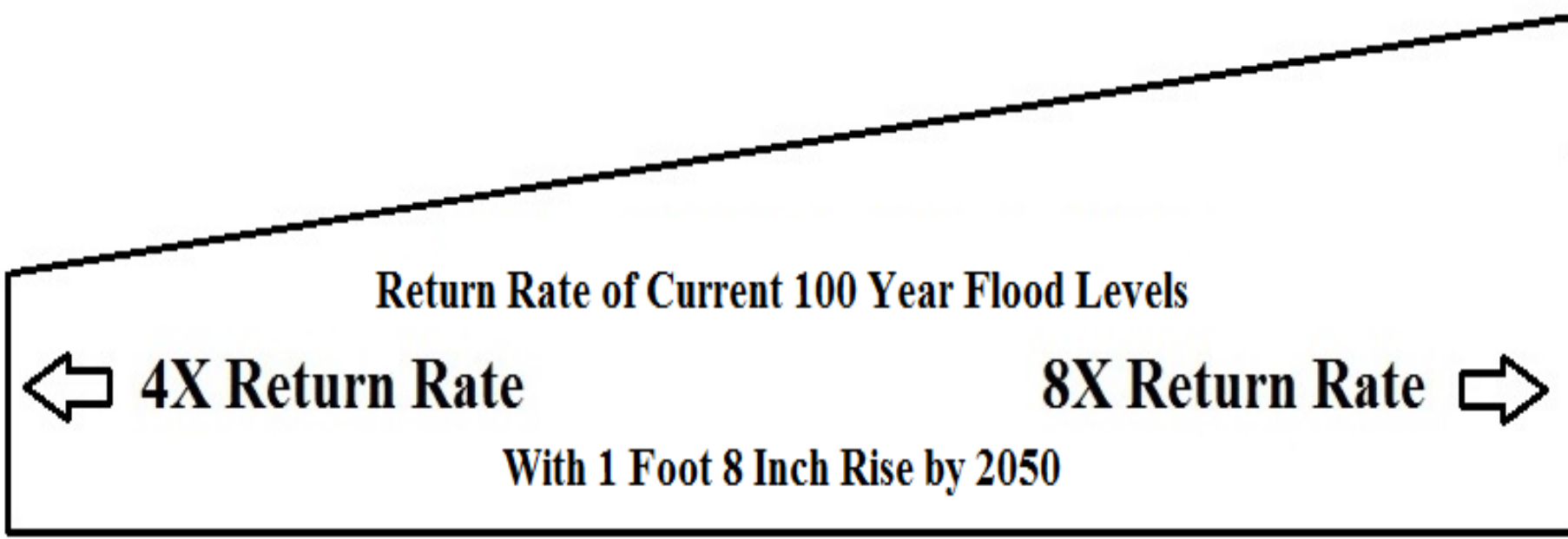
4X Return Rate      8X Return Rate

With 1 Foot 8 Inch Rise by 2050

Return Rate of Current 100 Year Flood Levels

4X Return Rate      8X Return Rate

With 1 Foot 8 Inch Rise by 2050



# Shoreline Community Floodplain Elevation Requirements

- All 24 shoreline communities have floodplain ordinances that meet the elevation requirements of the National Flood Insurance Program
- 13 of the 24 shoreline communities have floodplain ordinances that do not meet the elevation requirements of the 2016 Connecticut State Building Code

# CEEL Floodplain Elevation Guidance

- Increase Building Elevation Requirements
  - **Good:** Meet State Building Code Requirements
  - **Better:** Adopt ASCE 24-14 for All Floodplain Structures

(ASCE 24-14 = American Society of Civil Engineers consensus standard, “Flood Resistant Design and Construction”)
  - **Best:** Add *at least* two feet of freeboard above ASCE 24-14 requirements

# Freeboard is Cheap!

According to FEMA:

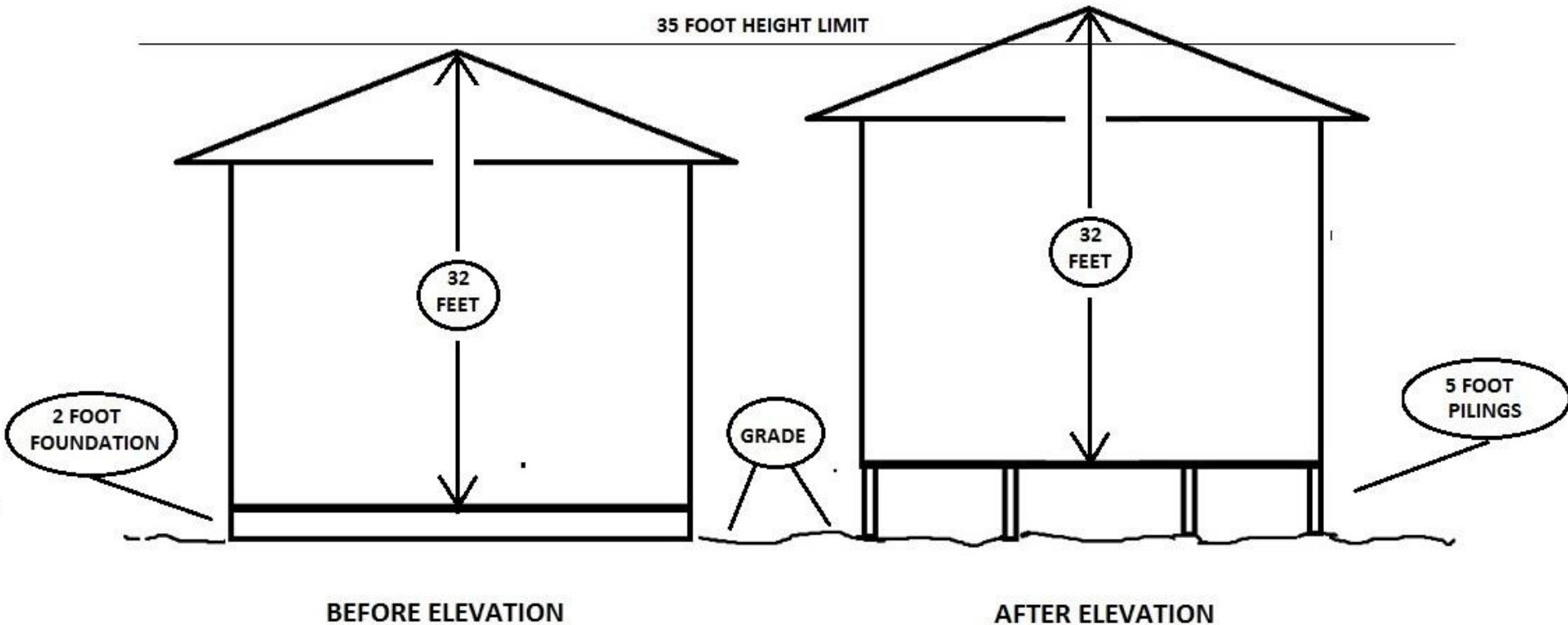
- Initial elevation is expensive, but additional freeboard is not:
  - 4 feet of freeboard  $\approx$  1-2% more than the cost of elevating to BFE
- Insurance savings can pay for freeboard:
  - Six years in A Zones
  - Three years in VE zones



# More Floodplain Elevation Guidance

- Establish a “Coastal A” Zone
  - Increased elevation (and other) standards for “A Zones” subject to 1½ to 3 Foot Waves
- Consider an ordinance to implement FEMA Publication P-804, "Wind Retrofit Guide for Residential Buildings."
- Participate in the NFIP Community Rating System
  - Get money back for doing the right thing!

# Height Restrictions on Elevated Residential Buildings



# Height Restrictions on Elevated Residential Buildings

- **Eight** shoreline communities have adopted floodplain ordinances that accommodate some height above the usual limits without a ZBA hearing
  - Bridgeport, Fairfield, **Greenwich**, Guilford, **Norwalk**, **Stamford**, Waterford, **Westport**
- Some simply add height above grade, some allow extra height based on flood levels
- **CEEL Guidance:** Consider this option



**Flood & Erosion Control Structure: “any structure the purpose or effect of which is to control flooding or erosion from tidal, coastal or navigable waters and includes . . . significant barriers to the flow of flood waters . . .”**

**SEAWALLS LANDWARD OF THE CIL**

**SEAWALL**

CMLS

## Of the 24 Shoreline Municipalities

- **Two** have incorporated the DEEP recommended language that exempts walls as long as they don't meet the definition of a "flood and erosion control structure"
- **Two** have eliminated "walls" from the list of on-premises structures exempt from the site plan review process
- **Twenty** retain the language that exempts "walls" from the site plan review process

**CEEL Recommendation:** Eliminate the “walls” from the exemption or incorporate the DEEP recommended language for "flood and erosion control structure"

# Good Practices in the Face of Sea Level Change

- Plan on a 20-Inch Sea Level Rise by 2050
- Consider Other UConn SLR Projections Based Upon the Life of the Project and the Consequences of Flooding
- Floodplain management Beyond the Minimums
  - Coastal A Zones
  - Extra Freeboard
  - ASCE 24-14 - Flood Resistant Design & Construction
  - ASCE 7-16 - Flood and Wind Design Loads
  - FEMA Publication P-804 - Wind Retrofit Guide
- Consider Ordinances to Accommodate Elevated Building Height
- Adopt DEEP Language for “Walls” Landward of the CJL
- Use CIRCA

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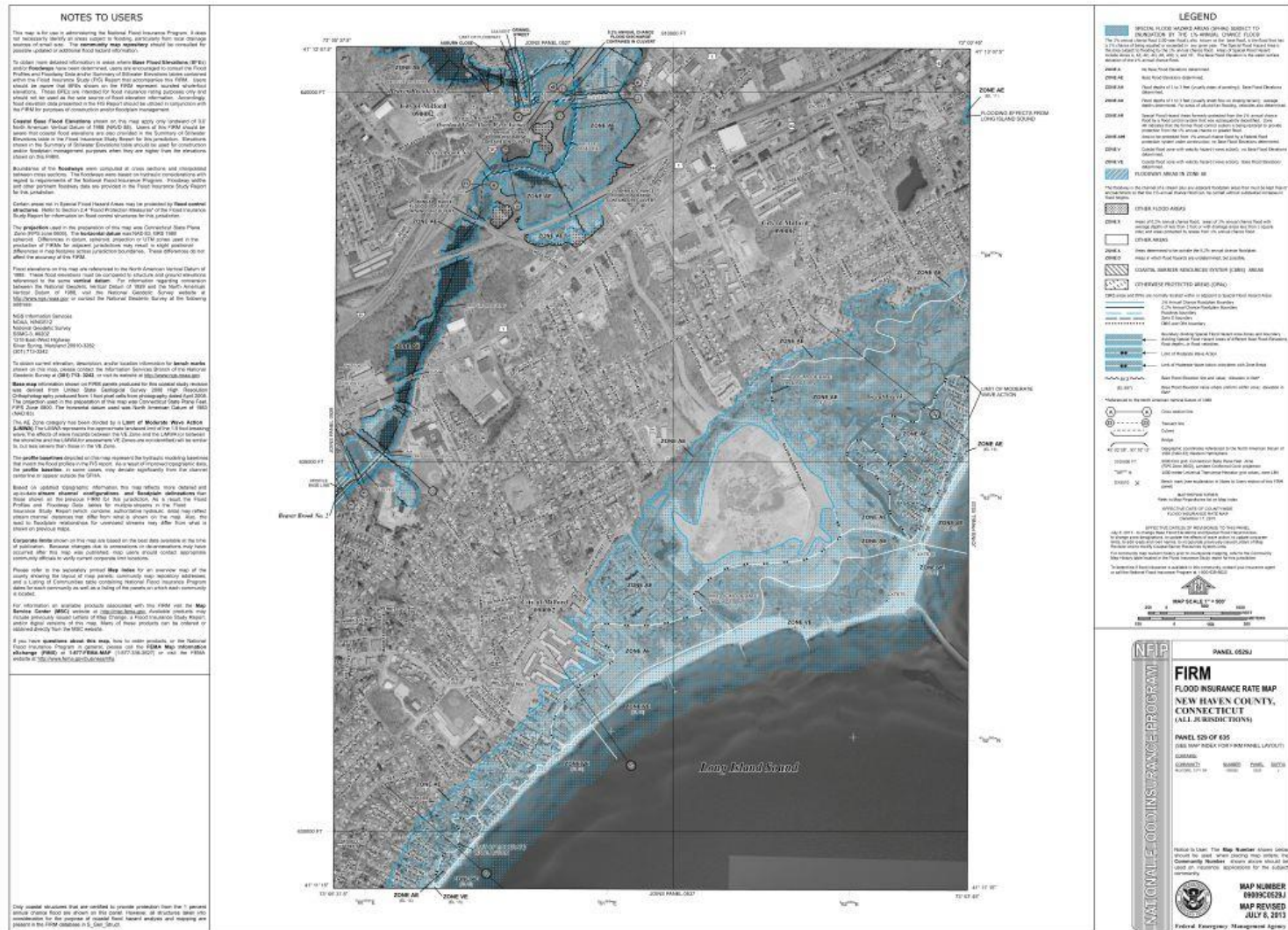
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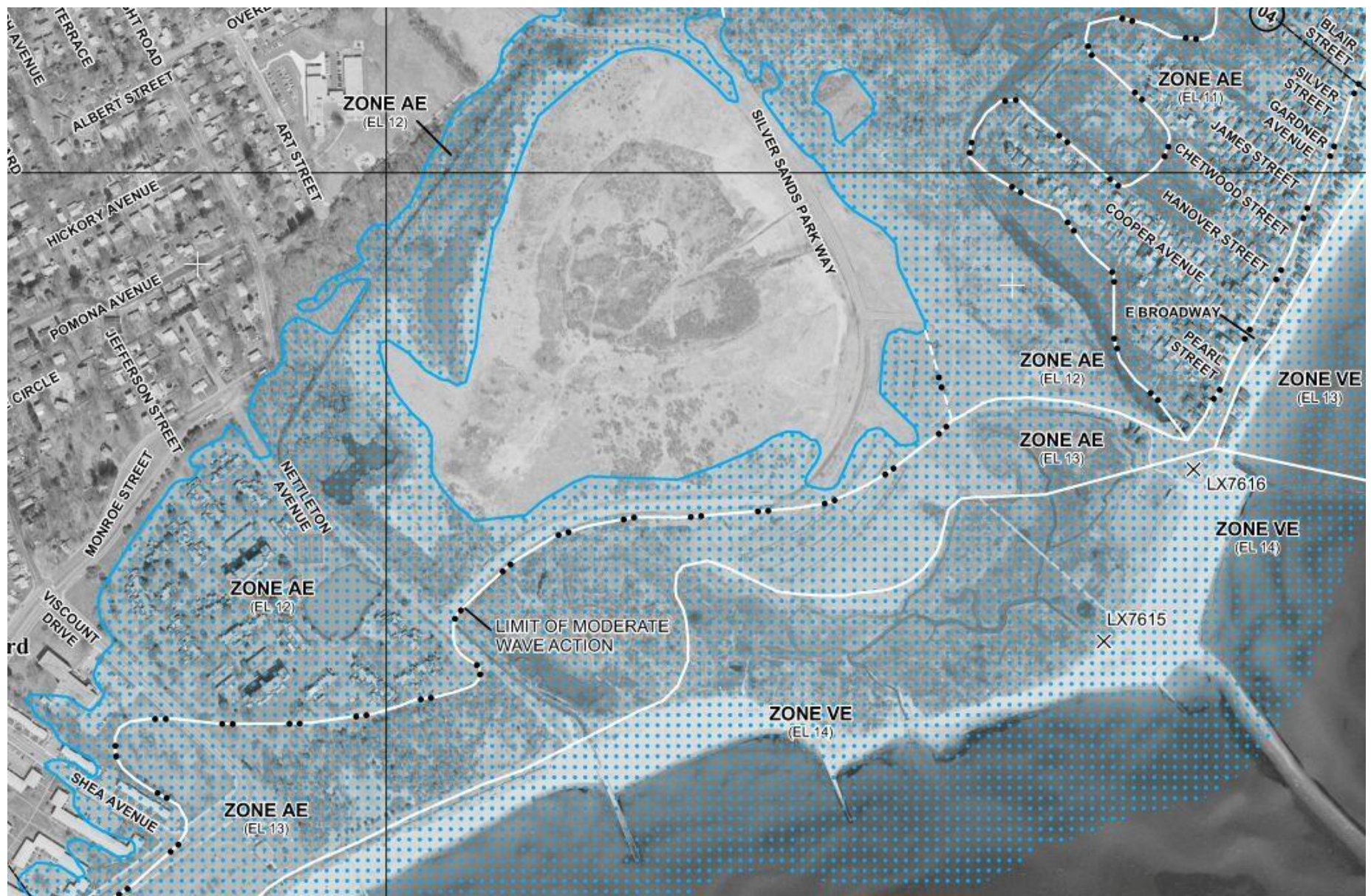




# Flood Insurance Rate Map







# Coastal Management Programs

- **Jurisdiction (Within the Coastal Boundary)**
  - Town Jurisdiction Landward of the Mean High Water Line
  - DEEP Jurisdiction Waterward of the Coastal Jurisdiction Line (Extreme High Tide Line)
  - Shared Jurisdiction Between the Two
- **Enforcement:** A Mandatory **Coastal Site Plan Review** of Planned Uses, Buildings and Structures Must Demonstrate No Unmitigated, Unacceptable Adverse Impacts on Coastal Resources and Future Water Dependent Uses
- **Exempt:** Certain Minor or Incidental Additions & Modifications, and Most Individual Single-Family Homes More than 100 feet Away from Coastal Resources.



# Floodplain Management Programs

- **Jurisdiction (Within the Floodplain)**
  - Town Jurisdiction Throughout
  - DEEP Jurisdiction for State Activities  
(“Activities” Includes Grants and Loans)
- **Purpose**
  - Create a Resilient Built Environment
  - Preserve Floodplain Volume and Flow
  - Meet Flood Insurance Requirements
- **Requirements**
  - Town Floodplain Ordinances
  - DEEP Floodplain Regulations