Resilient Stratford South End

In partnership with

Hazards Characterization

Hazards Characterization

Hazards:

- Coastal Flooding
  - Tides
  - Waves
- Intense Precipitation
  - Riverine Flood
  - Stormwater
- Effects of Climate Change
  - Sea Level Rise
  - Heat

Long Beach West after the 1938 Hurricane (Ref. Town of Stratford)

Hurricane Sandy (2011)

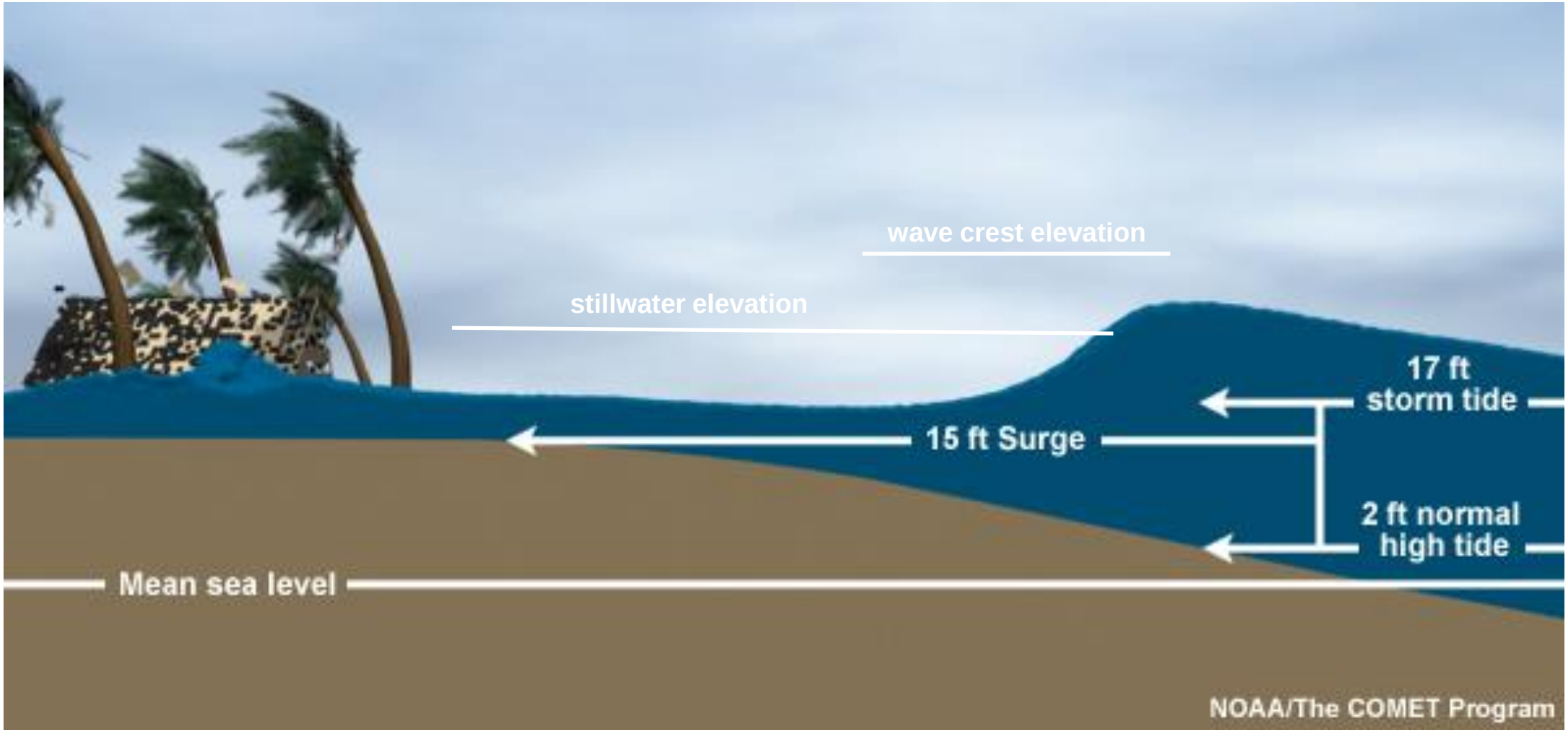
Hazard Characterization

Data Sources: Hazards Data

- **Coastal Flooding Data**
  - FEMA Flood Hazards – FIS and FIRMs; Digital Viewer
  - NOAA (tides and flood water level, observed storm oceanographic and meteorological data)
  - 2016 Coastal Resilience Plan Coastal Modeling
  - CIRCA Wave and Climatological Data - Climate Change Vulnerability Index and Viewers
  - NOAA 2017 (recently updated), CT State Sea Level Rise Projections
- **Intense Precipitation**
  - NOAA Atlas 14 Precipitation Data
- **Extreme Temperatures**
  - Fourth National Climate Assessment - Northeast US Climatological Data

Hazard Characterization

Coastal Flooding

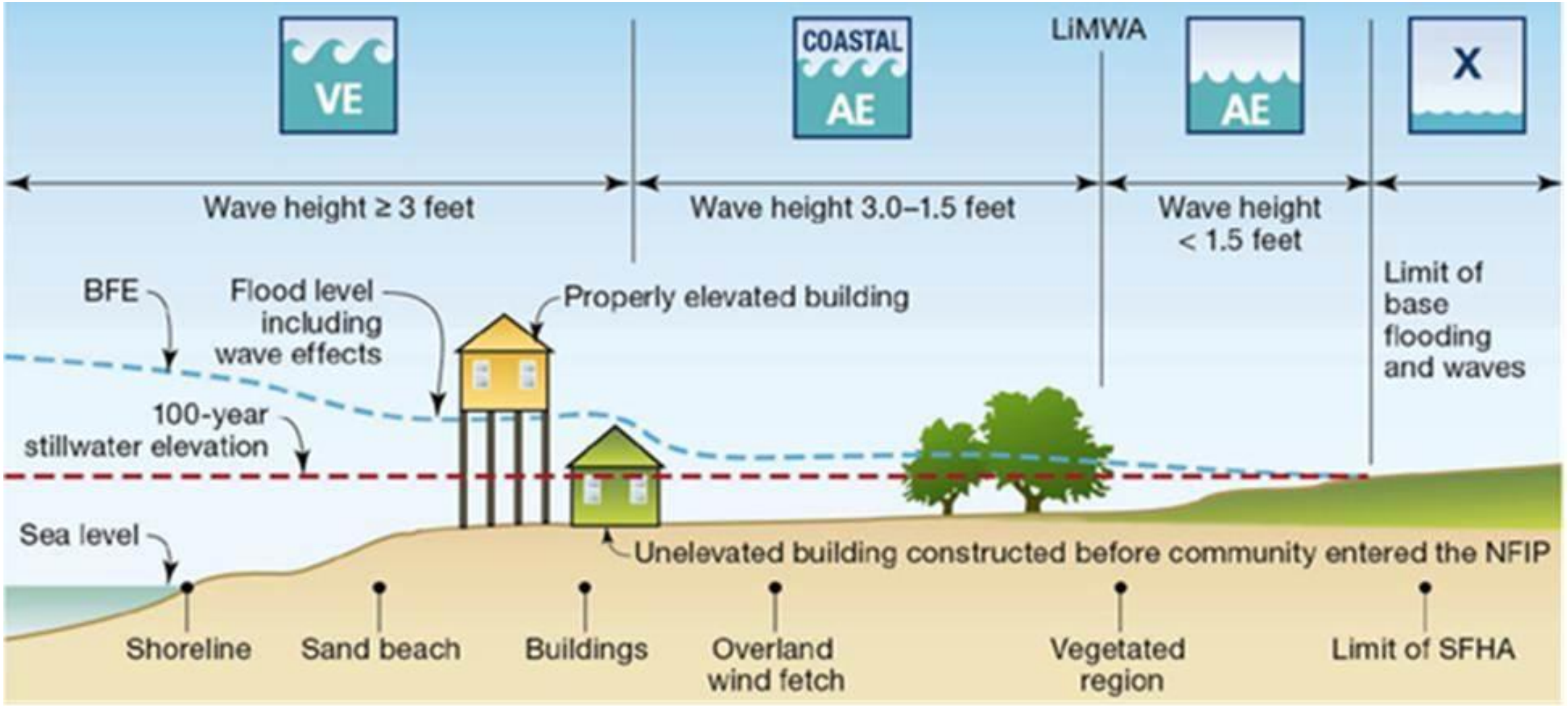


GEOGRAPHICAL FACTORS

STORM FACTORS

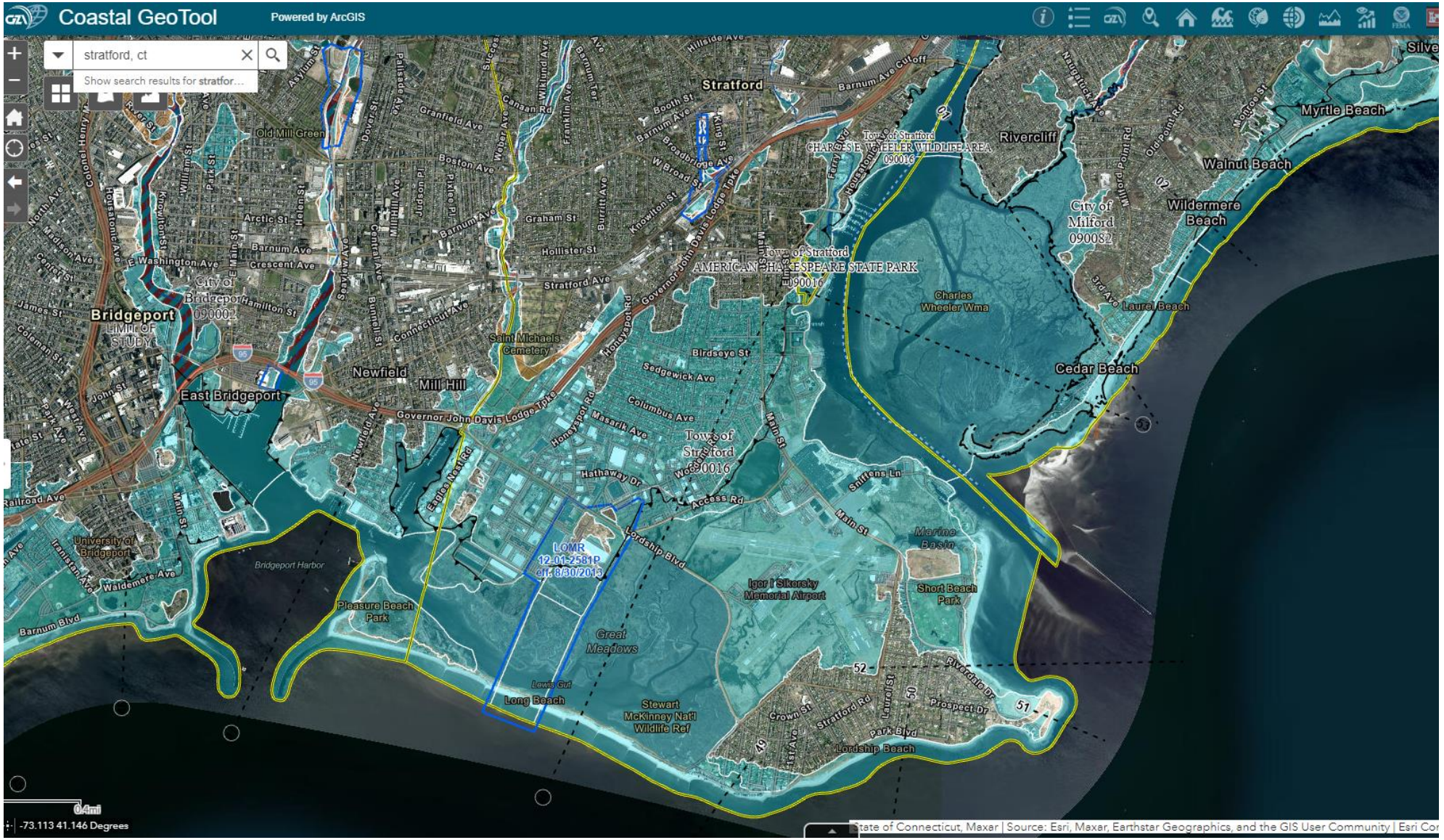
Hazard Characterization

FEMA Flood Hazard Zones



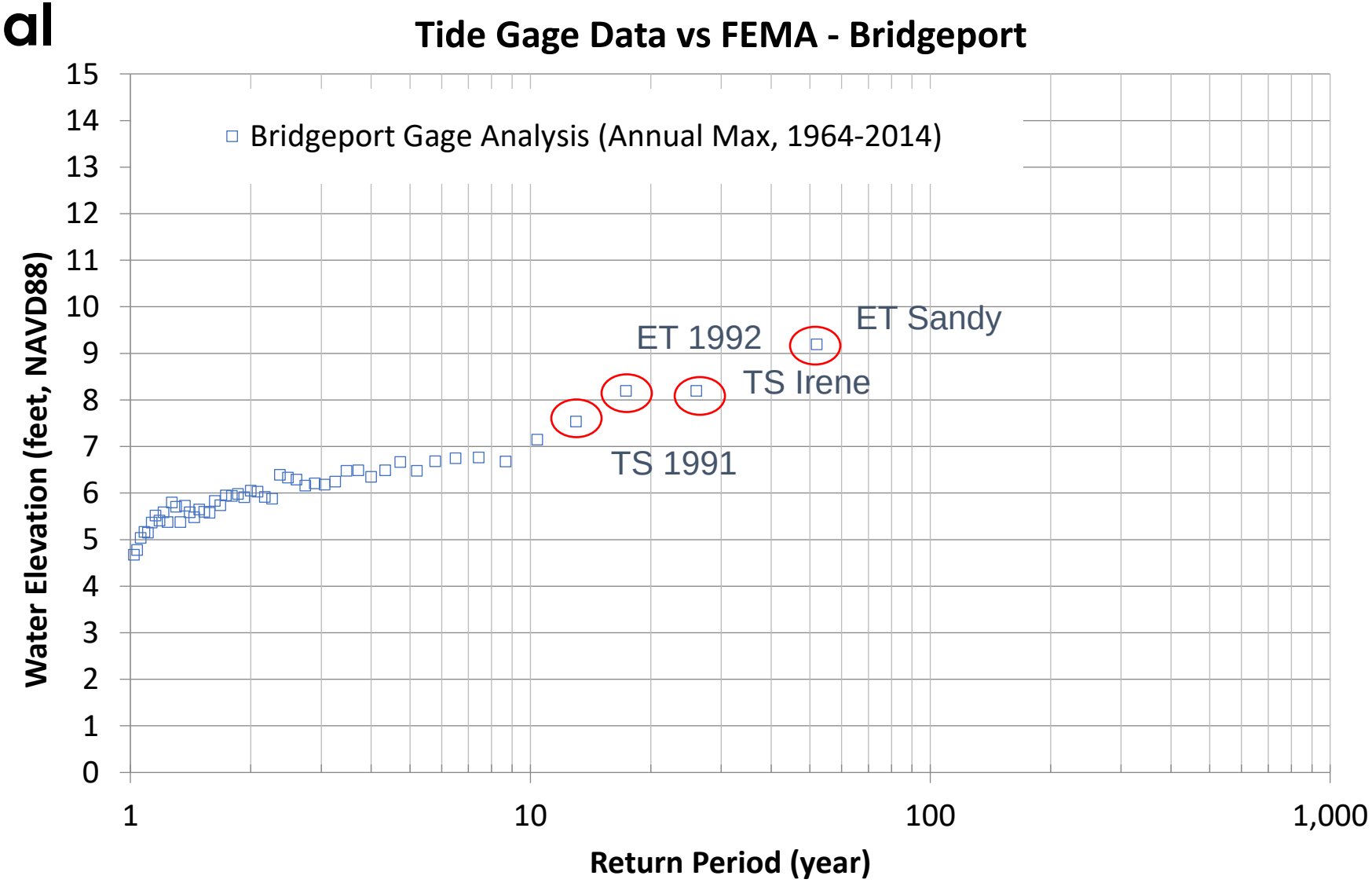
Hazard Characterization

FEMA Flood Insurance Rate Map



Hazard Characterization

Historical Storms



Hurricane Sandy
Flood Inundation Simulation using ADCIRC Model

Figure 3.10 GZA Computer Flood Simulations of Hurricane Sandy Time Step 1

Figure 3.11 GZA Computer Flood Simulations of Hurricane Sandy Time Step 2

Figure 3.12 GZA Computer Flood Simulations of Hurricane Sandy Time Step 3

Figure 3.13 GZA Computer Flood Simulations of Hurricane Sandy Time Step 4

Figure 3.14 GZA Computer Flood Simulations of Hurricane Sandy Time Step 5

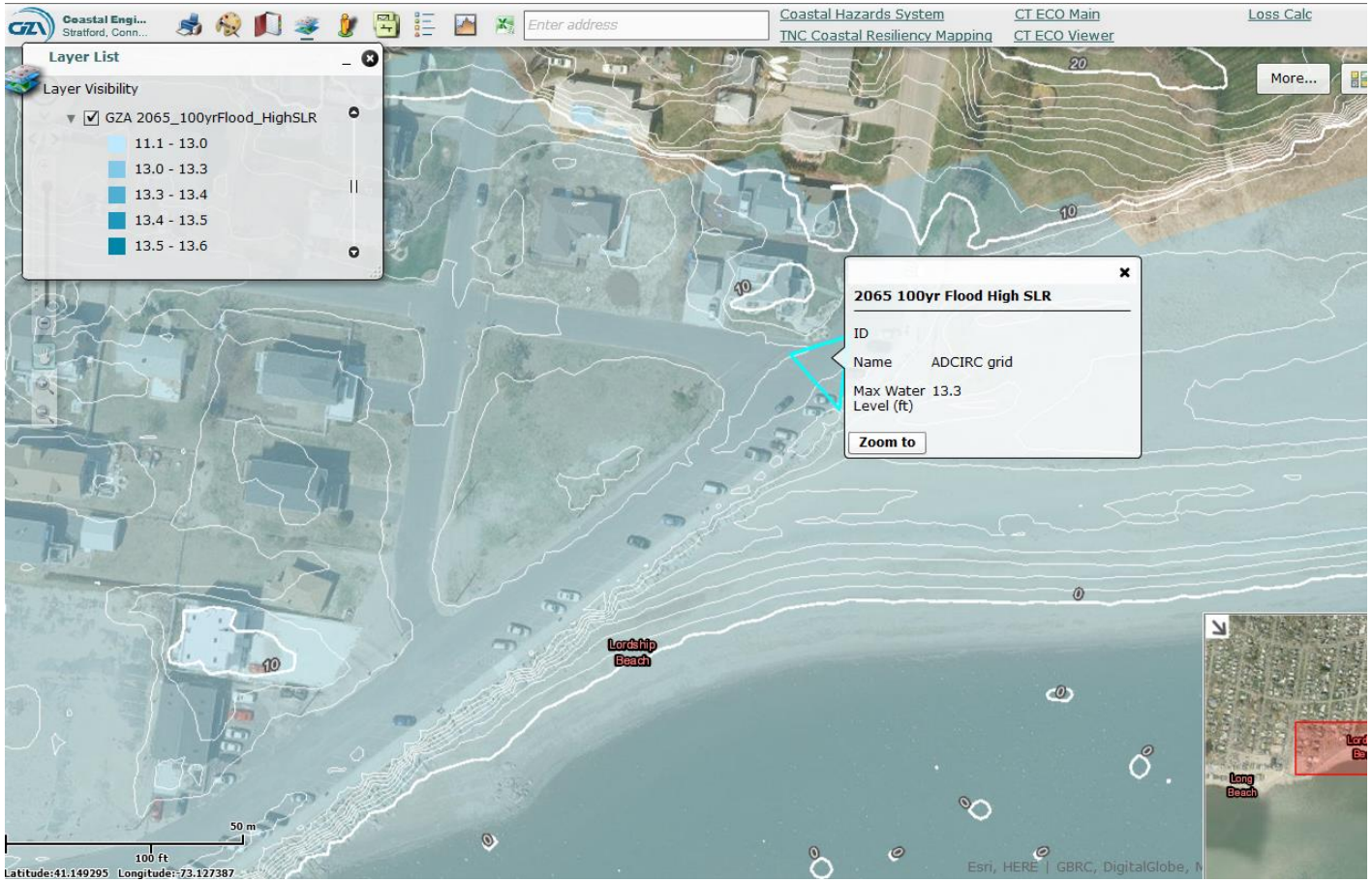
Figure 3.15 GZA Computer Flood Simulations of Hurricane Sandy Time Step 6

Figure 3.16 GZA Computer Flood Simulations of Hurricane Sandy Time Step 7

Figure 3.17 GZA Computer Flood Simulations of Hurricane Sandy Time Step 8

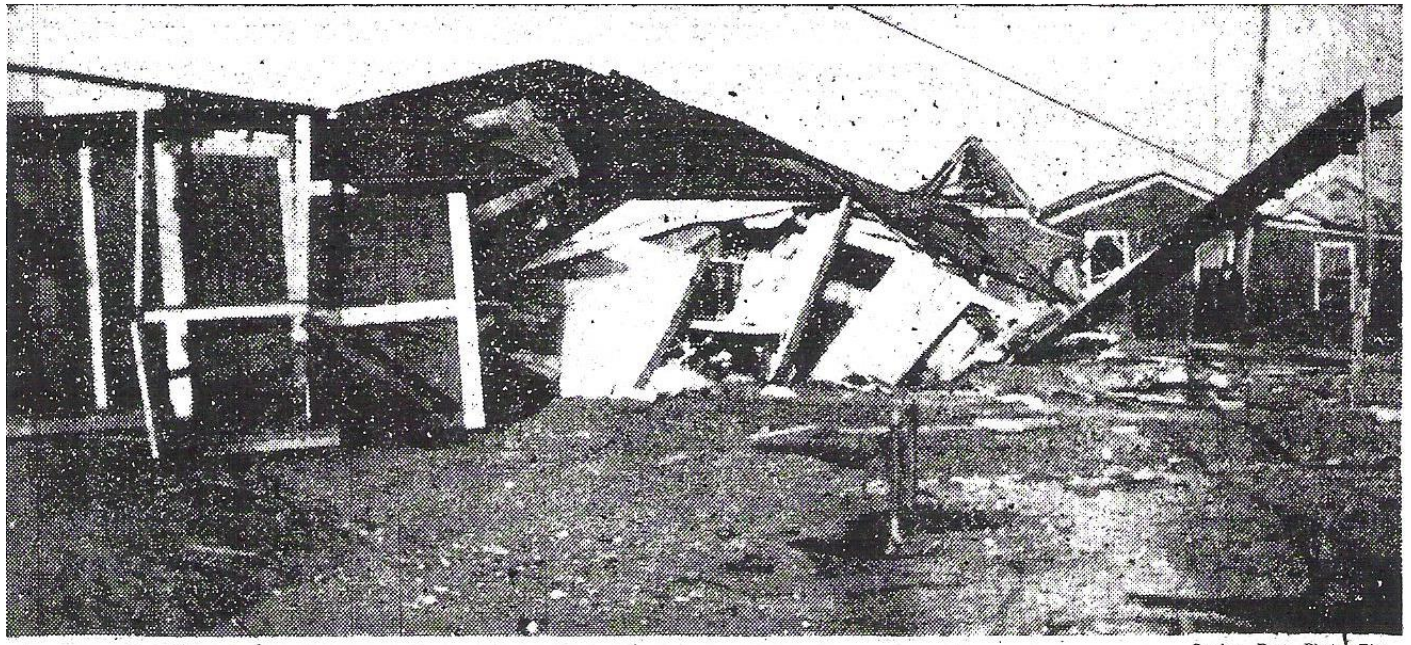
Hazard Characterization

Superstorm Sandy



Hazard Characterization

Hurricane of ‘38



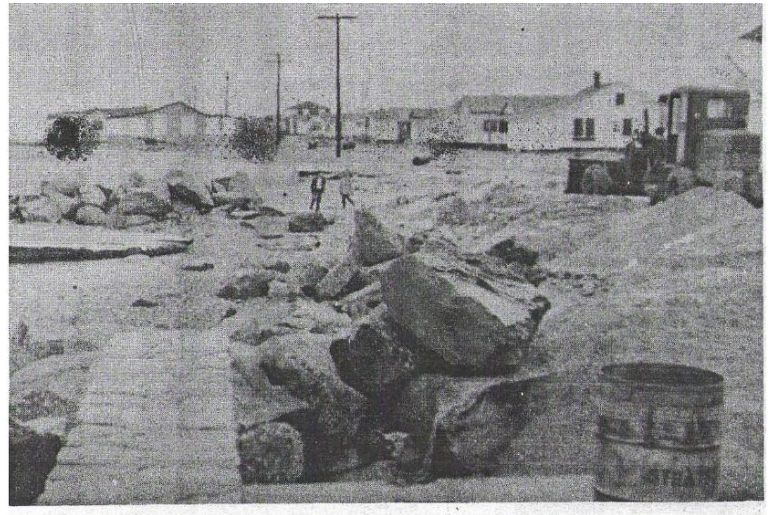
LORDSHIP COTTAGES SUFFER SIMILAR FATE—Here is one of more than 50 cottages demolished by the storm at Long Beach, Lordship, with damage estimated at more than $100,000.

Sunday Post Photo—Pitt

September 22, 1938

Damage from the Hurricane of 1938 at the cottages between Lordship and Long Beach. Courtesy of the Stratford Historical Society.

Damage from the Hurricane of 1938 at the cottages between Lordship and Long Beach. Courtesy of the Stratford Historical Society.



Stratford's Heritage: hurricane

Although it is most often a source of pleasure and recreation, the Stratford waterfront can also become a scene of desolation. This potograph was taken the day after a hurricane struck in 1955, wiping out the western end of the sea wall in Lordship and much of the adjoining sidewalk. (Collection of Mrs. F. Biebel, Sr.)

March 16, 1972

Hazard Characterization

Sea Level Rise Project Approach

Should consider Planning and Regulatory Implications of Sea Level Rise:

State of Connecticut Guidance and Regulation:

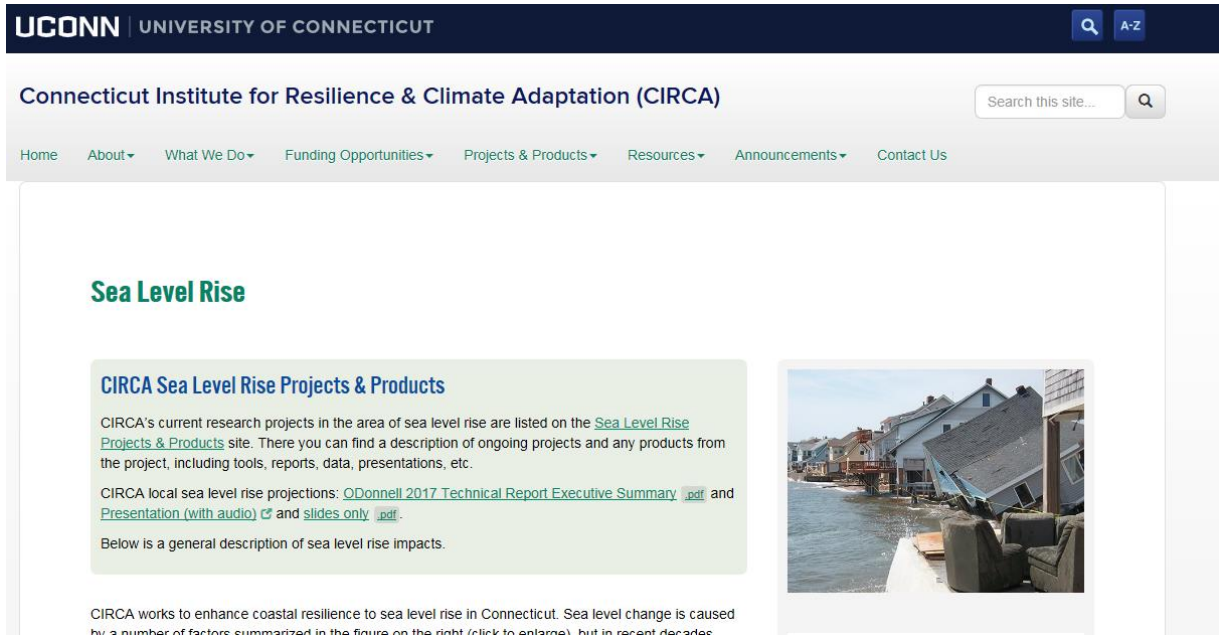
- PA 12-101
- PA 13-179

Must Consider RSLC:

- Plans of Conservation and Development
- Hazard Mitigation Plans
- Coastal Management

State Guidance: UCONN/CIRCA:

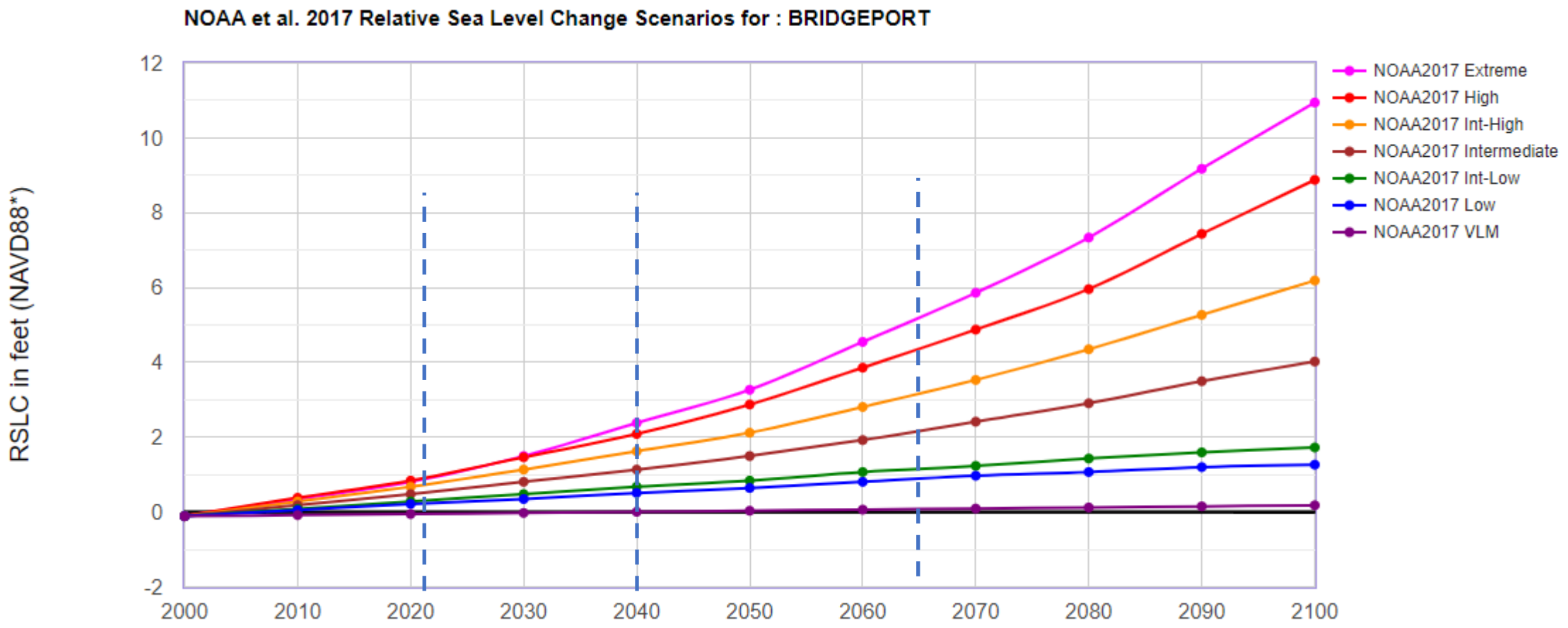
- Mid-range Planning 1.7 feet by 2050
- Long Term – be aware 3.25 feet by 2100
- Updated every decade



Hazard Characterization

Predicted Sea Level Rise

Sea Level Rise Scenarios



Hazard Characterization

Predicted Sea Level Rise

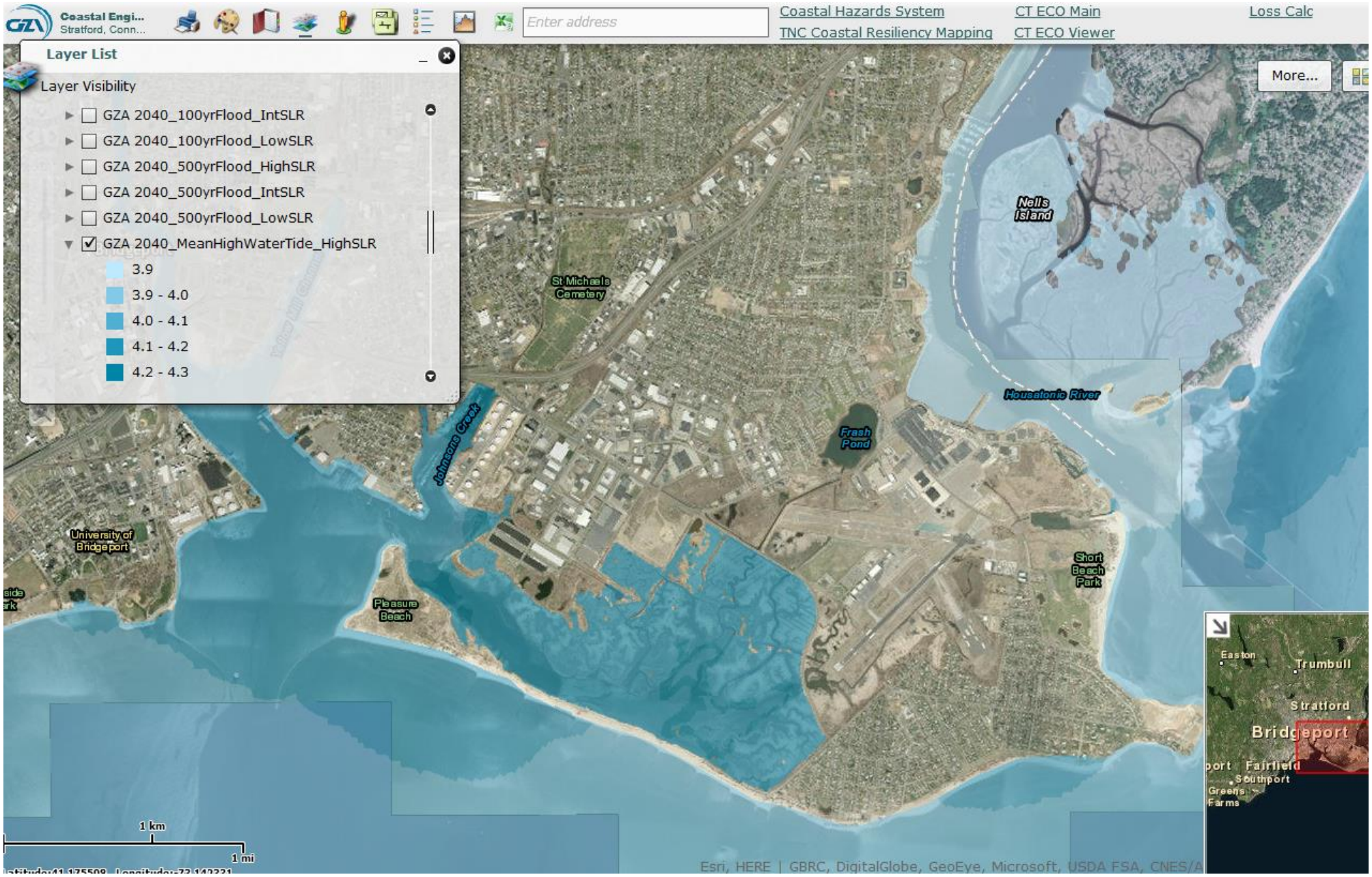
Scenarios for BRIDGEPORT
NOAA2017 VLM: 0.00292 feet/yr
All values are expressed in feet

Year	NOAA2017 VLM	NOAA2017 Low	NOAA2017 Int-Low	NOAA2017 Intermediate	NOAA2017 Int-High	NOAA2017 High	NOAA2017 Extreme
2000	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11
2010	-0.08	0.05	0.08	0.18	0.28	0.38	0.35
2020	-0.05	0.22	0.28	0.48	0.68	0.84	0.81
2030	-0.02	0.35	0.48	0.81	1.13	1.46	1.50
2040	0.00	0.51	0.68	1.13	1.63	2.09	2.38
2050	0.03	0.64	0.84	1.50	2.12	2.87	3.27
2060	0.06	0.81	1.07	1.92	2.81	3.86	4.55
2070	0.09	0.97	1.23	2.41	3.53	4.87	5.86
2080	0.12	1.07	1.43	2.91	4.35	5.96	7.34
2090	0.15	1.20	1.59	3.50	5.27	7.43	9.17
2100	0.18	1.27	1.73	4.02	6.19	8.88	10.94

TOWN OF STRATFORD
offering more from forest to shore

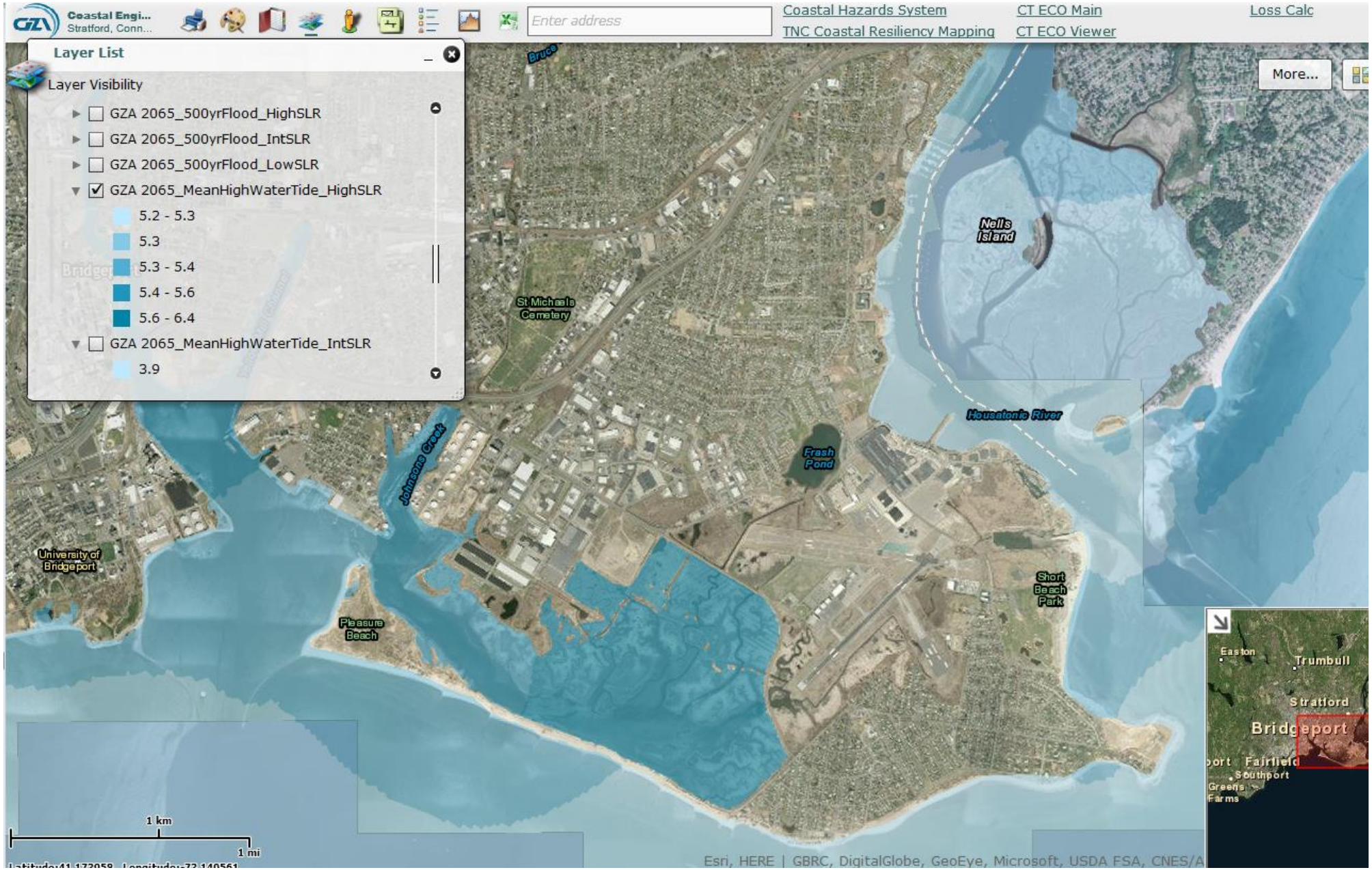
Hazard Characterization

Mean High Tide: 2040 High SLR



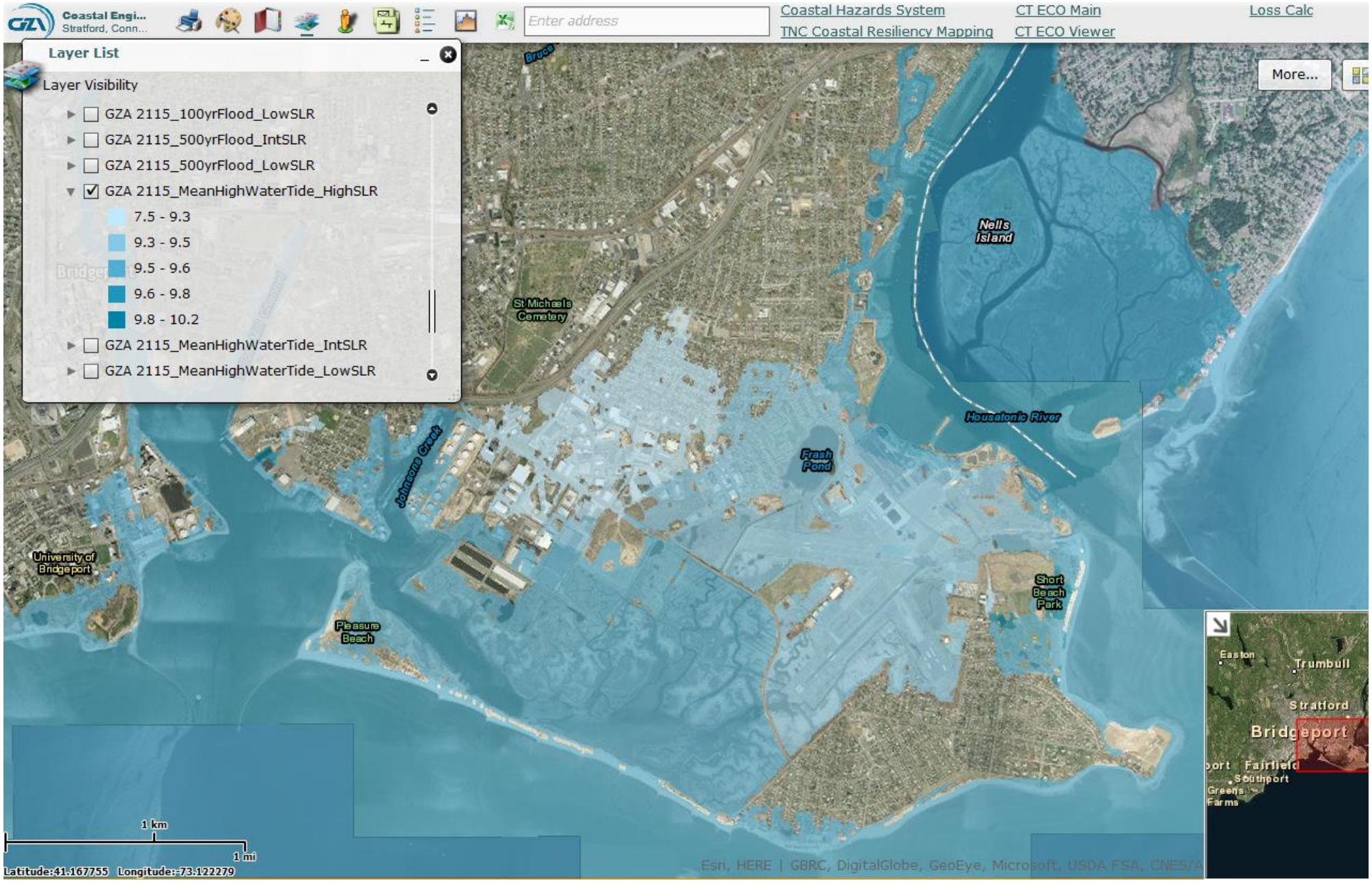
Hazard Characterization

Mean High Tide: 2065 High SLR



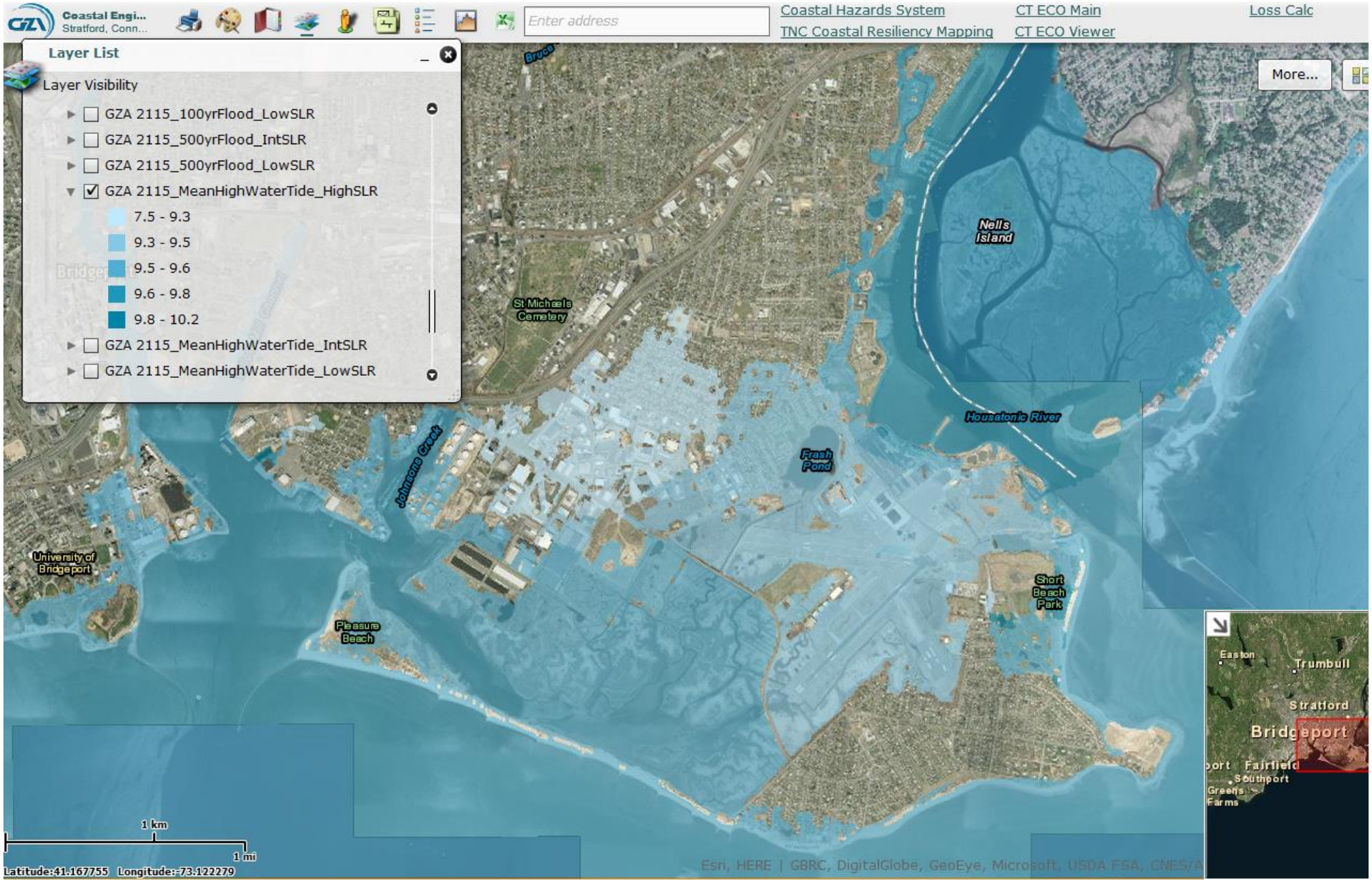
Hazard Characterization

Mean High Tide: 2115 High SLR



Hazard Characterization

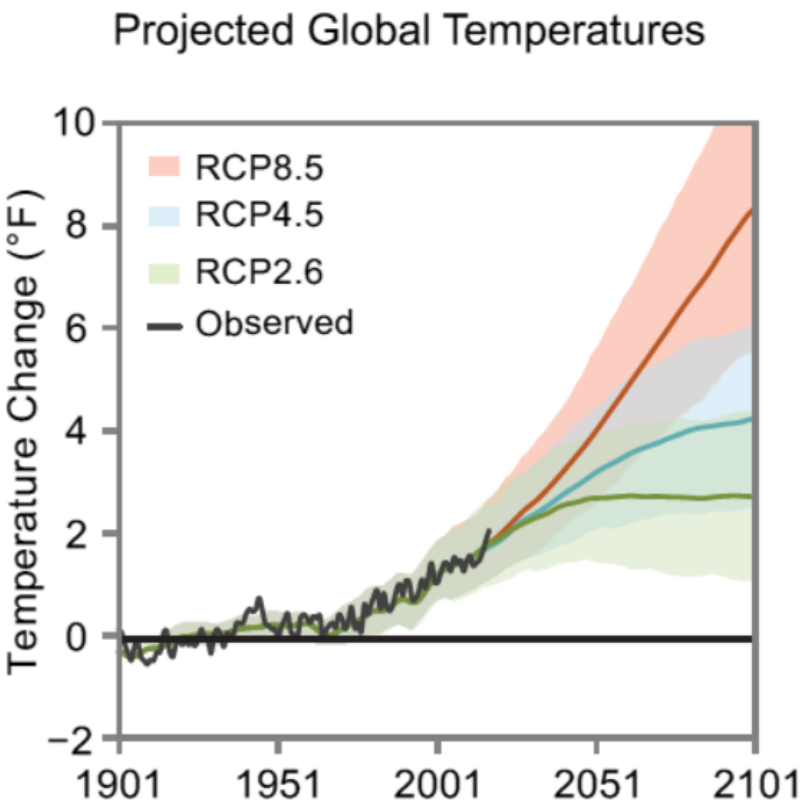
2015 High 100-year Flood Elevation (Stillwater)



Damaged fuel station at Sikorsky Airport after Sandy (Source: image from ctpost.com)

Hazard Characterization

Temperature



Time Period	Change in Temperature	Degrees Fahrenheit
Mid Century (2036-2065)	Change in Annual Average Temperature (RCP4.5)	4.0
	Change in Annual Average Temperature (RCP8.5)	5.1
Late Century (2071-2100)	Change in Annual Average Temperature (RCP4.5)	5.3
	Change in Annual Average Temperature (RCP8.5)	9.1

Resilient Stratford South End

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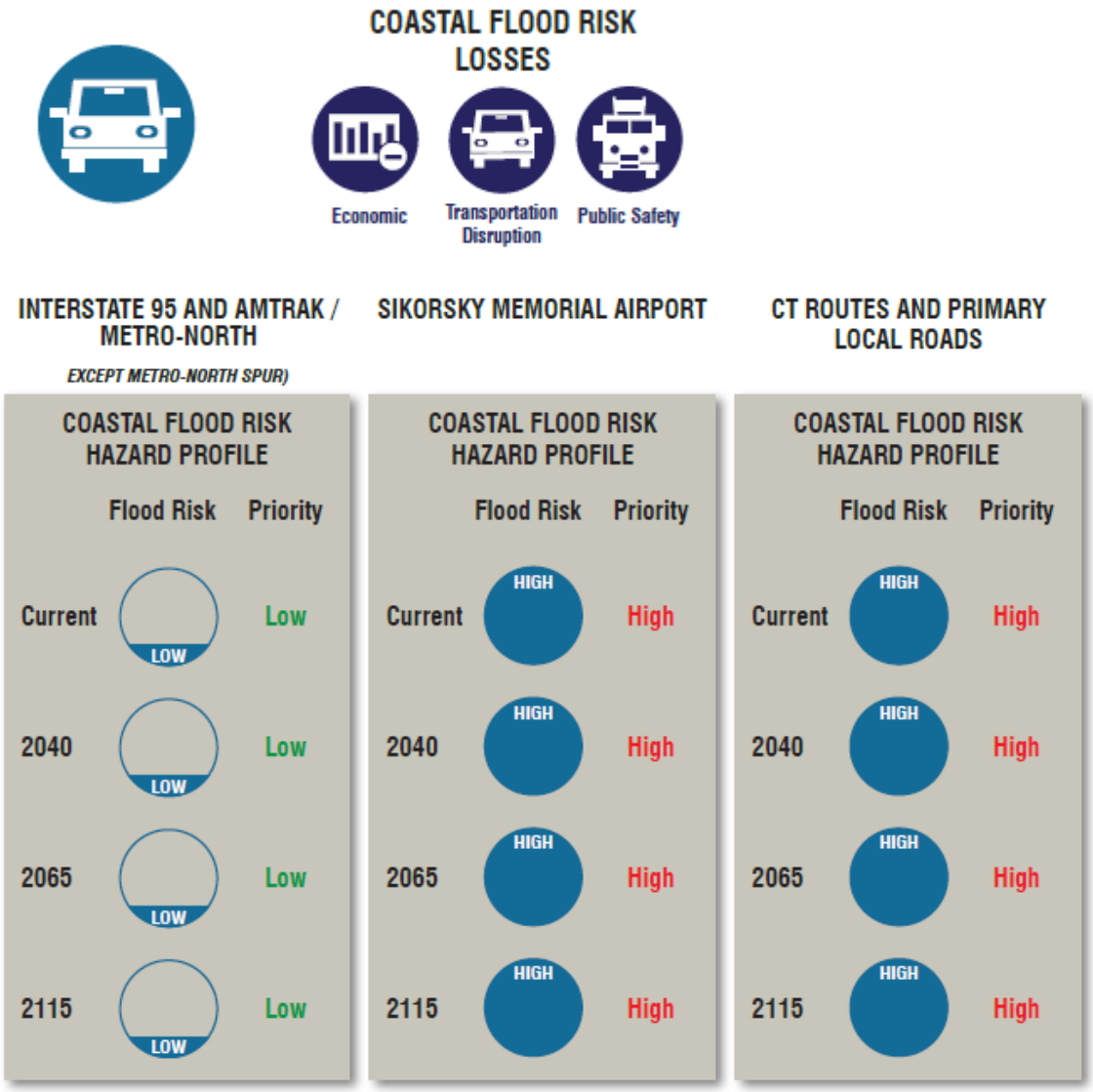
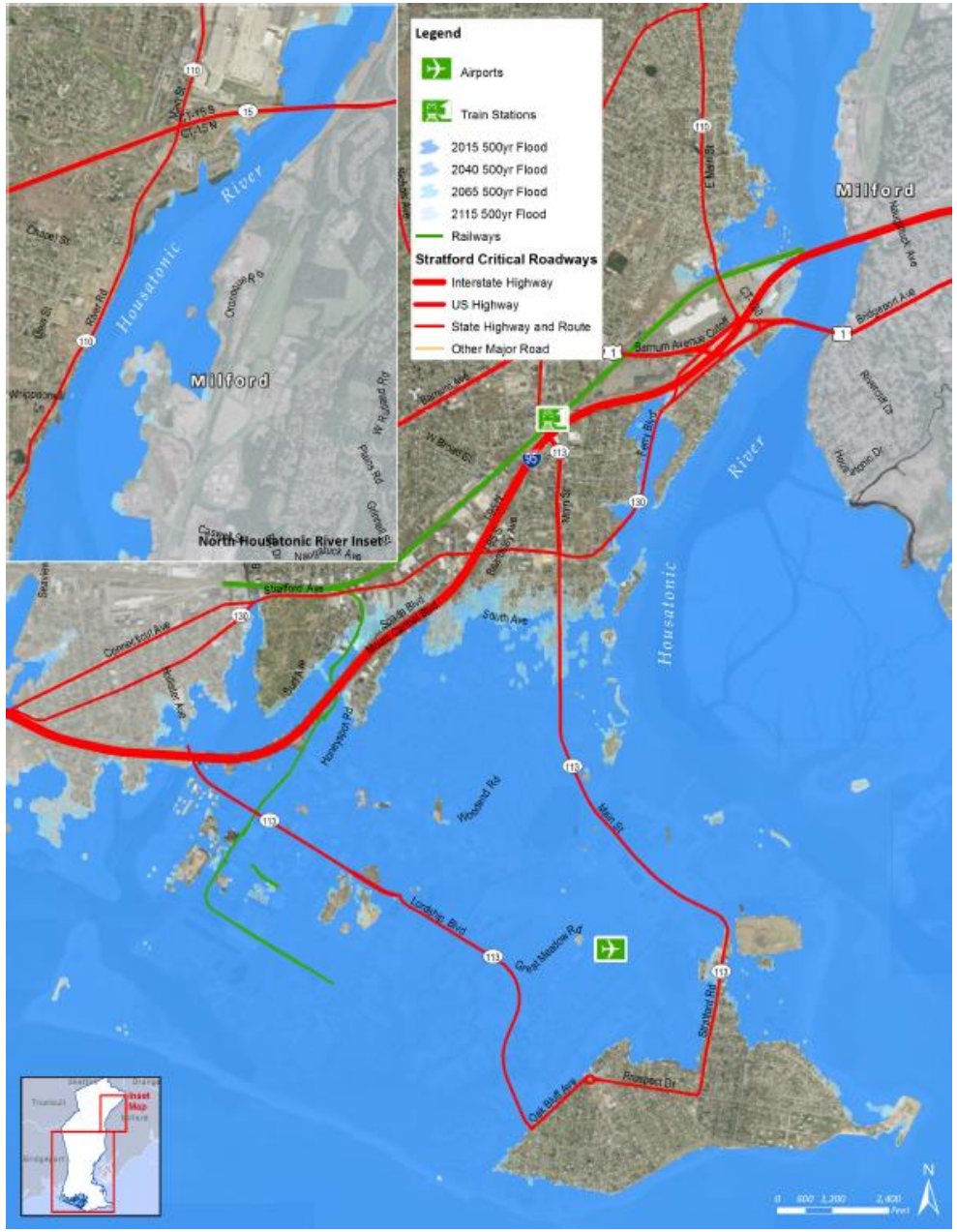
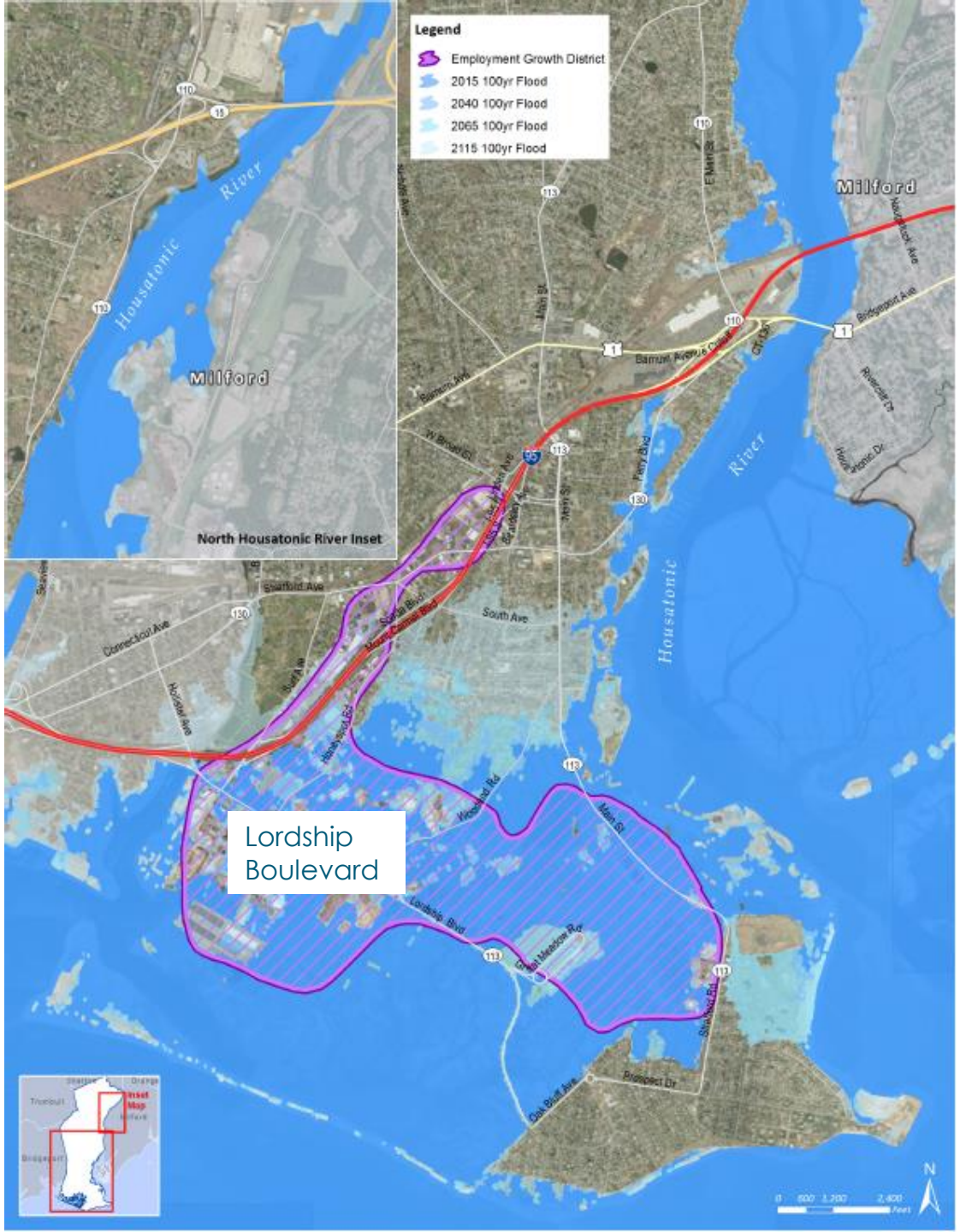
Vulnerabilities

Transportation Vulnerability Assessment





Asset-Based Vulnerability Assessment



SOUTH END & LORDHSHIP BLVD FLOOD RISK PROFILE

The POCD defines the Employment Growth District (EGD) as the mixed use employment corridor along Lordship Boulevard, including Sikorsky Airport, and along Honeyspot Road to Route 95. Table 4.1 presents an overview of the existing development EGD as well as the future development potential for commercial and industrial space and residential units.

	Commercial Space (sf)	Industrial Space (sf)	Residential Units (no. of units)
Existing	858,000	947,000	290
25% Build Out	925,000	4,725,000	610
Full Build Out	3,700,000	18,900,000	2,450

Table 4.1 Existing Development and Development Potential

The two key areas outlined in the POCD include are the Lordship Boulevard Employment Growth District and Sikorksy Airport.

Portions of Lordship Boulevard and much of Sikorsky Airport were inundated during Hurricane Sandy. The vulnerability of the EGD was evaluated relative to the current FEMA FIRM Base Flood Elevation and the predicted 100-year recurrence interval coastal floods (stillwater elevation) through the year 2115 (see Figure 4.3). Lordship Boulevard and Sikorsky Airport are highly vulnerable to coastal flooding. Lordship Boulevard and Sikorsky Airport are currently within the effective FEMA Zone AE.

The flood vulnerability is due principally to: 1) flooding from Great Meadows with respect to Lordship Boulevard and 2) floodwaters entering into Sikorsky Airport via the Marine Basin. The effects of coastal flooding will increase due to sea level rise, resulting in increased damage potential especially in consideration of future development along Lordship Boulevard.

Potential losses to the EGD include: 1) direct costs due to existing and future EGD development and content damages; 2) direct costs to aircraft, facilities and content damages at Sikorsky Airport; and 3) indirect costs due to disruption of services. Sikorsky Airport also houses essential facility support such as the police helicopter.

COASTAL FLOOD RISK LOSSES

Transportation Disruption
Disruption of Critical Services
Public Safety
Economic

COASTAL FLOOD RISK HAZARD PROFILE

	Flood Risk	Priority
Current	HIGH	High
2040	HIGH	High
2065	HIGH	High
2115	HIGH	High

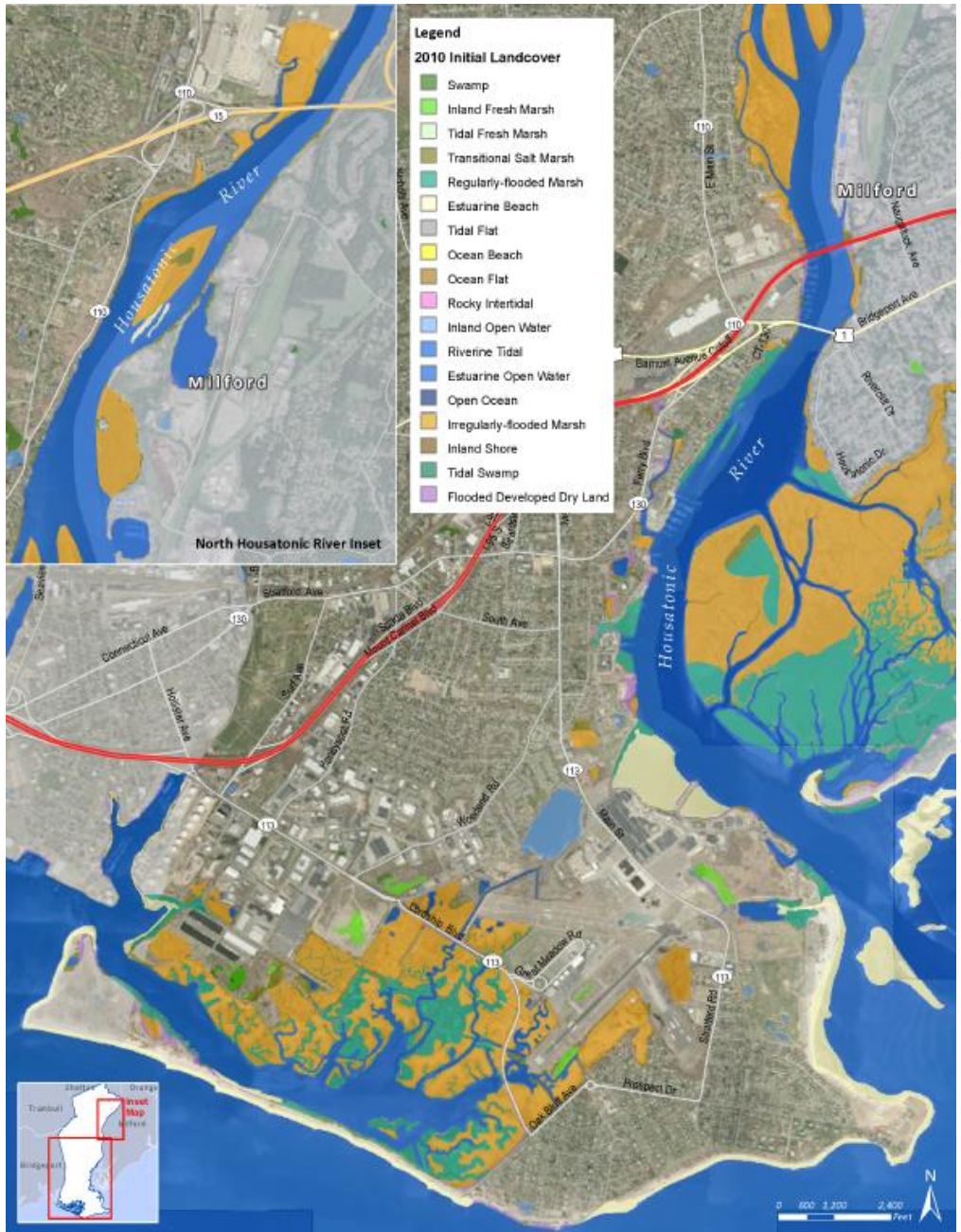
Figure 4.3 Employment Growth District *(facing page)*

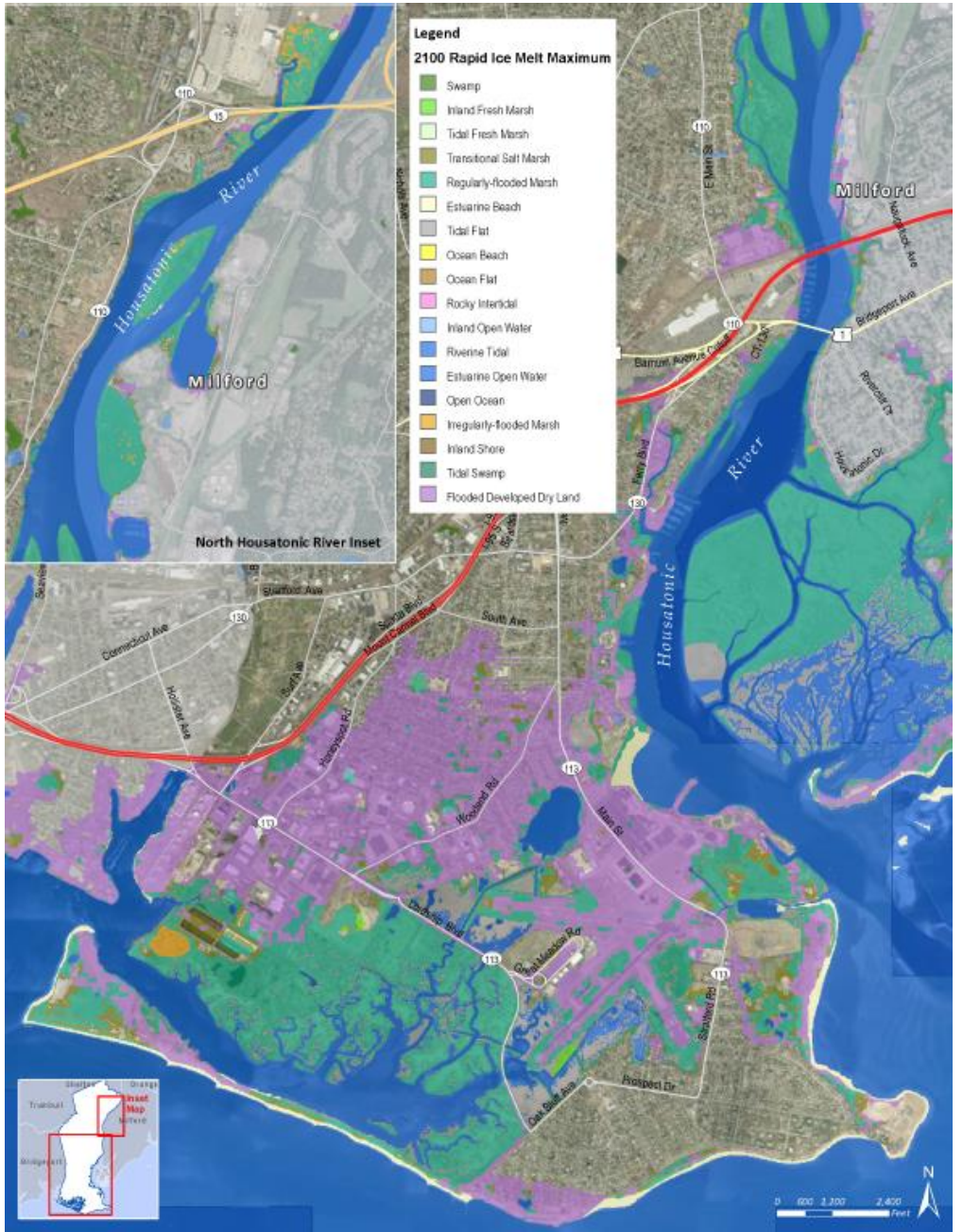
Natural Resource Vulnerability Assessment

COASTAL FLOOD RISK LOSSES

Loss of Natural Resources

Economic





Financial Vulnerability Assessment

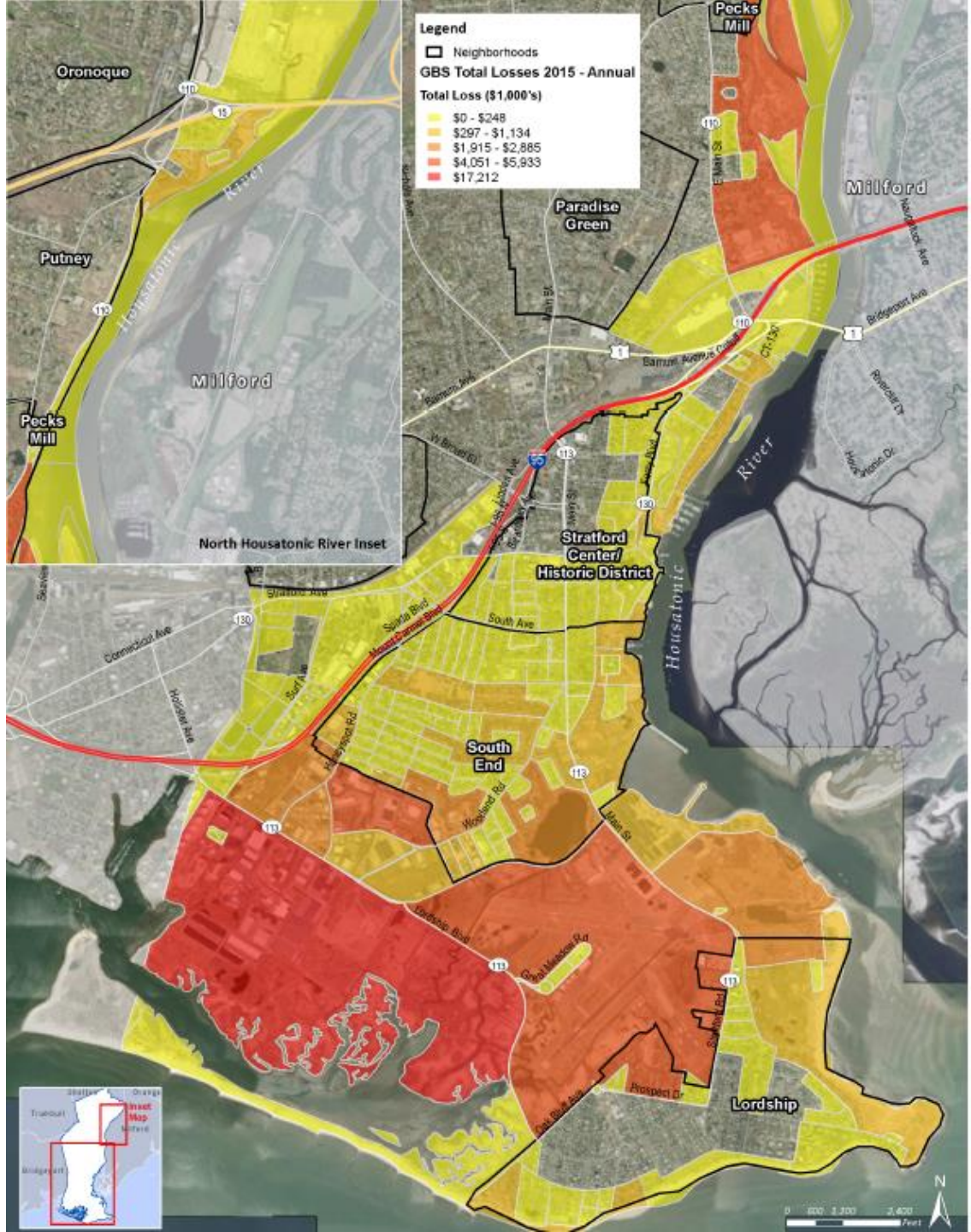
AAL Per capita: $1,100 +/-

Occupancy	Exposure ($1,000)	Percent of Total
Residential	4,804,160	71.5%
Commercial	1,184,257	17.6%
Industrial	517,257	7.7%
Agricultural	14,010	0.2%
Religious	102,683	1.5%
Government	33,465	.5%
Education	64,294	1%
Total	**6,720,103**	**100%**

Table 4.2 Stratford Building Exposure and Occupancy Type

Category	10 yr	25 yr	50 yr	100 yr	500 yr	AAL
	(Shown in Millions of Dollars)					
Residential	$87	$110	$174	$244	$442	
Commercial	$160	$203	$286	$424	$551	
Industrial	$107	$135	$192	$272	$390	
Other	$13	$18	$24	$30	$47	
Total	**$367**	**$465**	**$675**	**$971**	**$1,430**	**$57**

Table 4.3 Estimated Flood-Related Building Losses - Stratford



Vulnerability Assessment

Temperature

- High vulnerability to increasing temperatures:
  - Daily maximum temperature is increasing by about 5°F per century;
  - Number of days with maximum temperature above 90°F is increasing by about 13 days per century; and
  - Number of days with maximum temperature above 70°F is increasing by about 16 days per century.