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# Natural Hazard Mitigation Plan Update

Town of Westbrook

July 29, 2019

# Today's Meeting

- Introduce Planning Team
- Present Project Overview
- Review Planning Process
- Present Community Profile Overview
- Present Assets Inventory Update
- Provide Natural Hazard Characterization Update
- Discuss Next Steps

Second Public Meeting: September 16, 2019

# Westbrook Local Planning Team (Working Group)

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## Local Planning Team

Town Planner, Land Use Department

Eric Knapp

First Selectman, Board of Selectmen

Noel Bishop

Char, Planning Commission

Marilyn Ozols

Chair, Economic Development Commission

James Crawford

Director, Emergency Management

Donald Izzo

Director, Health Department

Sonia Marino

Environmental Health Technician, Water Pollution  
Control Office

Shirley Mickens

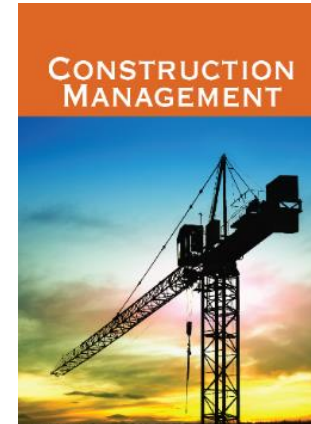
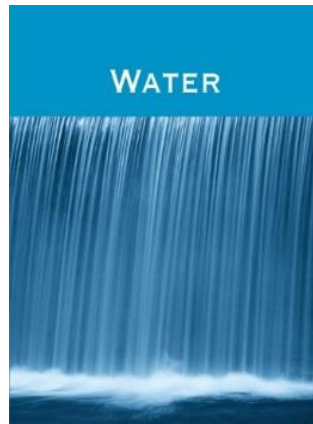
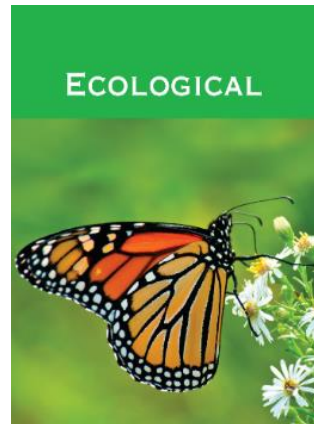
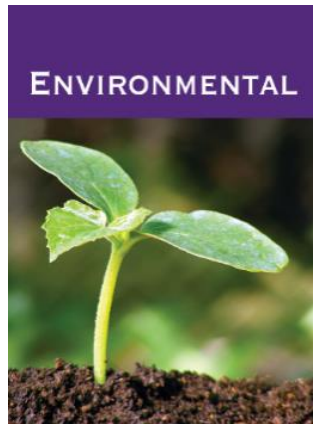
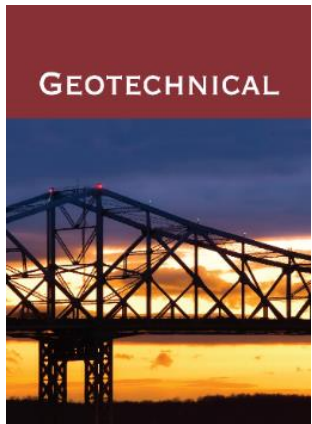
# Local Planning Team (Working Group) Meetings

<b>Planning Team Meetings</b>	<b>Date</b>
Project Initiation Meeting	10/25/18
Working Group Meeting	4/30/18
Working Group Meeting	7/23/2019

# Project Hazard Planning Consultant

## About GZA

*32 offices, 7000 Engineers, Scientists, Planners and Technical Specialists providing expert, risk-informed and pragmatic advice and solutions in the following **Core Service** areas....*



# Project Overview

# HAZARD MITIGATION PLANNING BACKGROUND

**PURPOSE:** Hazard Mitigation planning is a proactive effort to identify actions that can reduce the dangers to life and property from natural hazard events, such as hurricanes, tornadoes, winter storms and earthquakes.

**REQUIREMENTS:** The [Federal Disaster Mitigation Act of 2000](#) requires all municipalities that wish to be eligible to receive FEMA funding for hazard mitigation grants, to adopt a local multi-hazard mitigation plan and update this plan in five year intervals.

## Westbrook, Connecticut Natural Hazards Mitigation Plan Update, 2014



Prepared for  
Westbrook Planning Commission

Adopted by  
Town of Westbrook, Connecticut  
August 28, 2014



**WESTBROOK, CT**

Prepared by  
Lower Connecticut River Valley Council of Governments  
145 Dennison Road  
Essex, CT 06426  
[www.rivercog.org](http://www.rivercog.org)

# Natural Hazard Mitigation Plan Update



## Planning Goals:

- ✓ Document progress made per the 2014 Plan Update
- ✓ Update Town asset inventory
- ✓ Characterize the natural hazards and climate-change effects updates
- ✓ Assess current and future hazard vulnerability
- ✓ Provide public education and outreach throughout the planning process
- ✓ Revise and develop strategies and actions to mitigate the hazard risks
- ✓ Adopt the Plan Update

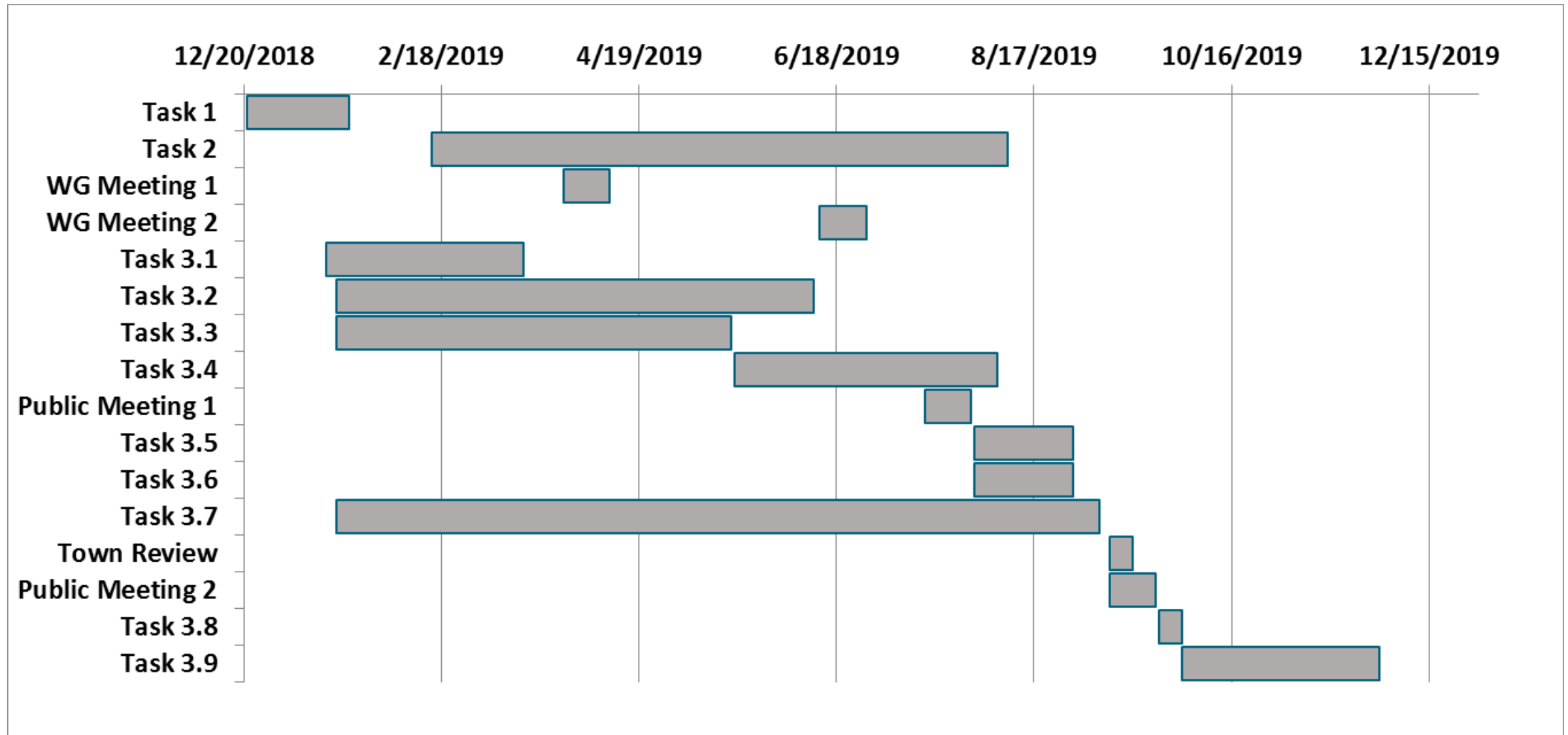


# Project Overview

## Planning Tasks:

1. Project Initiation
2. Conduct Working Group Meetings
3. Planning Process Documentation
4. Multi-Hazard Mitigation Plan Update Development
5. State and Federal Plan Review Revisions and Local Adoption

# Plan Schedule



# Planning Process

# Planning Process

- Assess Risk:
  - Community Demographics/Social Vulnerability
  - Asset Inventory
  - Natural Hazards Characterization
  - Risk Assessment
- Mitigation Strategy and Actions
- Plan Adoption and Maintenance



Figure credit FEMA/Jenny Burmester – Aug 21, 2017

# Plan Components

## Table of Contents

Quick Plan Reference Guide

p.3

Section 1: Introduction

P.7

Section 2: Planning Process

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Section 3: Community Profile Overview

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Section 4: Natural Hazard Risk Profile

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Section 5: Natural Hazard Mitigation Strategies

P.39

Section 6: Regional and Intercommunity Considerations

P.43

Section 7: Plan Adoption and Implementation

### Attachments:

1: Community Profile Details

2: Natural Hazard Details

3: Natural Hazard Risk Details

4: FEMA HAZUS-MH Simulation Results

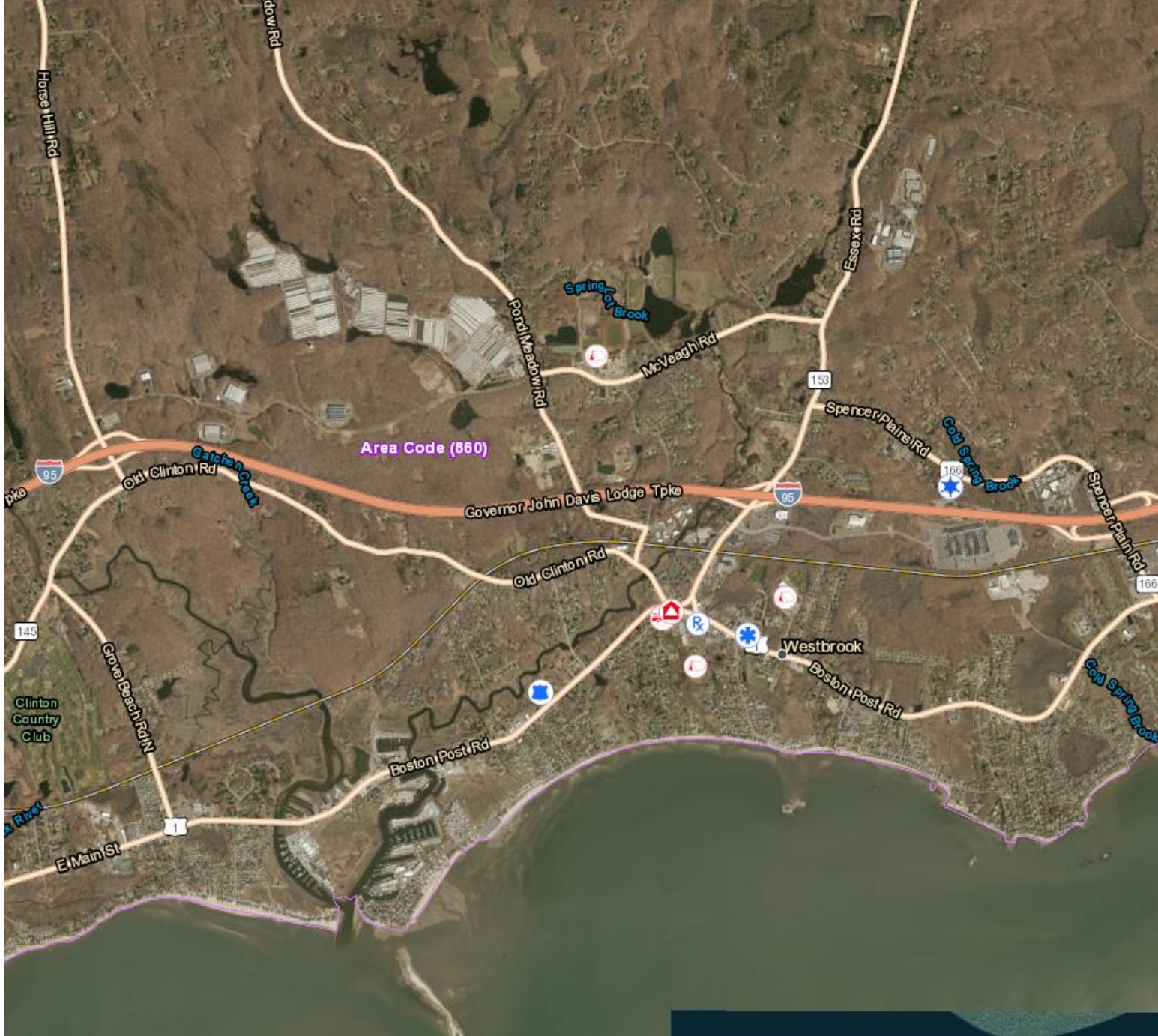
5: State and Federal Funding Sources

6: Public Meeting Documentation

7: References and Resources

8: Key Contacts

# Project Approach: GIS Data Management



**Legend** ⌵

**HIFLD Assets**

Essential Facilities - Emergency Response and Shelter

- Local Emergency Operations Center
- American Red Cross Chapter Facilities
- National Shelter System

Essential Facilities - Police

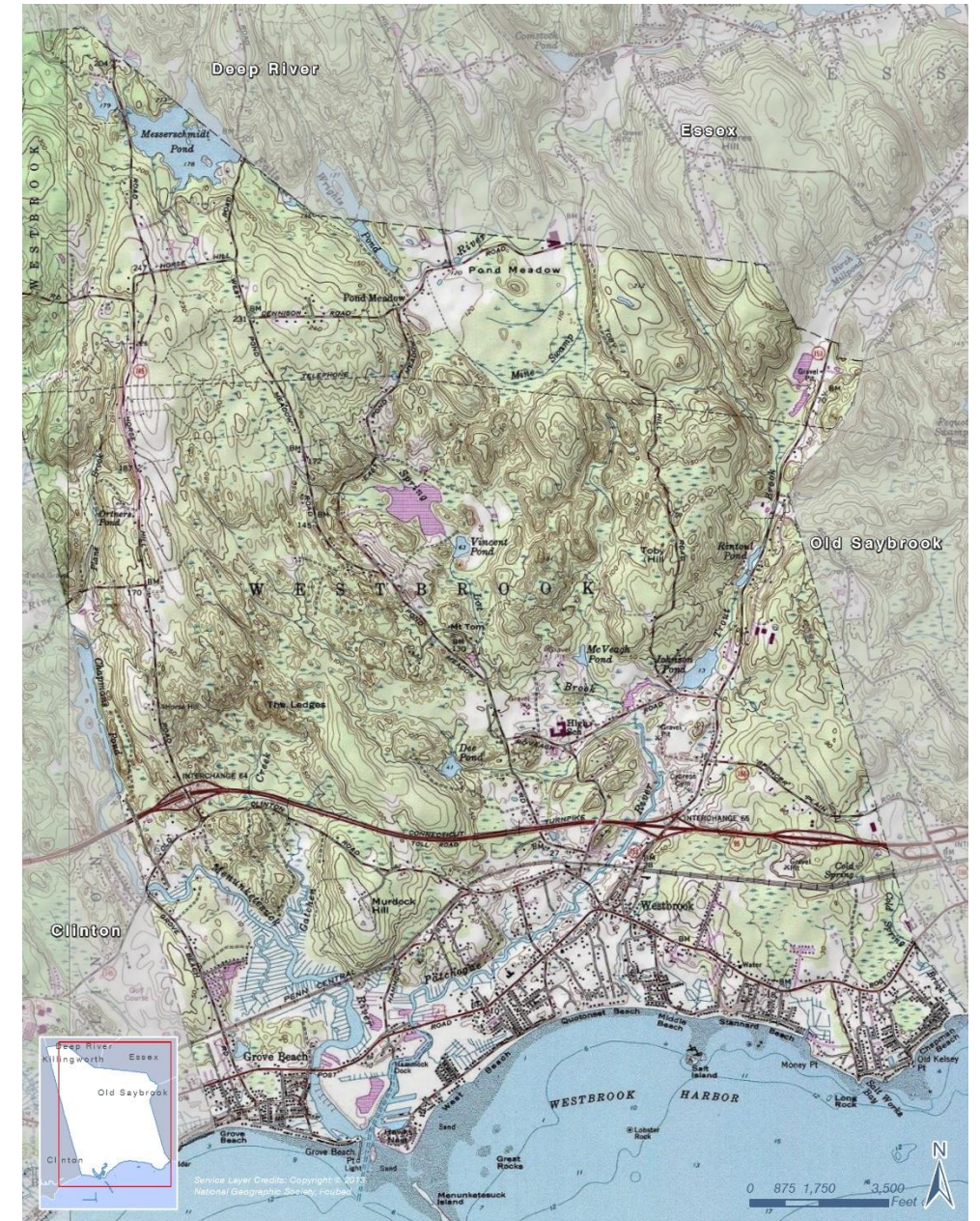
- Federal Bureau of Investigation (FBI) Offices
- Local Law Enforcement Locations
  - ALCOHOL, TOBACCO, AND FIREARMS CONTROL
  - BOOT CAMPS FOR DELINQUENT YOUTH
  - BOYS' AND GIRLS' RESIDENTIAL FACILITIES (E.G., HOMES, RANCHES, VILLAGES)
  - CORRECTIONAL FACILITY OPERATION ON A CONTRACT OR FEE BASIS
  - CORRECTIONAL INSTITUTIONS
  - CRIMINAL INVESTIGATION OFFICES, GOVERNMENT
  - DRUG ENFORCEMENT AGENCIES AND OFFICES
  - FEDERAL POLICE SERVICES
  - FIRE MARSHALS' OFFICES
  - HIGHWAY PATROLS, POLICE
  - HONOR CAMPS, CORRECTIONAL
  - HOUSING POLICE, GOVERNMENT
  - JAILS (EXCEPT PRIVATE OPERATION OF)
  - MARSHALS' OFFICES
  - PARK POLICE
  - POLICE ACADEMIES
  - POLICE AND FIRE DEPARTMENTS, COMBINED
  - POLICE DEPARTMENTS (EXCEPT AMERICAN INDIAN OR ALASKA NATIVE)

# Town Setting

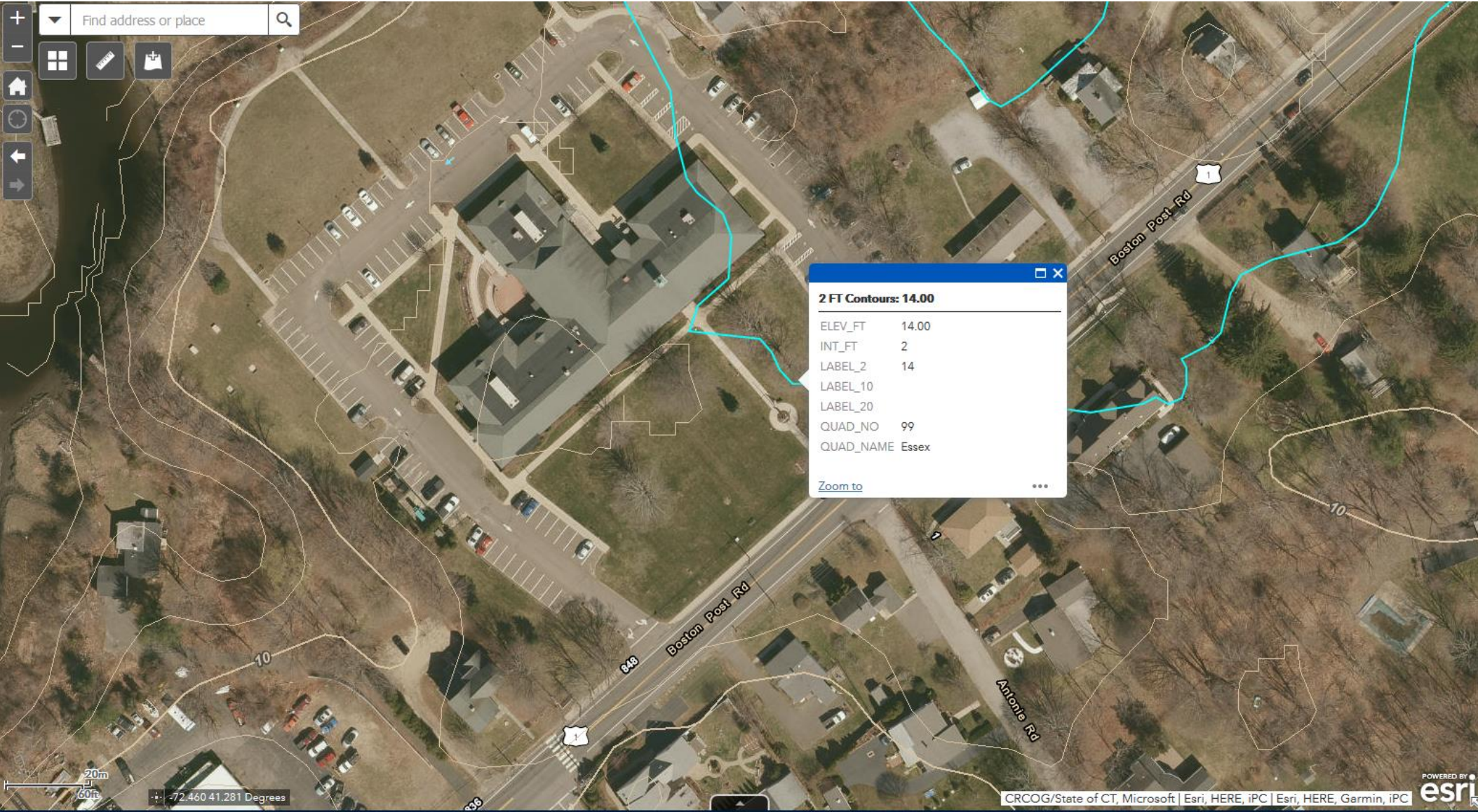


# Westbrook – Town Setting

1. Uplands bordered by low-lying areas
2. 4 to 5 miles of coastline
3. Beaches – southern shoreline
4. Tidal Wetlands and Marshes
5. Brooks and Creeks
6. 21.4 sm: 15.7 sm land, 5.7 sm water

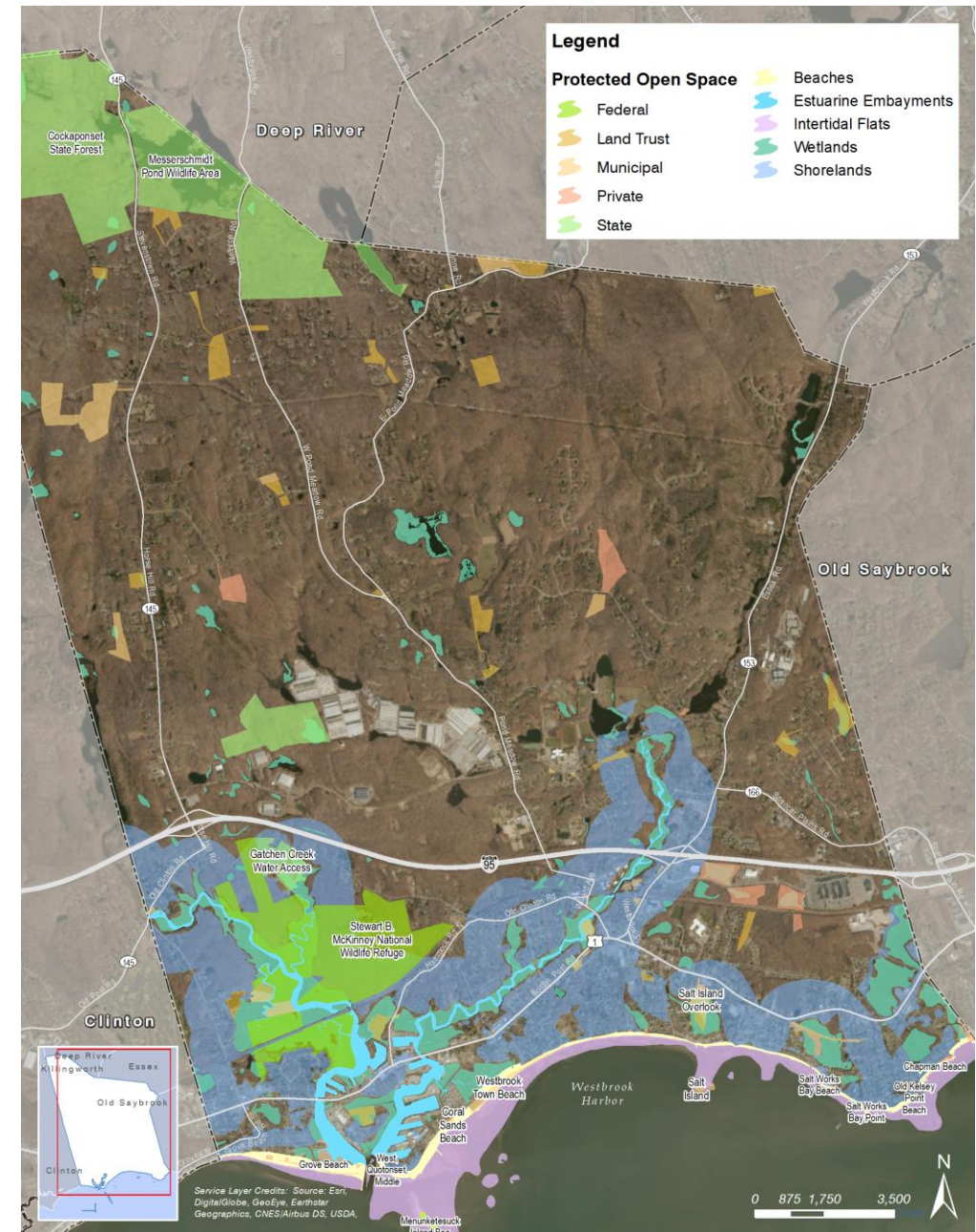


# Topography and Available Lidar Data



# Town Setting

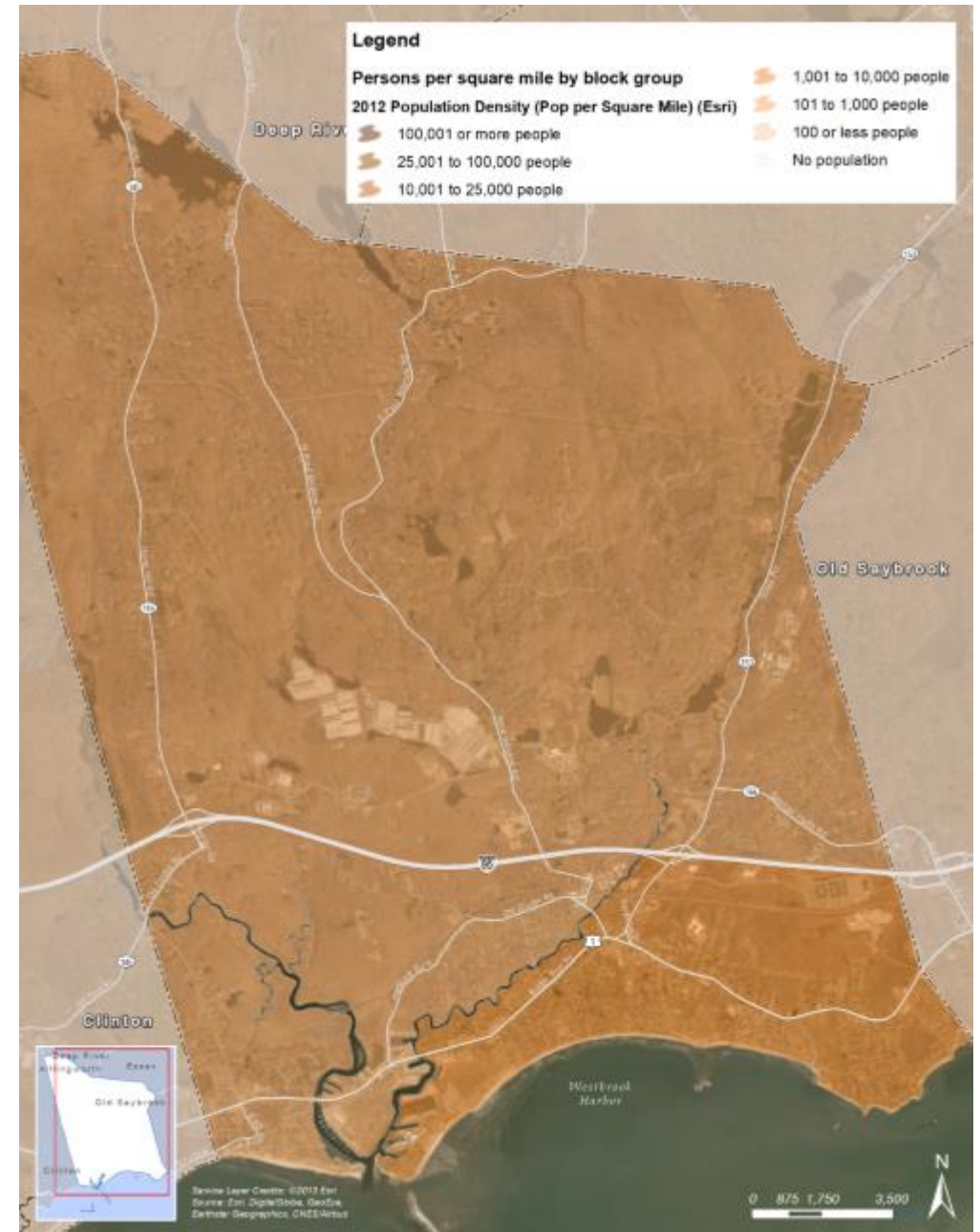
- topography/bathymetry
- shoreline features
- land cover
- geology
- natural resources
- ecology
- socioeconomic data



# Community Profile

# People

- Population: +/- 6,956 people
- Land Area: about 15.7 square miles
- Population Density: about 439.6 people per square mile
- Median Age: about 46.6 years (compared to median age of 39 for the State)
- Households: 2,873
- Median household income: \$95,583 (compared to State average of \$73,433)



# Buildings and Property

## Buildings:

- Residential: 3861
- Commercial/Industrial: 213
- Vacant: 847 parcels

Median Housing Cost: \$378,900

Public Schools: 3 (775 total enrollment)

Historic Properties: 27

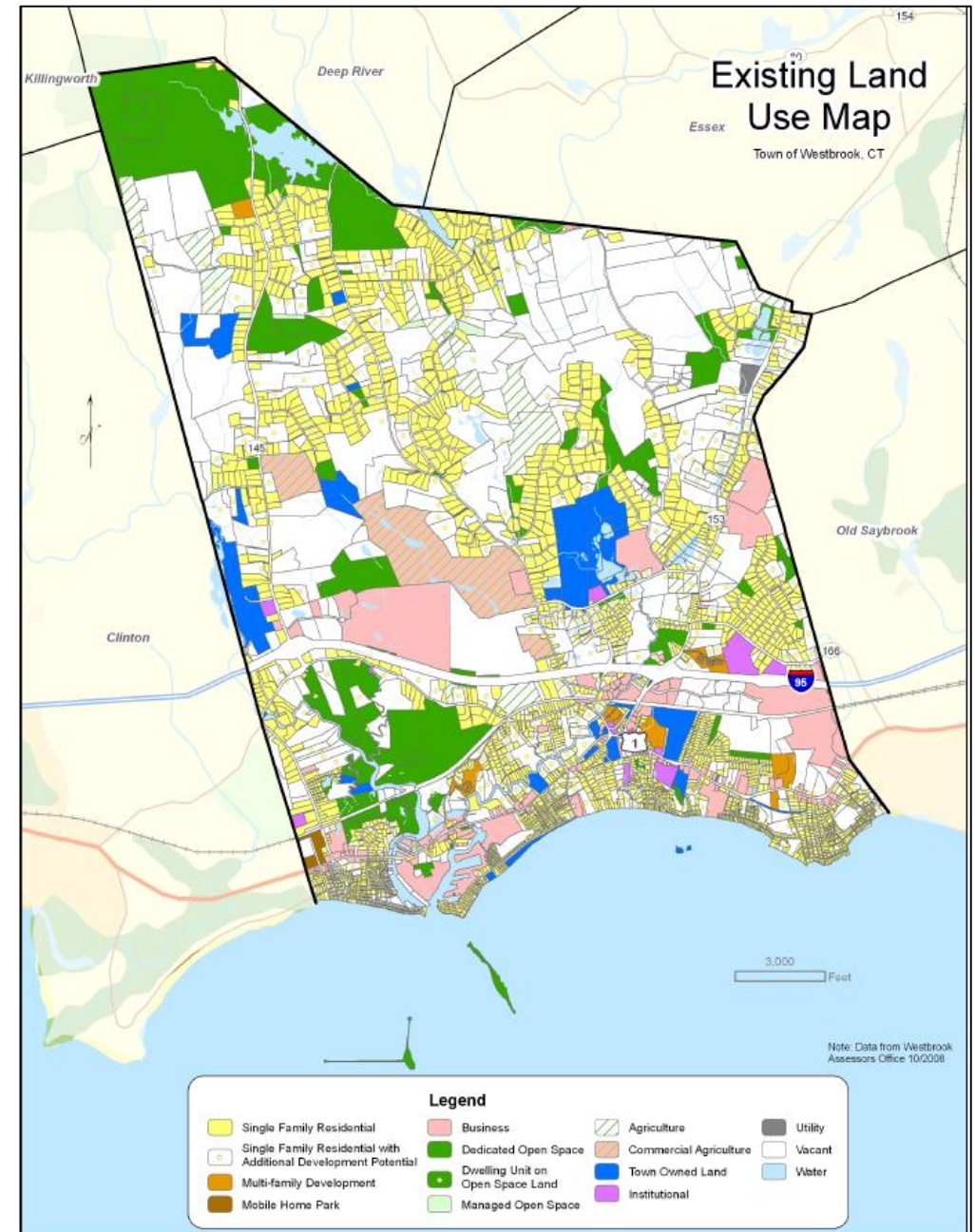
- Federal: 1
- State: 26



# Land Use

# Land Use

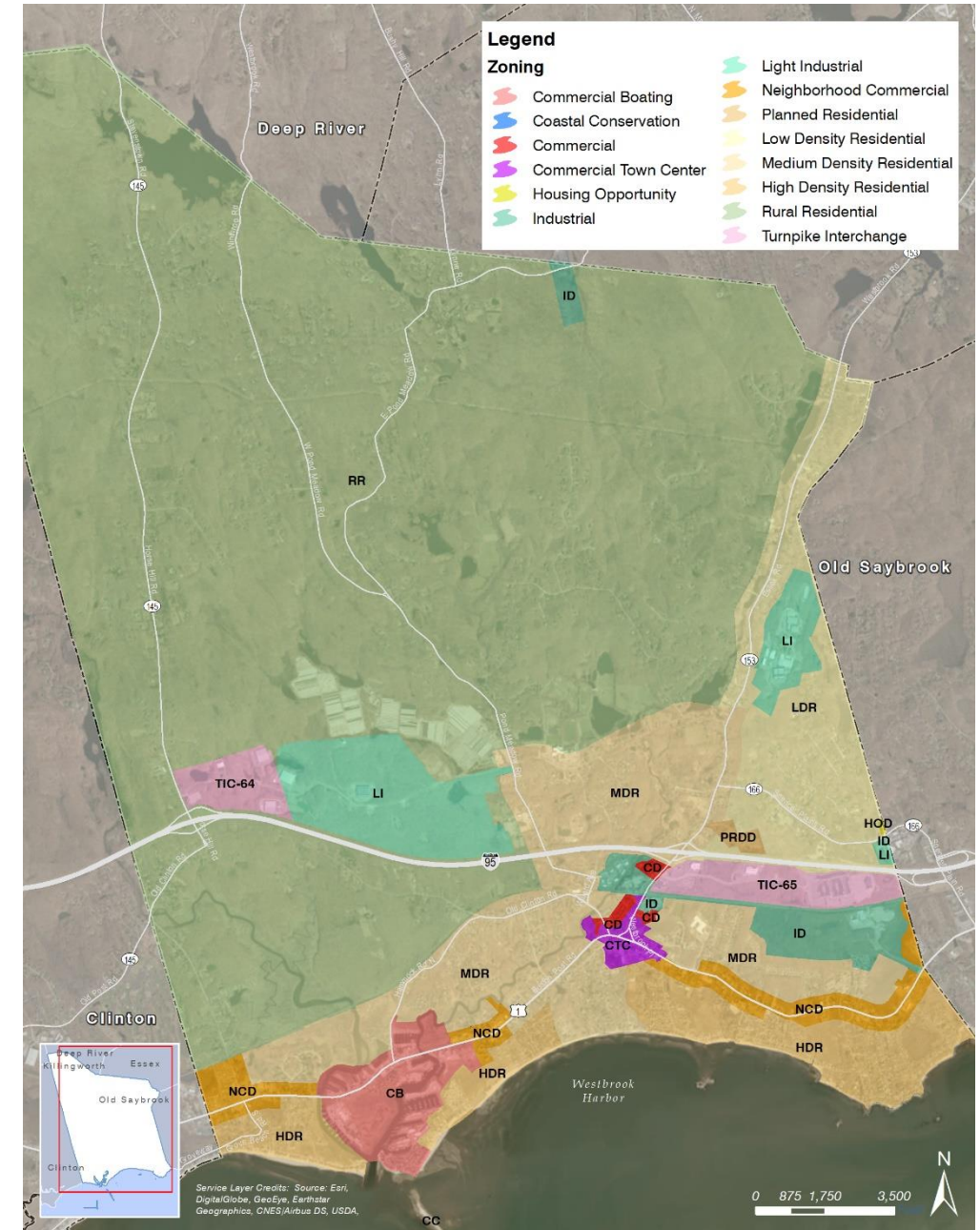
- Single-Family Residential
- Single-Family Residential w/  
Additional Development Potential
- Multi-family Development
- Mobile Home Park
- Business
- Dedicated Open Space
- Managed Open Space
- Agriculture
- Commercial/Agriculture
- Town Owned Land
- Institutional





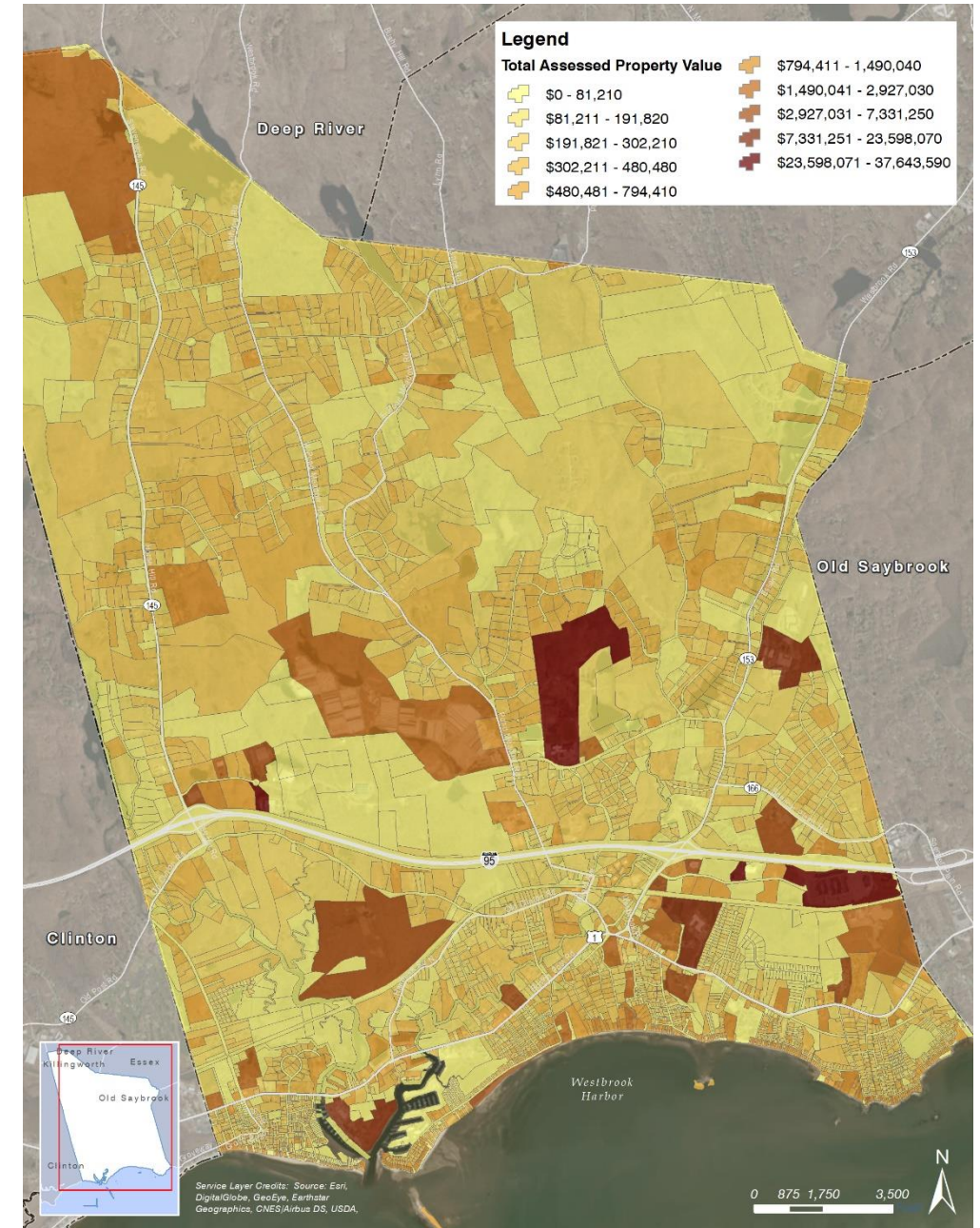
# Zoning Districts

- Commercial Boating (CB)
- Commercial Conservation (CC)
- Commercial (CD)
- Commercial Town Center (CTC)
- Housing Opportunity (HOD)
- Industrial (ID)
- Light Industrial (LI)
- Neighborhood Commercial (NCD)
- Planned Residential (PRDD)
- Low Density Residential (LDR)
- Medium Density Residential (MDR)
- High Density Residential (HDR)
- Rural Residential (RR)
- Turnpike Interchange (TIC)



# Property Assessed Value (2018)

- Real Estate Regular Net – \$1.03 Billion
- Elderly Home Owners Net- \$17.85 Million
- Motor Vehicle Net- \$60.96 Million
- Personal Property Net - \$42.09 Million
- Total Net Assessment - \$1.15 Billion



# Shoreline Features and Natural Resources

# Coastal Structures

- Breakwater
- Bulkheads
- Seawalls
- Jetties
- Groins
- Docks and Piers
- Reinforced bluffs/revetments



# Coastal Wetlands & Critical Habitat

**Legend**

**Protected Open Space**

- Federal
- Land Trust
- Municipal
- Private
- State

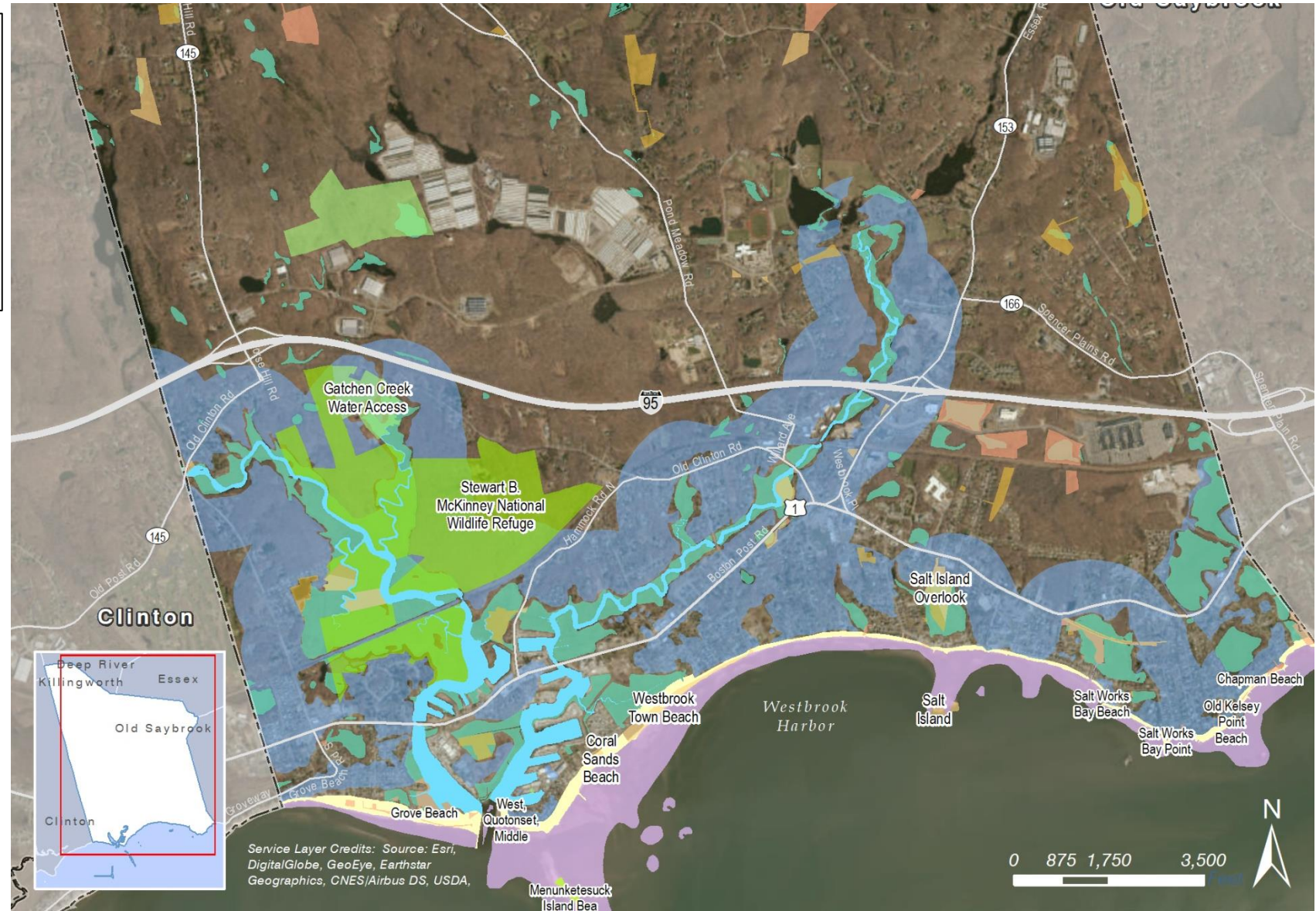
Beaches

Estuarine Embayments

Intertidal Flats

Wetlands

Shorelands



# Assets Inventory

# 2014 Plan Asset Categories

## Critical Facilities:

- 10 Facilities

## Economic and Cultural Resources:

- Real estate (90.5% of total assessment)
- Top 4 Uses include:
  - Residential (36%)
  - Commercial/industrial (12%)
  - Preserved Open Space (19%)
  - vacant land (33%)
- Personal property (3.3% of total)
- Motor vehicles (4.7% of total)

## Environment and Ecological Resources:

- Beaches
- Tidal and inland wetlands
- Long Island shoreline

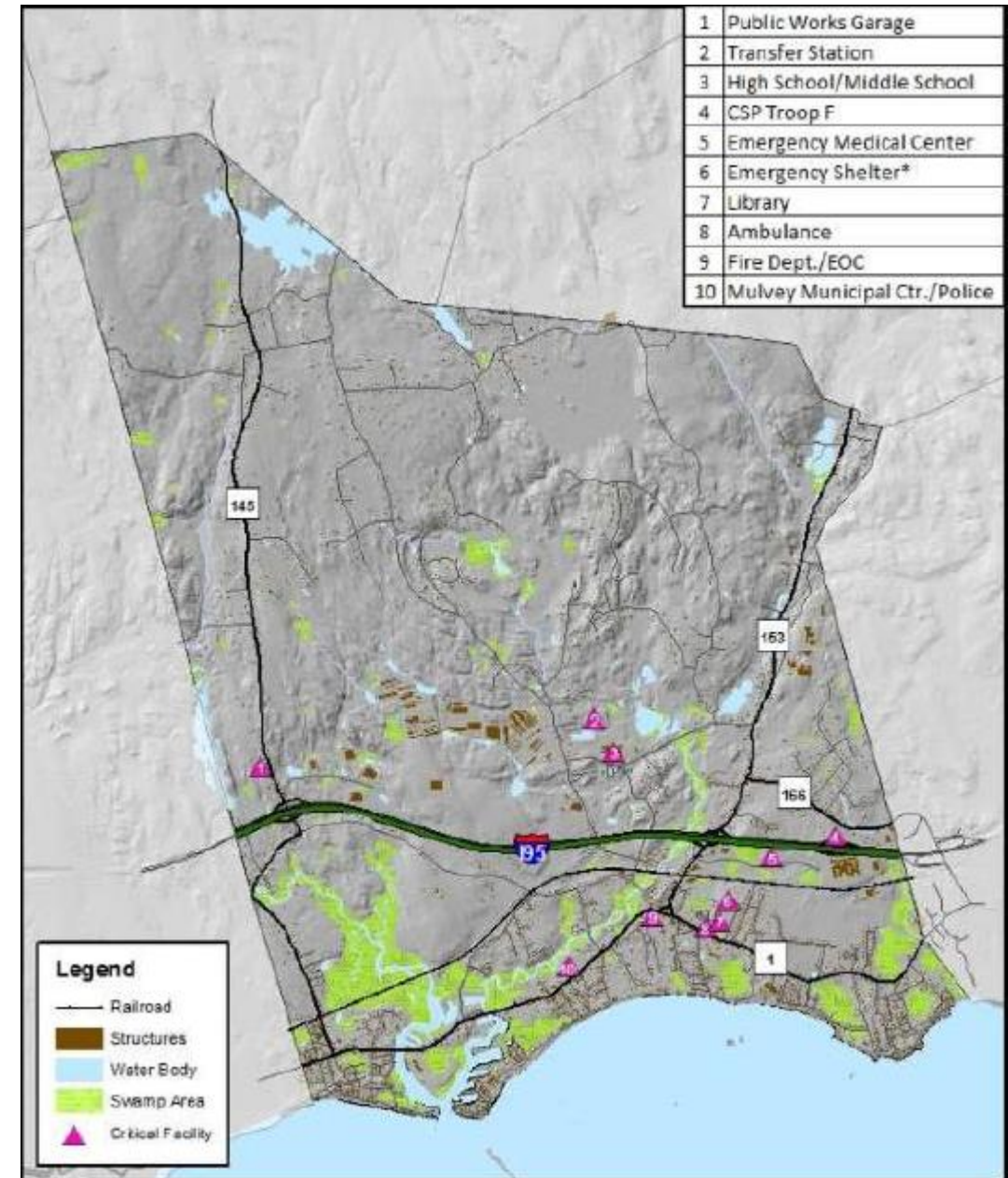


Marina District in Westbrook (image ref. Pilots Point Marina)

# 2014 Plan Asset Categories

## Critical Facilities (10 Total)

- Public Works Garage
- Transfer Station
- High School & Middle School
- CT State Troop F
- Emergency Medical Facilities
- Emergency Shelter
- Library
- Ambulance
- Fire Department EOC
- Mulvey Municipal Center/ Police Department





# 2019 Plan Update Asset Categories

1. Essential Facilities
2. Lifeline Utility Systems
3. Hazardous Material Facilities
4. High Potential Loss Facilities
5. Transportation Systems
6. Support, High Occupancy and Vulnerable Populations
7. Natural Resources
8. Shoreline Structures

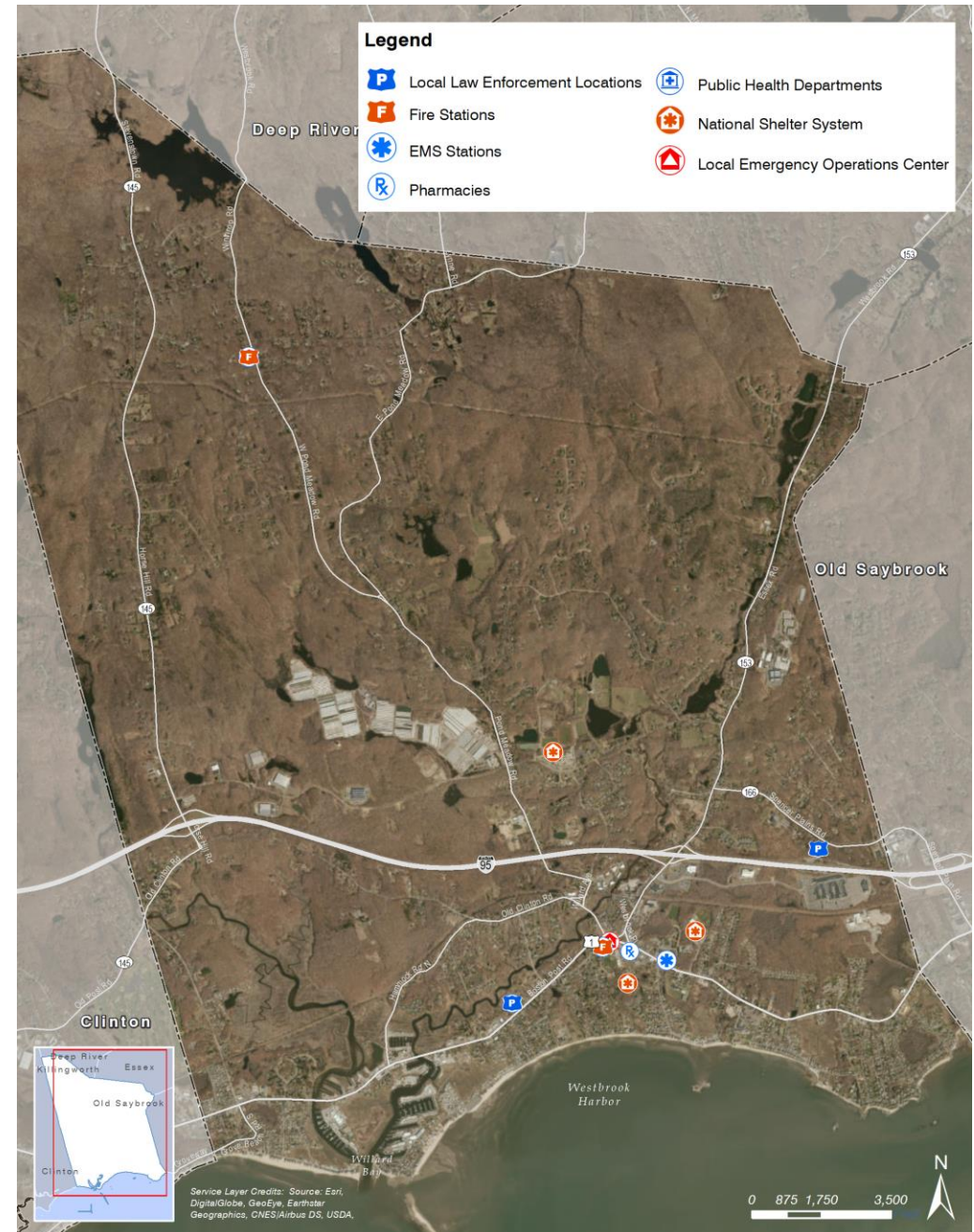
# Essential Facilities

1. Hospitals/Healthcare
2. Emergency Shelters
3. Fire and Rescue
4. Emergency Response Centers
5. Police
6. Emergency Vehicle Garages
7. Aviation



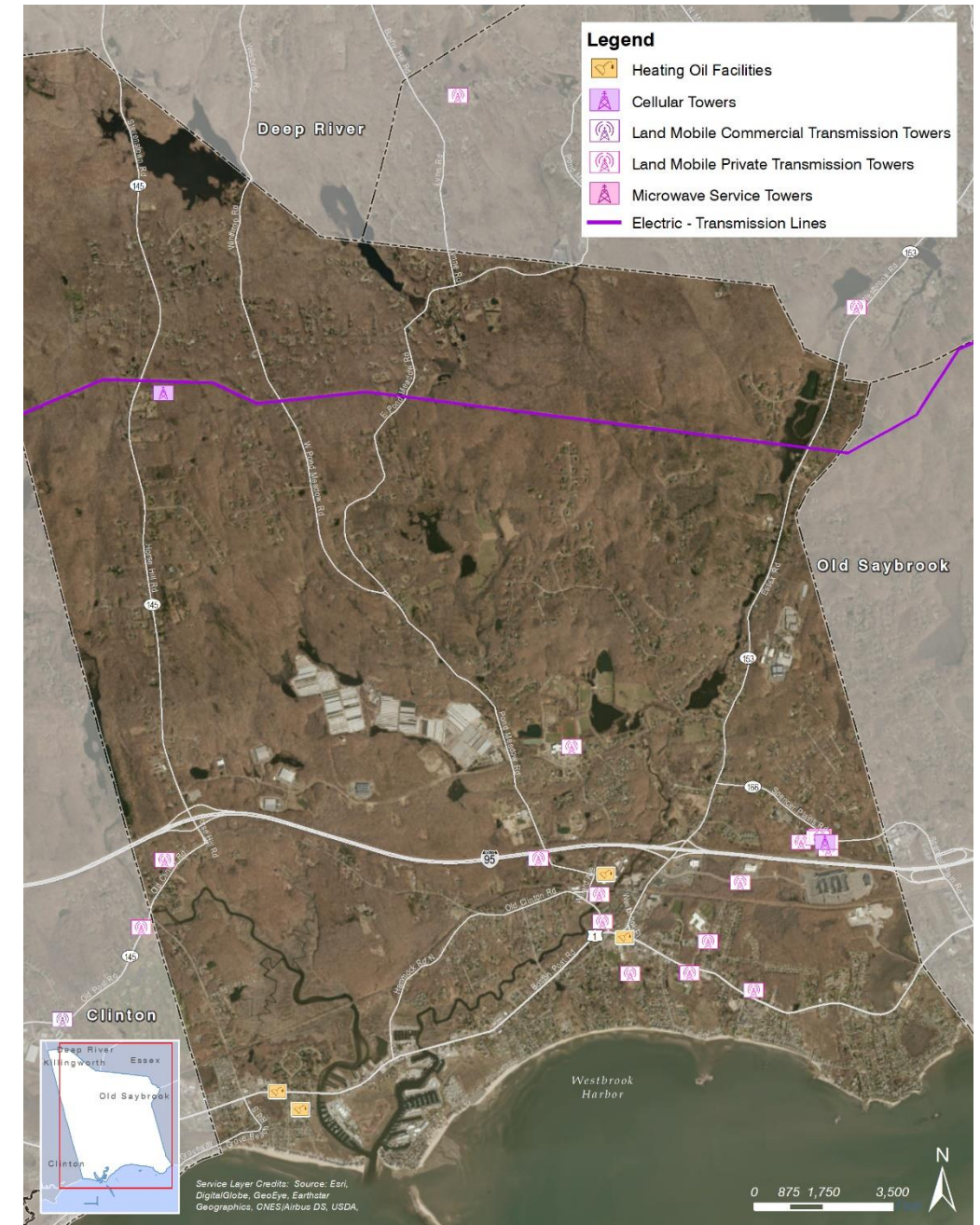
# Essential Facilities

- Medical Centers/Healthcare Facilities: 2
- Police Station: 2 (1 local and 1 state)
- Fire/Rescue: 3
- Emergency Shelter: 2 (1 primary and 1 back-up)



# Lifeline Systems

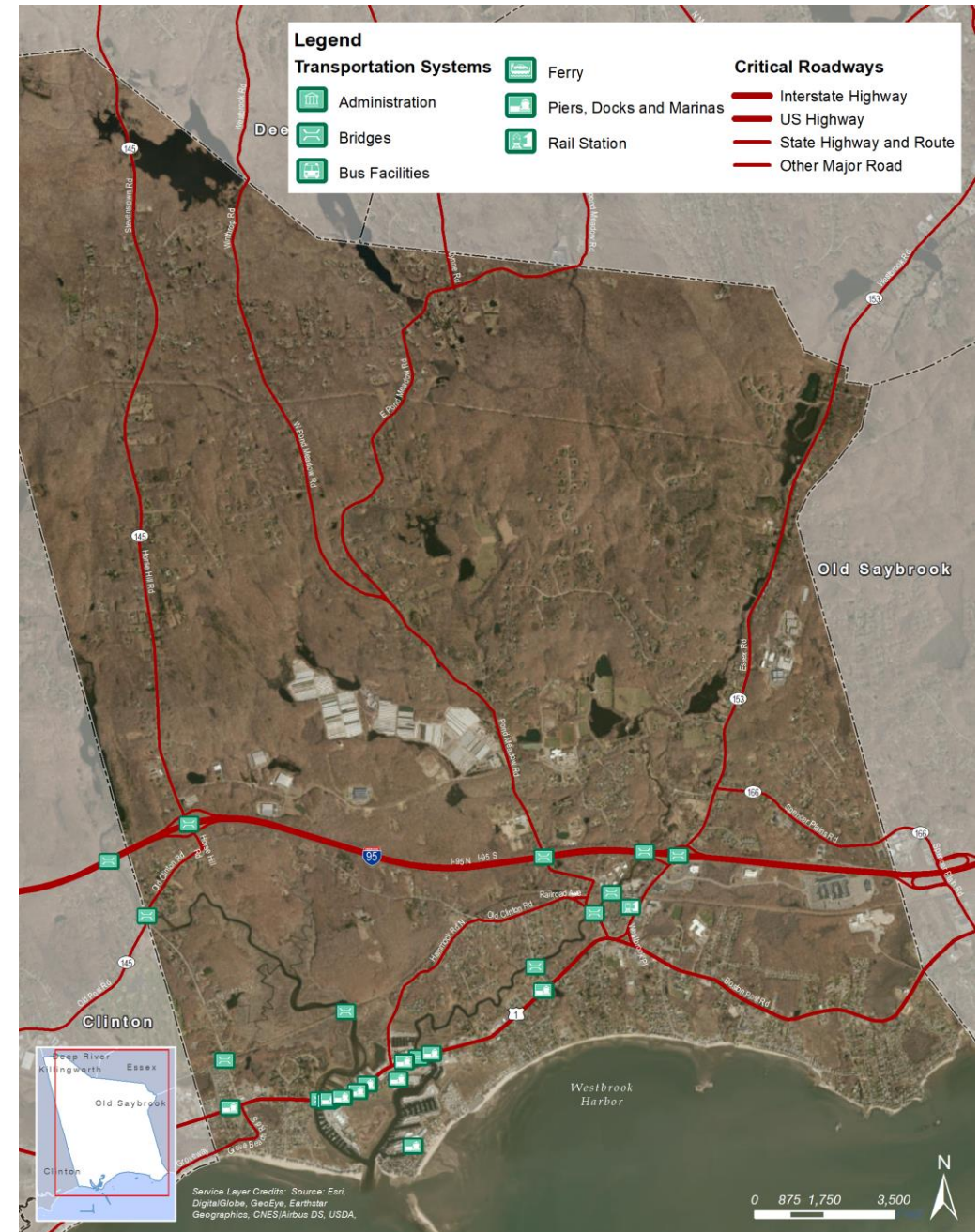
- Electric Power Generation
- Electric Power Transmission
- Natural Gas
- Heating Oil
- Water Supply
  - Public
  - Private Wells
- Wastewater Distribution
  - On-site wastewater disposal
- Telecommunications



# Transportation Systems

## ROADWAYS

- 1 Key Federal Roadway
  - Interstate -95
- 5 Key State Highways
  - Route 1 (Boston Post Road)
  - Route 145 (Old Post Road, Old Clinton Road, Horse Hill Road, Stevenstown Road)
  - Route 153 (Essex Road)
  - Route 166 (Spencer Plain Road)
  - Route 625 (Grove Beach North)
- 32 Key Local Roads that are subject to nuisance flooding and more significant coastal flooding based on the 2014 NHMP



# Transportation – Key Local Roadways

## Sample of Key Local Roadways:

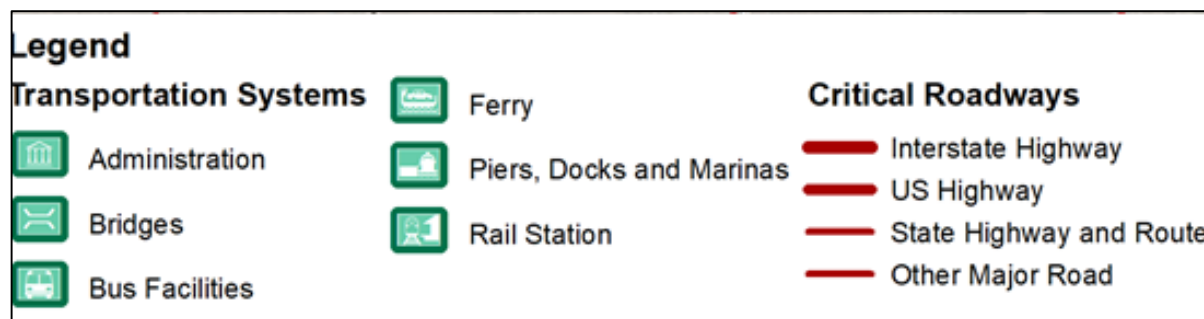
- Winthrop Road Bridge,
- East Pond Meadow Road,
- Doc's Hill Road
- Salt Island Road,
- Pepperidge Ave.,
- Stokes Ave., Gerard Ave.
- Chapman Beach Rd.,
- Waldron Dr.
- Dolphin Ave.
- Striper, Tarpon Ave.
- Toby Hill Road
- McVeagh Road
- Meetinghouse Lane
- Willard Avenue
- Pond Meadow Road
- E. Pond Meadow Road
- Boone Circle
- Old Clinton Road
- Boston Post Road
- Hammock Road N.
- Grove Beach Road S.
- Elm Ave.
- Menunketesuck Road

# Transportation Systems



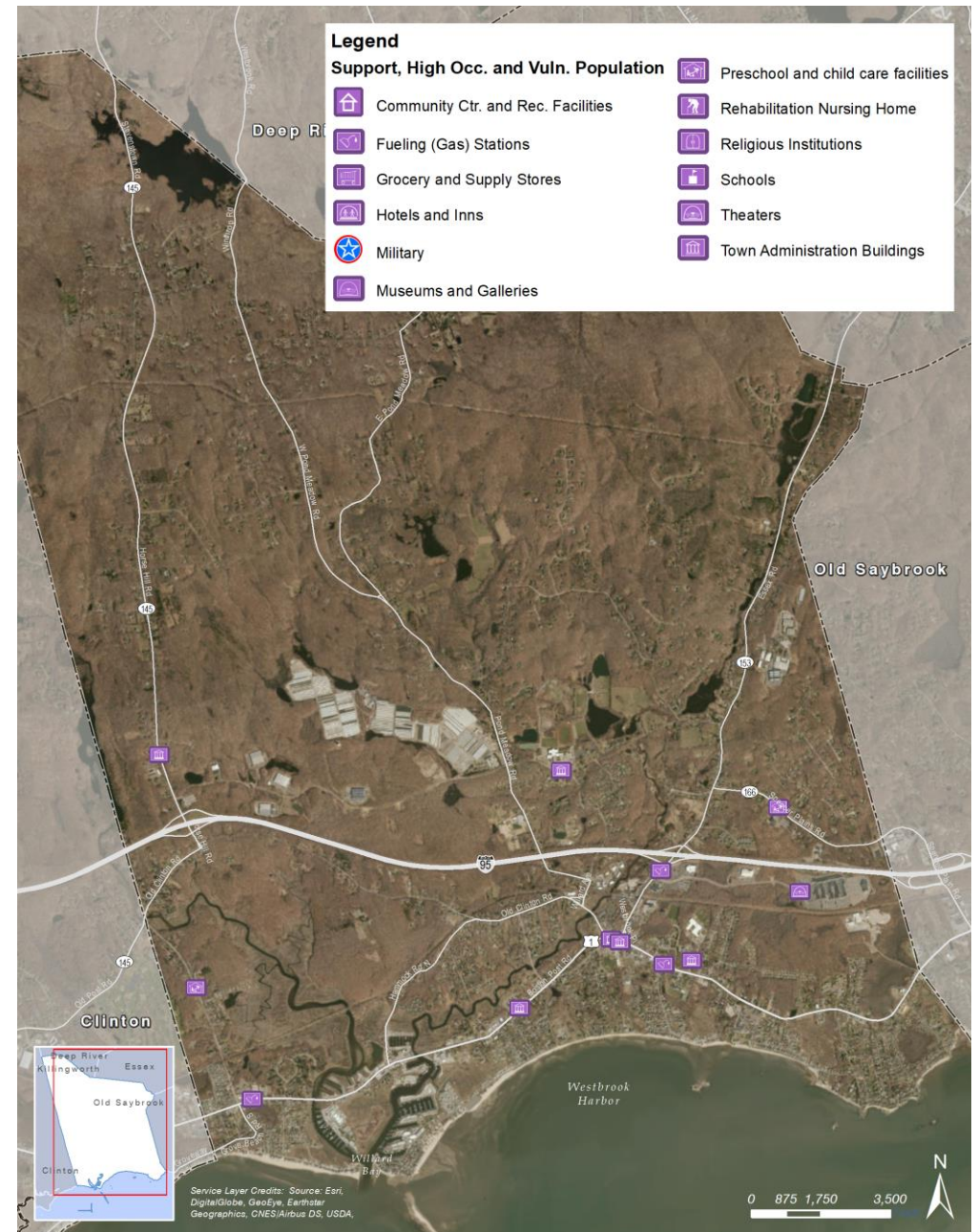
## BRIDGES

- I-95 Menunketesuck River Bridge
- I-95 Patchogue River Culvert
- Route 145 (Horse Hill Road) over I-95
- Route 153 (Essex Road) over I-95
- Chapman Mill Pond Road over I-95
- Route 1 Menunketesuck River Bridge
- Route 1 Patchogue River Bridge
- Amtrak Menunketesuck River Bridge
- Amtrak Patchogue River Bridge
- Route 145 (Old Clinton Road) Patchogue River Bridge
- Route 145 (Old Clinton Road) Menunketesuck River Bridge
- Wesley Avenue over Patchogue River Bridge
- Grove Beach Road N. over Amtrak



# Support, High Occupancy and Vulnerable Population

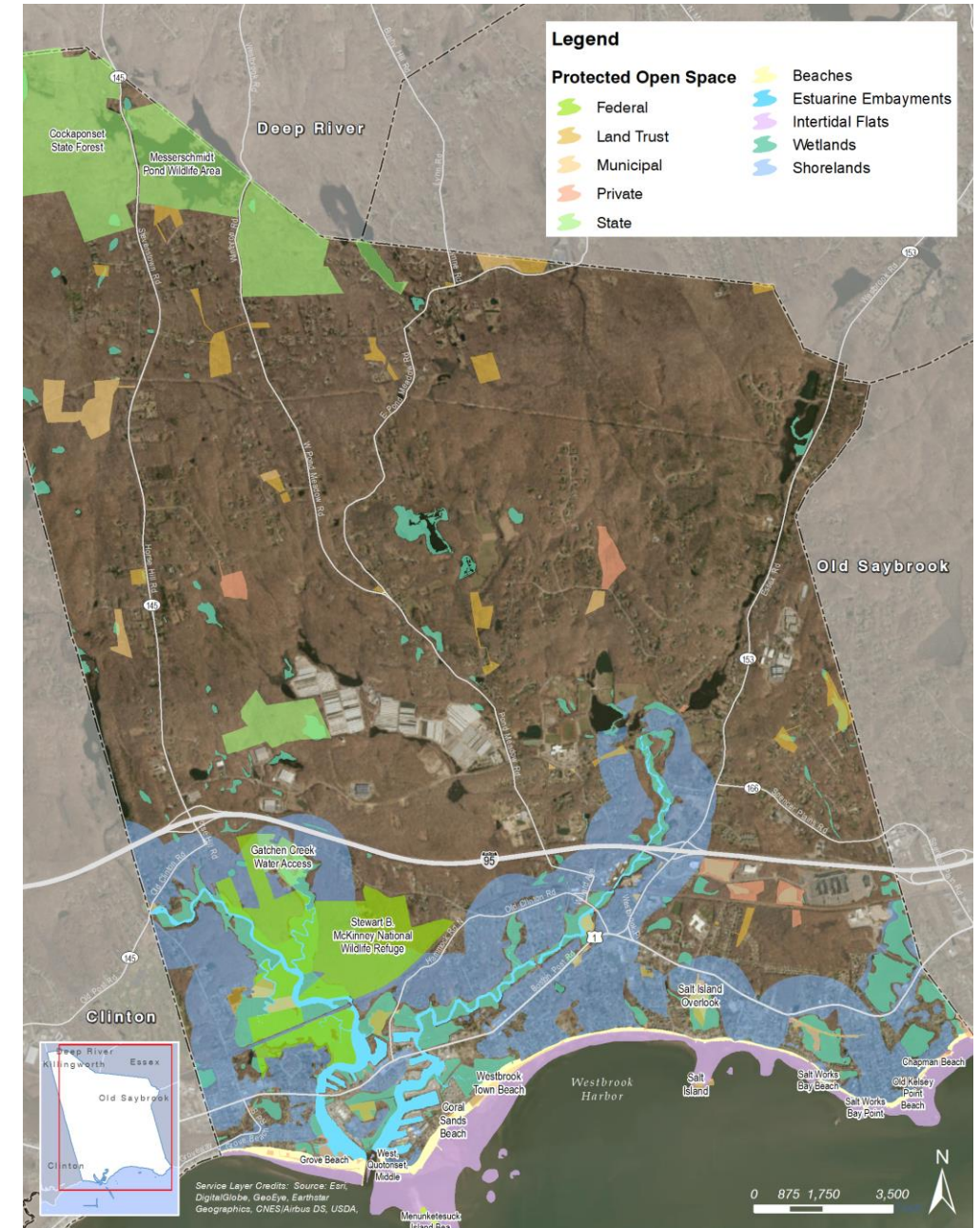
- Community Centers
- Fueling Stations
- Hotels and Inns
- Pre-school and Childcare Facilities
- Religious Institutions
- Schools
- Theaters
- Town Administration Buildings





# Natural/Ecological Resources

- Beaches
- Marshes and Intertidal Flats
- Estuary Embayments
- Wetlands
- Shorelands



# High Loss Potential Facilities: Dams

## High Loss Potential Facilities:

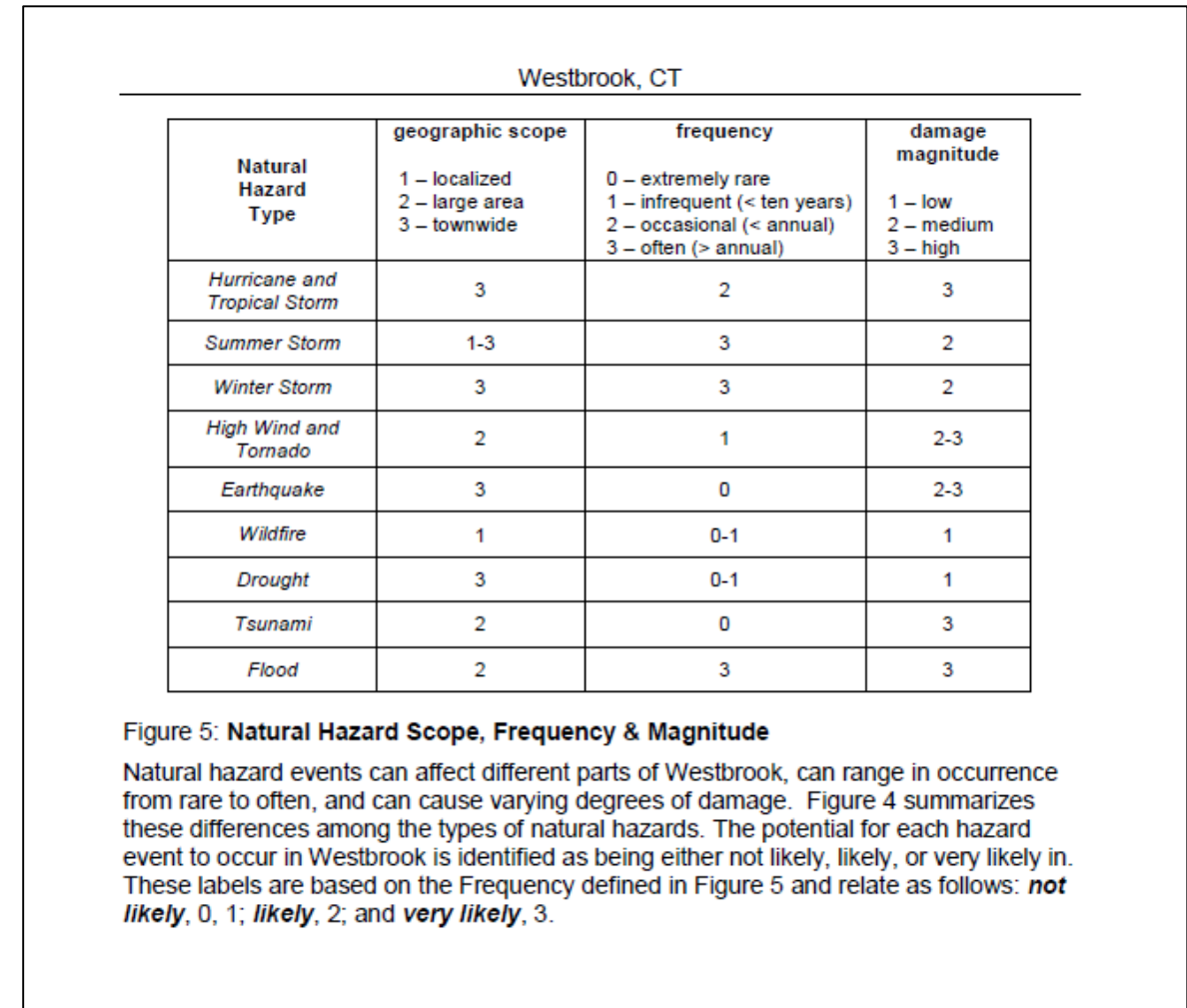
- Dams: 3
  - Chapman Pond Dam
  - Wrights Pond Dam
  - Messerschmidt Pond Dam



# Natural Hazards

# 2014 Plan Natural Hazard Categories

- ✓ Flooding
- ✓ High Wind & Tornado
- ✓ Drought
- ✓ Winter Storms
- ✓ Earthquake
- ✓ Hurricane & Tropical Storm
- ✓ Summer Storm
- ✓ Wildfire
- ✓ Tsunami



# 2019 Plan Update Natural Hazard Categories

- 19 natural hazards identified as applicable to Town
- Four hazard categories:
  - ✓ Severe Weather Hazards
  - ✓ Climate-Related Hazards
  - ✓ Geologic Hazards
  - ✓ Secondary Hazards

<b>Severe Weather Hazards:</b>	
Severe Wind:	
	Hurricanes/Tropical Storms
	Thunderstorms
	Tornadoes
Lightning	
Hail	
Flood:	
	Storm Surge
	Sea Level Rise
	Urban Drainage Flooding
	Riverine Flooding
	Intense Rainfall
Severe Winter Weather	
	Snowfall
	Ice Storms
<b>Climate-Related Hazards:</b>	
Extreme Temperature:	
	Heat
	Cold
Drought	
Wildfire	
<b>Geologic Hazards:</b>	
Earthquake	
Landslides	
Tsunami	
<b>Secondary Hazard:</b>	
Dam Failure	

# Characterize Flood Hazards

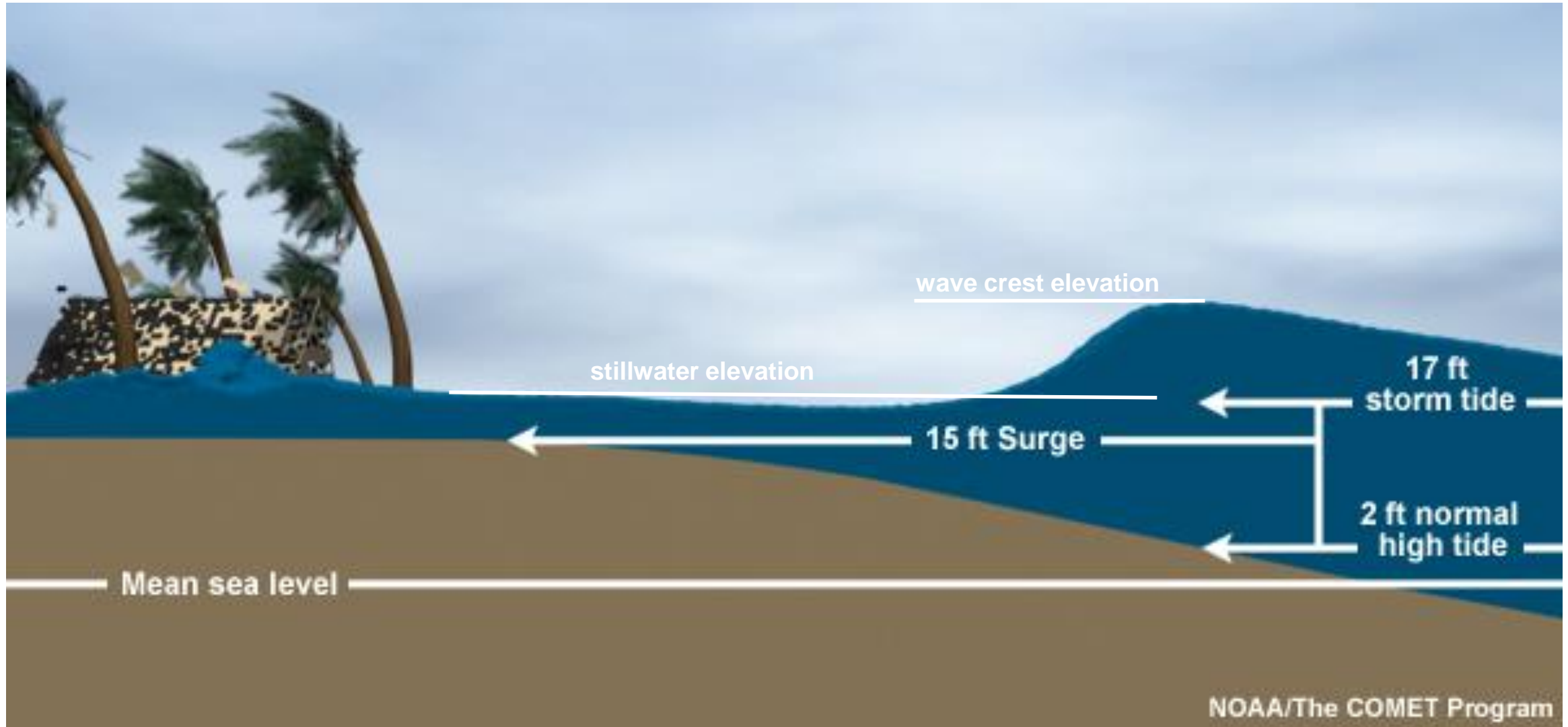
- ✓ Coastal flooding:
  - tides
  - storm surge
  - waves
- ✓ Coastal erosion/sediment transport
- ✓ Precipitation (river flood, storm water, building damage)
- ✓ Riverine Flooding
- ✓ High wind
- ✓ Effects of sea level rise

Accurate, scientifically sound and probabilistic characterization of coastal hazards is important



Flooding in Westbrook on Beach Way (image ref. <https://fox61.com/2018/03/02/noreaster-pays-a-visit-to-westbrook/>)

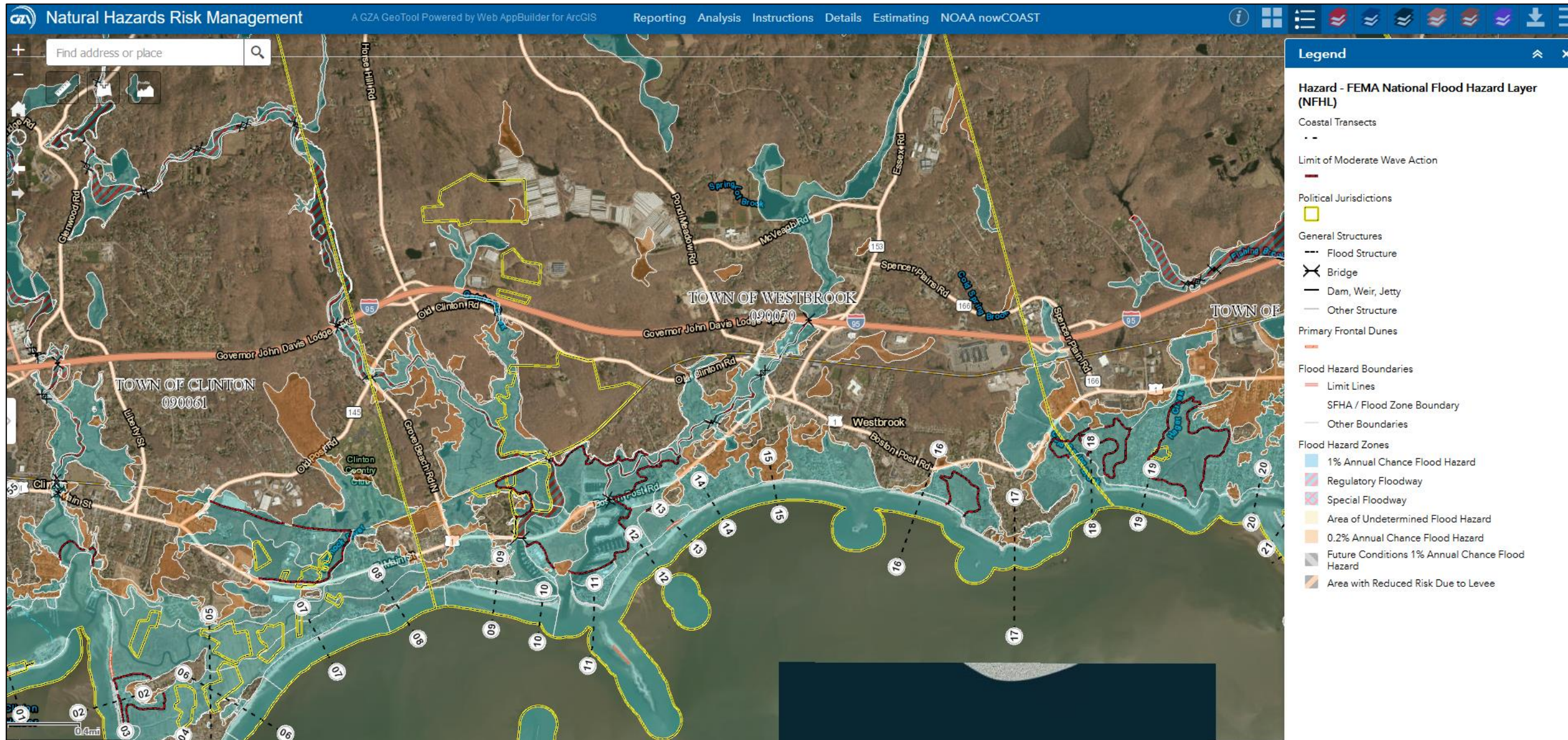
# Coastal Flooding



GEOGRAPHICAL FACTORS

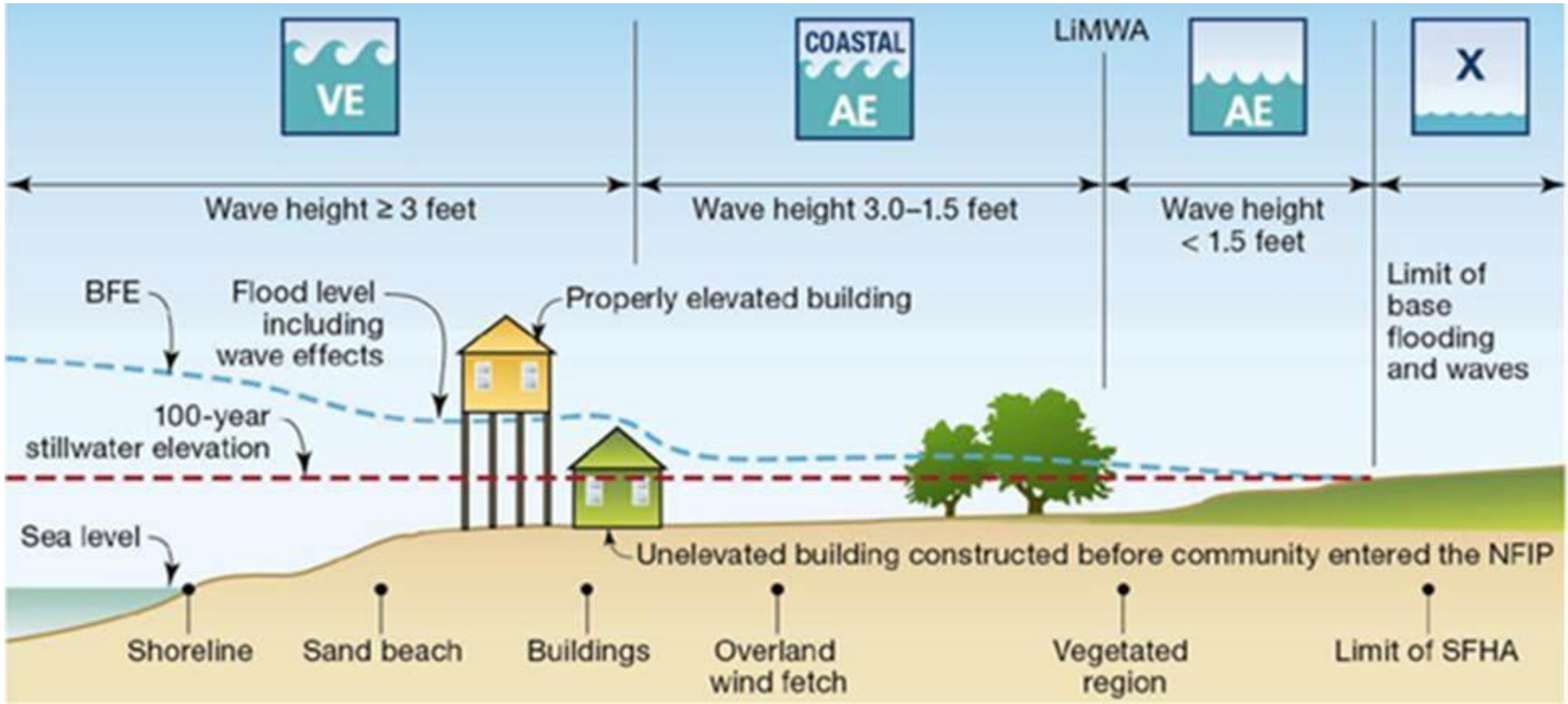
STORM FACTORS

# FEMA Flood Insurance Rate Map: Base Flood





# FEMA Flood Hazard Zones



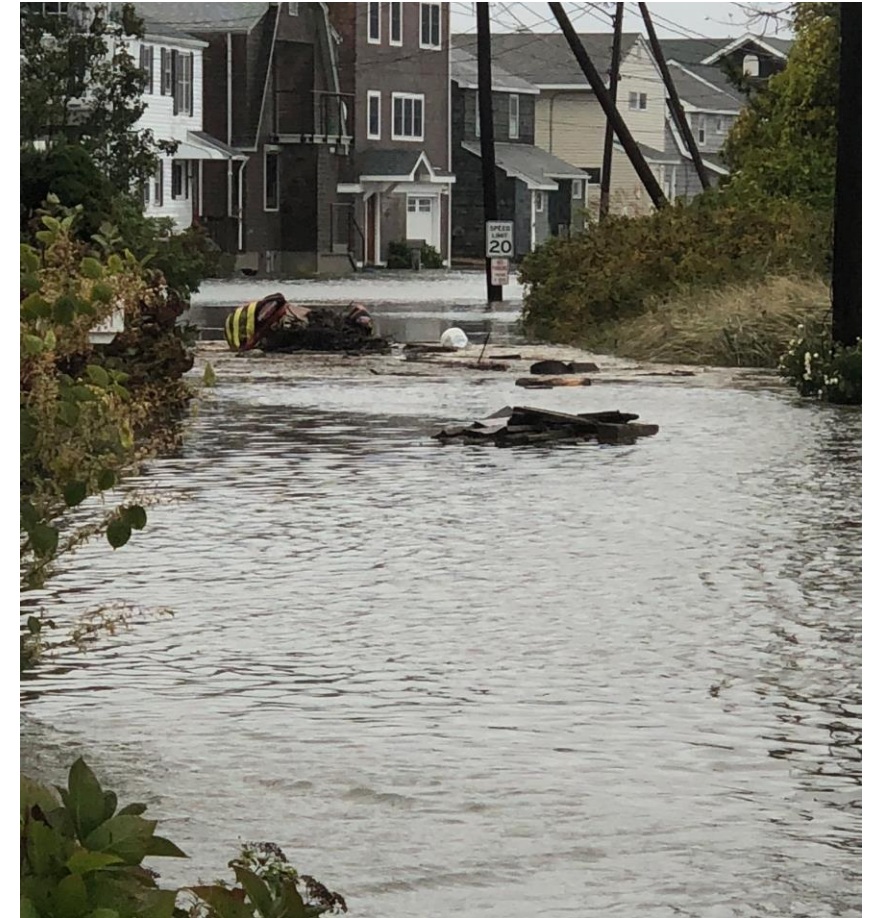
# Examples of Coastal Flooding Vulnerability

## ✓ Property Damage



Waves during Tropical Storm Irene in Westbrook

image from <https://www.courant.com/courant-250/moments-in-history/hc-250-hurricanes-weather-story-htmlstory.html>

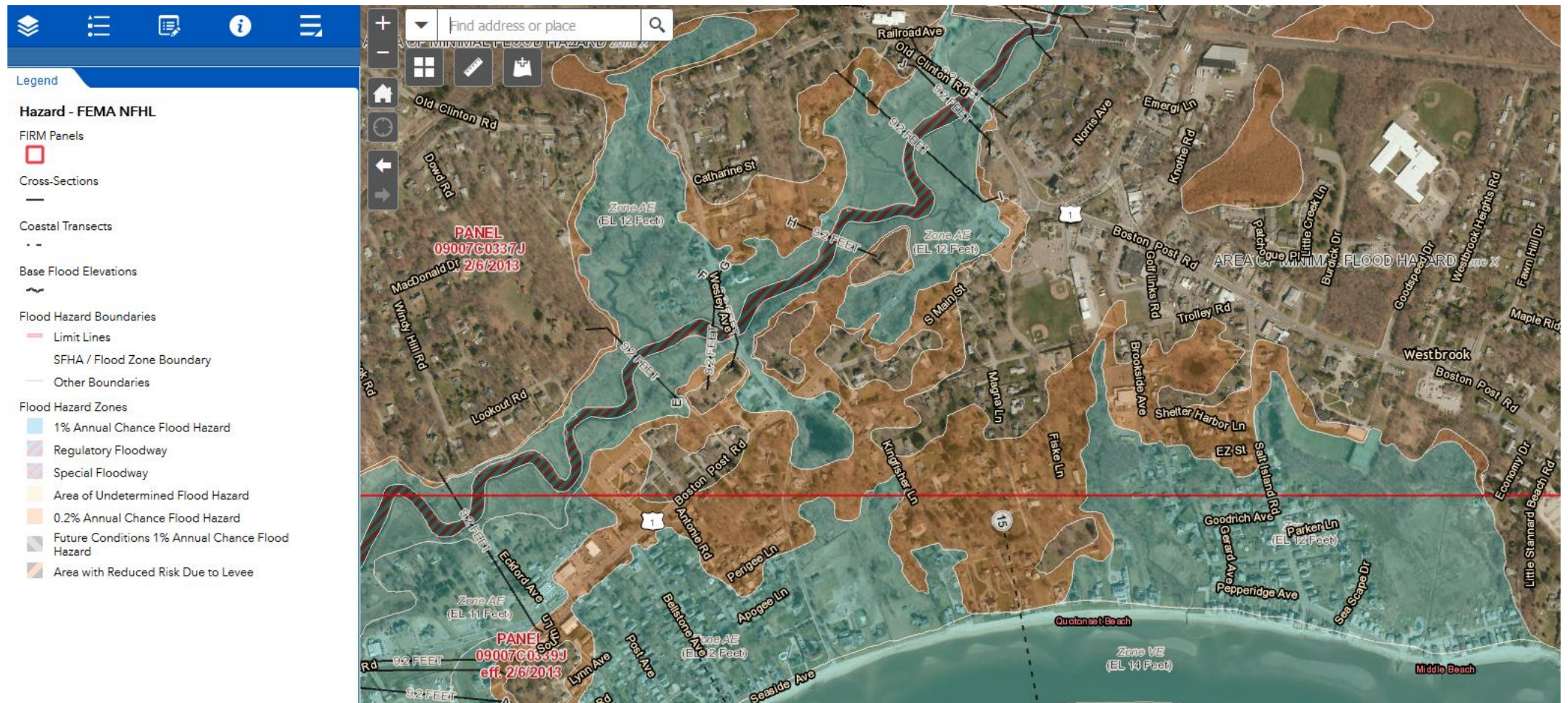


Coastal Flooding at Grove Beach

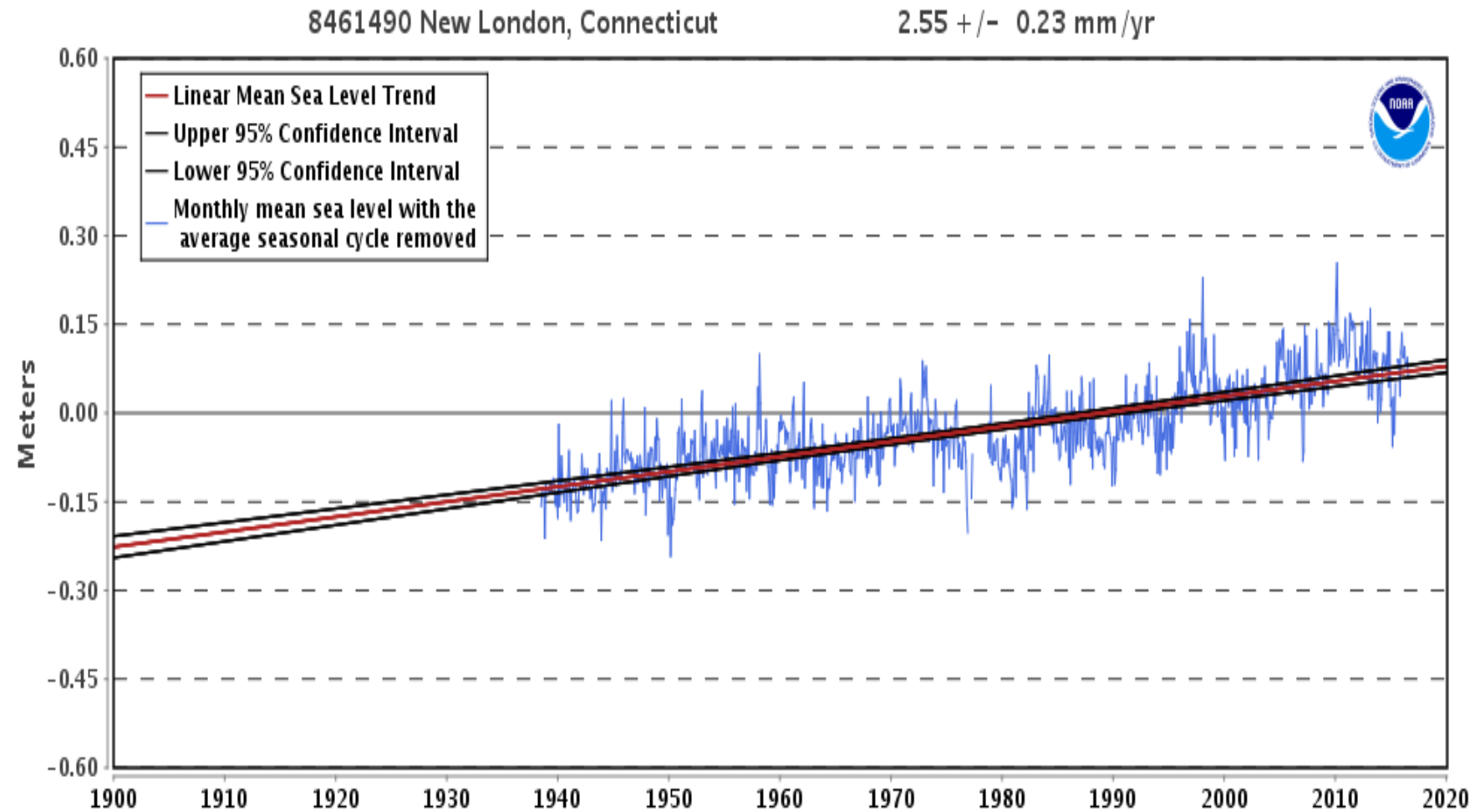
image from [#Stormhour](#) [@rvanhanrahan](#) [@RachelFrank\\_CT](#) [@KaitMcGrathNBC](#) [@gilsimmons/](#)

# Examples of Coastal Flooding Vulnerability

- ✓ Impacted Essential Facilities
- ✓ Evacuation and Sheltering Impacts



# Sea Level Rise – Historical New London Tide Gage



# Planning Implications of Sea Level Rise

## State of Connecticut Guidance and Regulation:

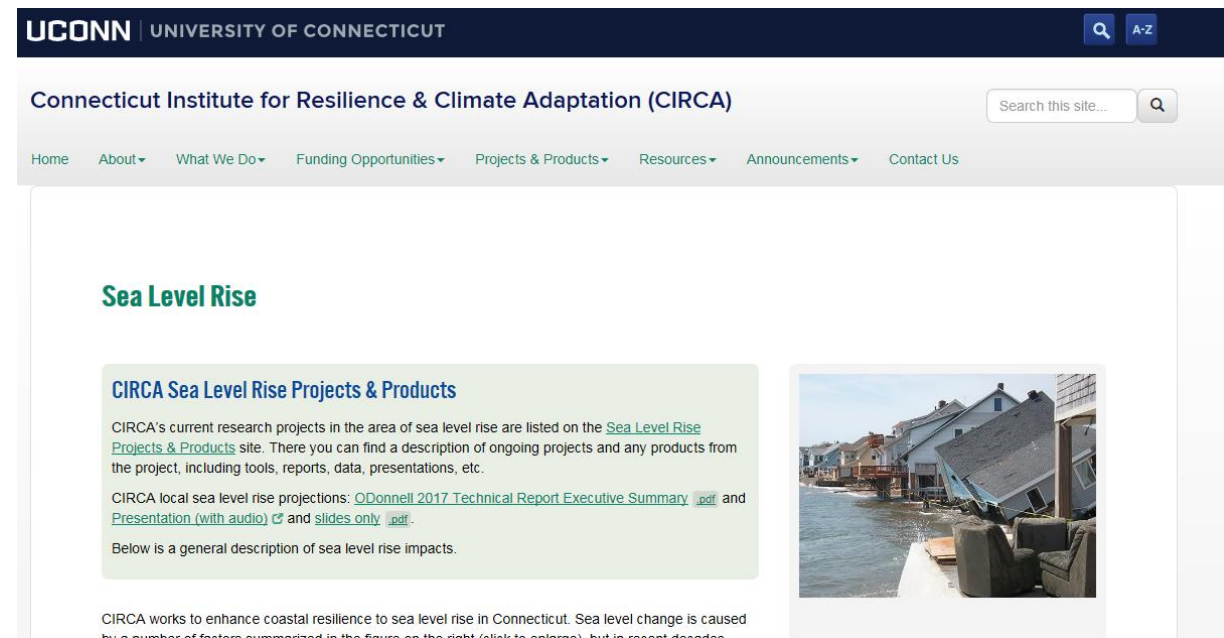
- PA 12-101
- PA 13-179

## Must Consider RSLC:

- Plans of Conservation and Development
- Hazard Mitigation Plans
- Coastal Management
- Inconsistencies in definition of sea level rise
- Does not consider structure criticality

## State Guidance: UCONN/CIRCA:

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



The screenshot shows the UCONN University of Connecticut website header with the logo and navigation menu. Below the header is the Connecticut Institute for Resilience & Climate Adaptation (CIRCA) section, which includes a search bar and a navigation menu. The main content area features a 'Sea Level Rise' heading and a 'CIRCA Sea Level Rise Projects & Products' section. This section contains text about current research projects and local sea level rise projections, along with links to technical reports and presentations. A photograph on the right shows a flooded residential area with debris.

UCONN | UNIVERSITY OF CONNECTICUT

Connecticut Institute for Resilience & Climate Adaptation (CIRCA)

Home About What We Do Funding Opportunities Projects & Products Resources Announcements Contact Us

### Sea Level Rise

#### CIRCA Sea Level Rise Projects & Products

CIRCA's current research projects in the area of sea level rise are listed on the [Sea Level Rise Projects & Products](#) site. There you can find a description of ongoing projects and any products from the project, including tools, reports, data, presentations, etc.

CIRCA local sea level rise projections: [ODonnell 2017 Technical Report Executive Summary .pdf](#) and [Presentation \(with audio\) & slides only .pdf](#).

Below is a general description of sea level rise impacts.

CIRCA works to enhance coastal resilience to sea level rise in Connecticut. Sea level change is caused by a number of factors summarized in the figure on the right (click to enlarge), but in recent decades

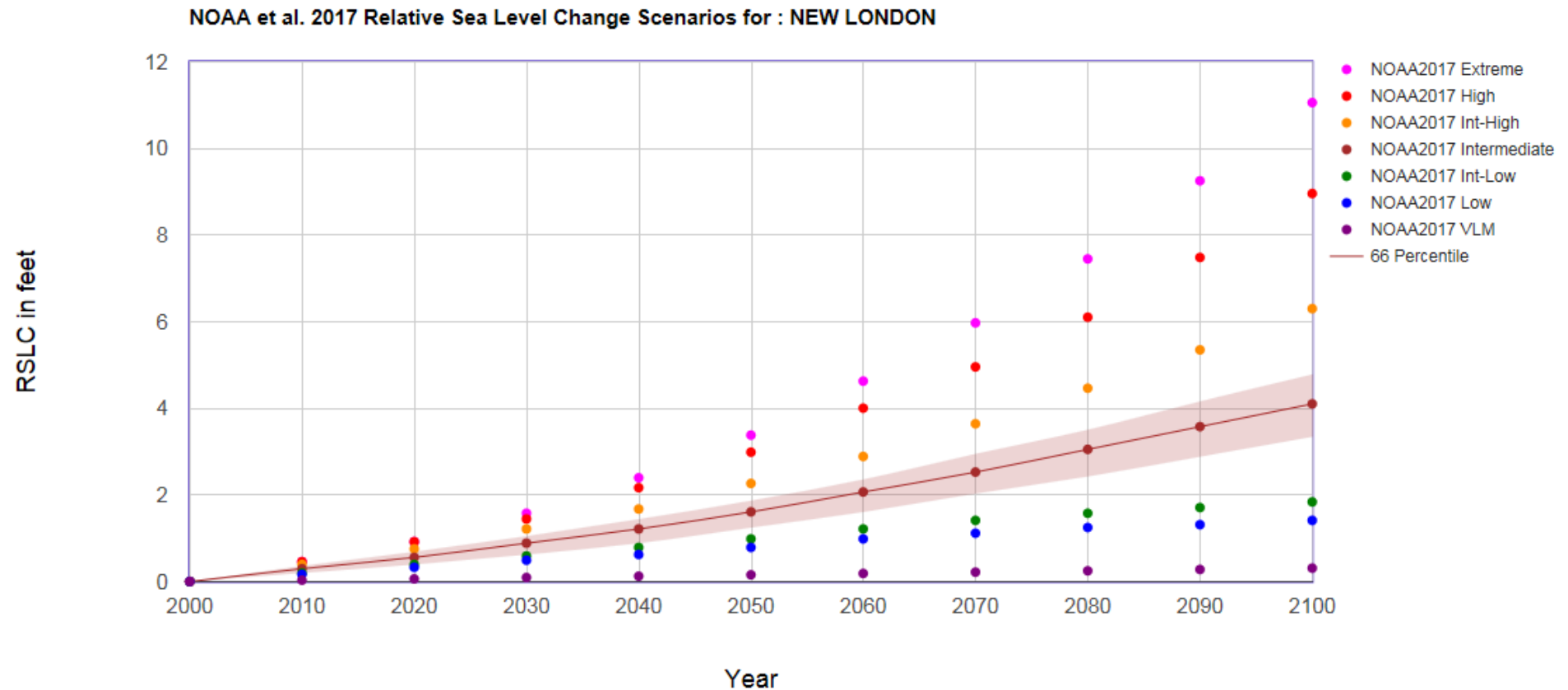
# Climate Change Effects

## Projected Sea Level Rise Near Westbrook:

2040: 0.05 to 1.23 feet

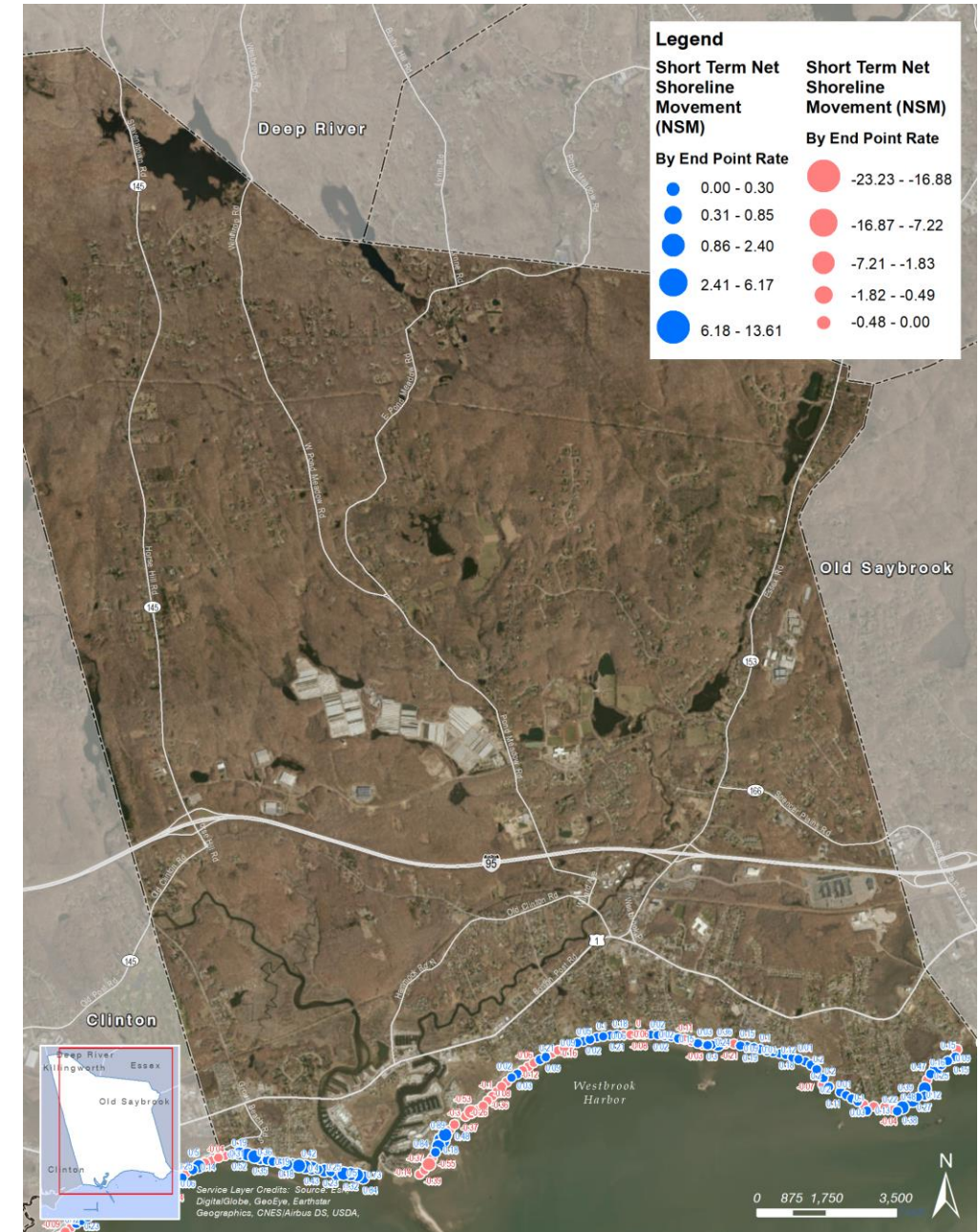
2065: 0.24 to 2.96 feet

2100: 0.5 to 6.46 feet



# Examples of Coastal Flooding Vulnerability

## ✓ Shoreline Change



# Implications of Sea Level Rise

1. Increased frequency, extent and depth of coastal flood inundation
2. Larger wave effects
3. Increased rate of shoreline erosion
4. Long term effects on salt marshes
5. Increased amount of property damage and economic losses
6. Long term effects to economic development
7. Long term reduction to Muni Bond Rating
8. Loss of future real estate tax revenue



Street flooding in Westbrook following March 2, 2018 Nor'easter )(mage from: <https://www.youtube.com/watch?v=06obs2Gog3o> )



# Next Steps

1. Complete Risk Assessment
2. Update Mitigation Strategy and Actions
3. 2<sup>nd</sup> Public Meeting – September 16, 2019
  - Risk Assessment Results
  - Updated Mitigation Strategy & Actions
4. Provide Draft Natural Hazards Mitigation Plan Update for review