

# Resilient Connecticut Update

*From Data to Resilient Adaptation Projects*





HUD NDRC

## RESILIENT BRIDGEPORT



**\$46M**

- Coastal Flood Defense System
  - Resilience Center
  - Energy Study
- Floodplain Design Guidelines

## Resilient Connecticut



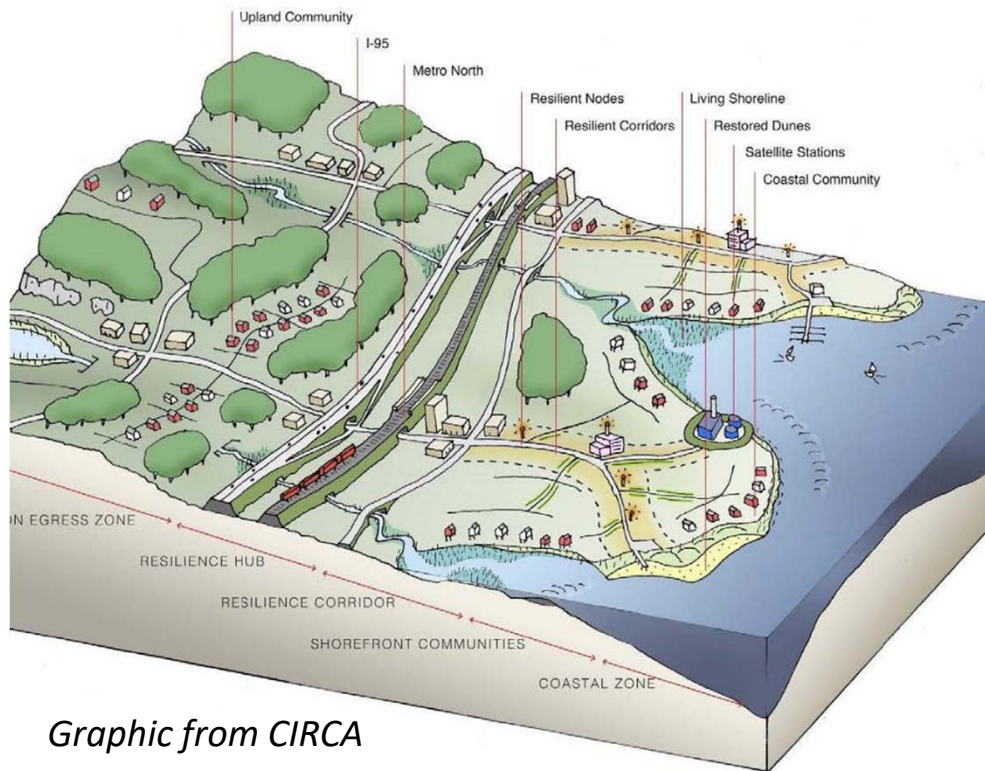
**\$8.3M**

- Regional Resilience Planning
- Technical Support & Capacity Building
- Pilot Projects in Fairfield & New Haven Counties

# Vision for Establishing Resilient Communities

- **Adapt** structures and critical infrastructure in flood zones to **withstand flooding**
- Protect communities through healthy buffering ecosystems where critical services, infrastructure, and transportation hubs are **located on safer high ground**
- Develop **energy, economic, and social** resilience
- Increase **transit** connectivity
- Create corridors resilient to climate change: **“Resilient Corridors”**
- Focus community development around transit: **Resilient Transit Oriented Development (TOD)**
- Create opportunities for affordable housing, preserving and enhancing the quality of life for existing **affordable communities**

# Key Terms



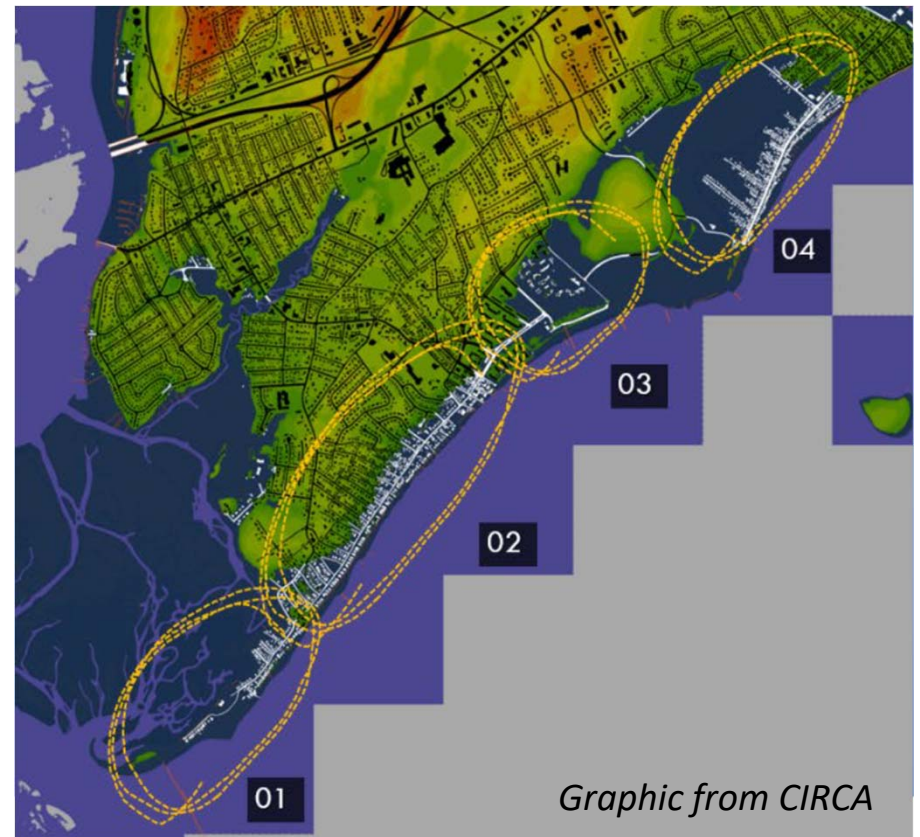
Graphic from CIRCA

- What is a Resilience Corridor?
  - “Resilience corridor utilizes the concept of urban redevelopment corridors as a mechanism to adapt coastal urban areas at risk. The resilience corridor supports transportation, utilities, stormwater and habitats, and economic development that connect the upland areas of Connecticut where resources exist (resilience zones) down to shorefront communities.”



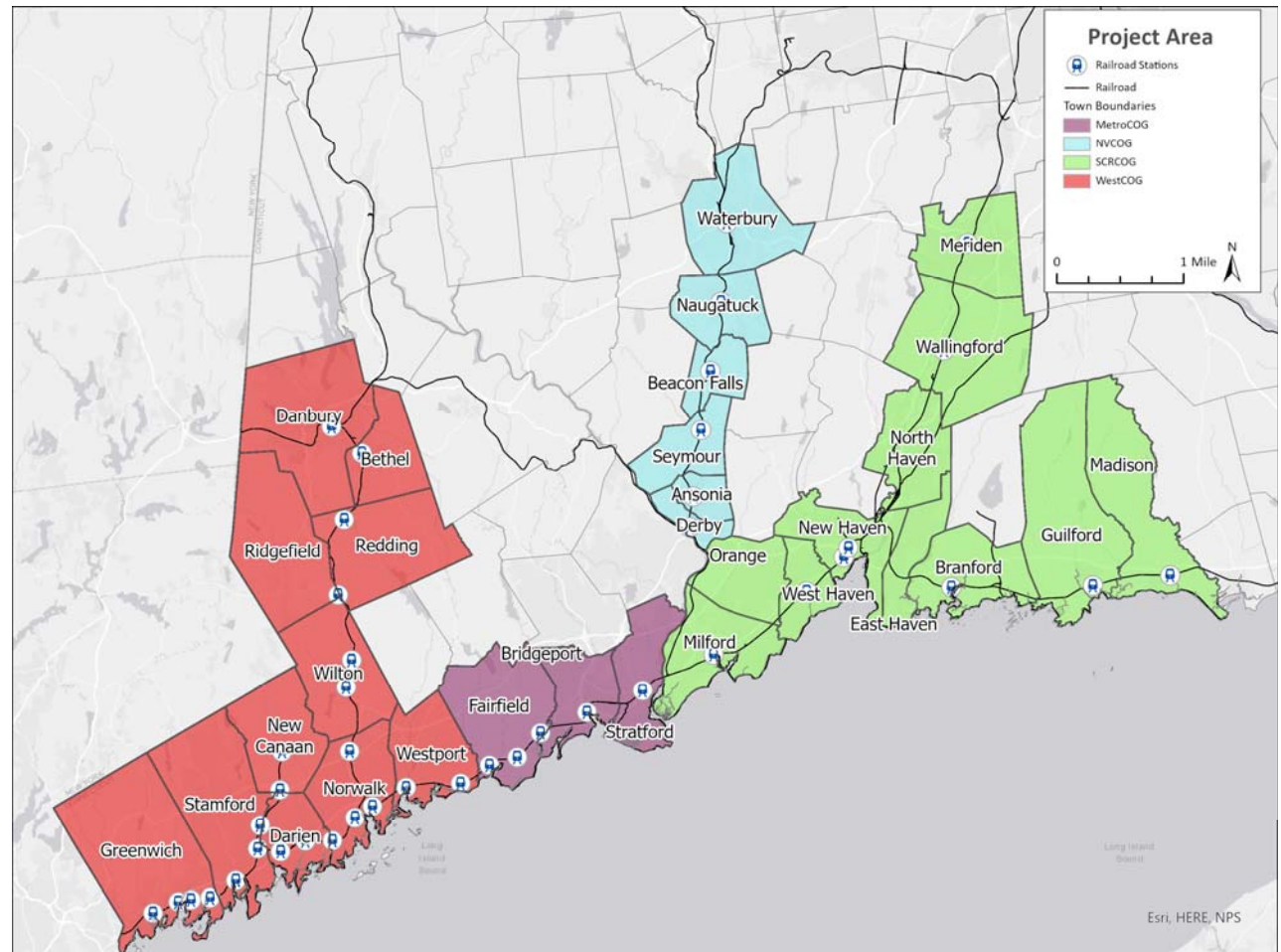
# Key Terms

- What is a Zone of Shared Risk?
  - “Zones of shared risk are regions that face common challenges either in existence already or caused by climate change, and therefore risks are shared among or between groups of people that may have different perspectives and priorities for coastal resilience. A Zone of Shared Risk includes the houses, land, infrastructure, hydrological, ecological, social, and institutional elements that contribute to the functioning of a place.”

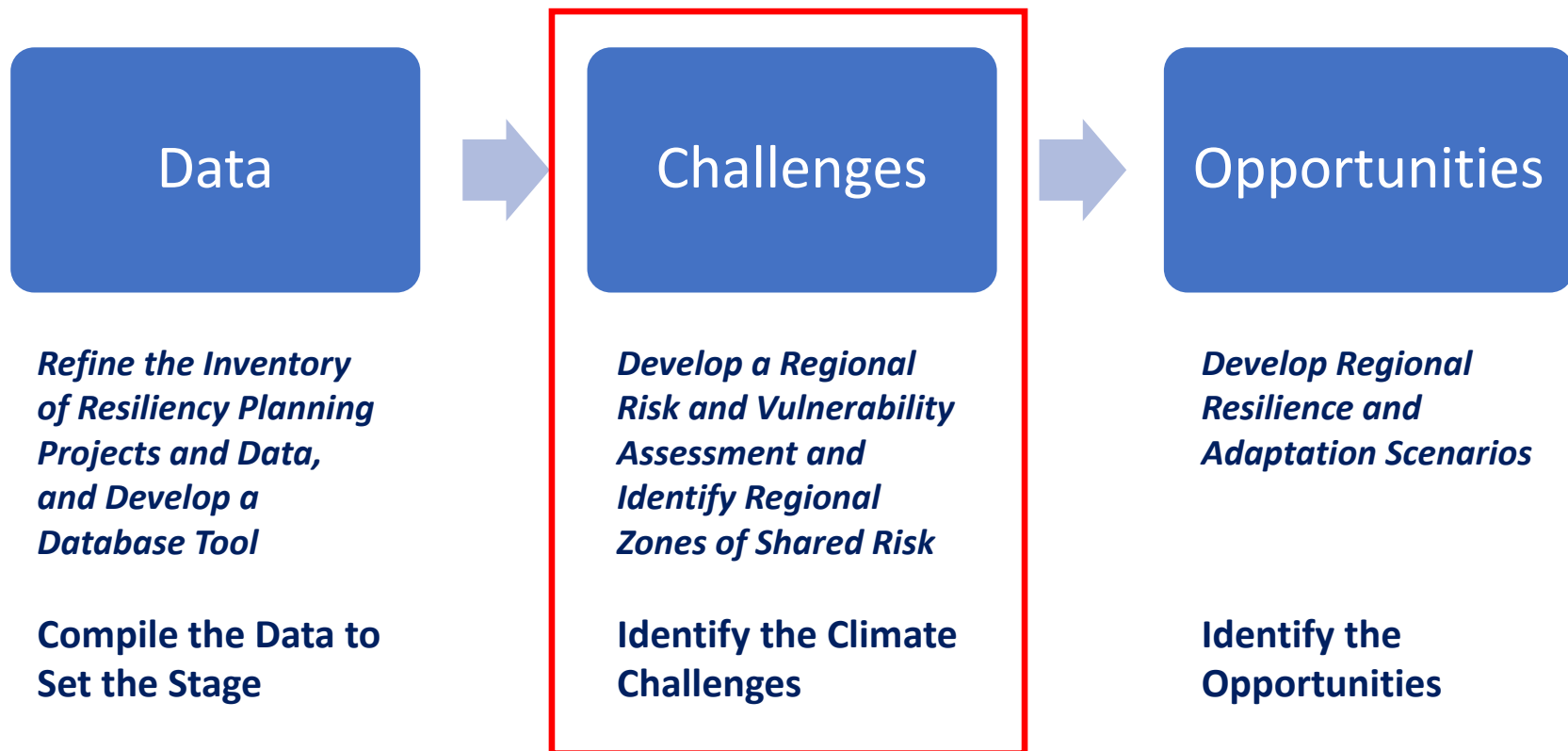


# Areas of Focus

- Fairfield and New Haven Counties
- Communities with Transit-Oriented Development (TOD) Potential
- Communities with Resilience Corridor Potential



# The Path to Resilience in Three Steps



# Identify the Climate Challenges

- *Develop a Regional Risk and Vulnerability Assessment and Identify Regional Zones of Shared Risk*
  1. Develop Indicators
  2. Map Social Vulnerabilities
  3. Develop Climate Change Vulnerability Index from CIRCA's Coastal Vulnerability Index
  4. Identify Zones of Shared Risk

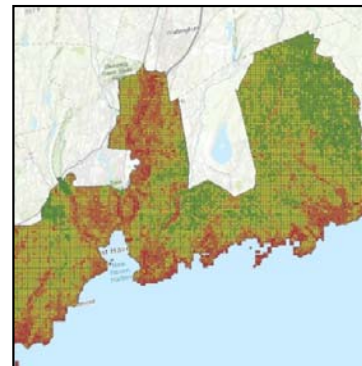
INDICATORS



SOCIAL VULNERABILITIES



CLIMATE VULNERABILITY INDEX

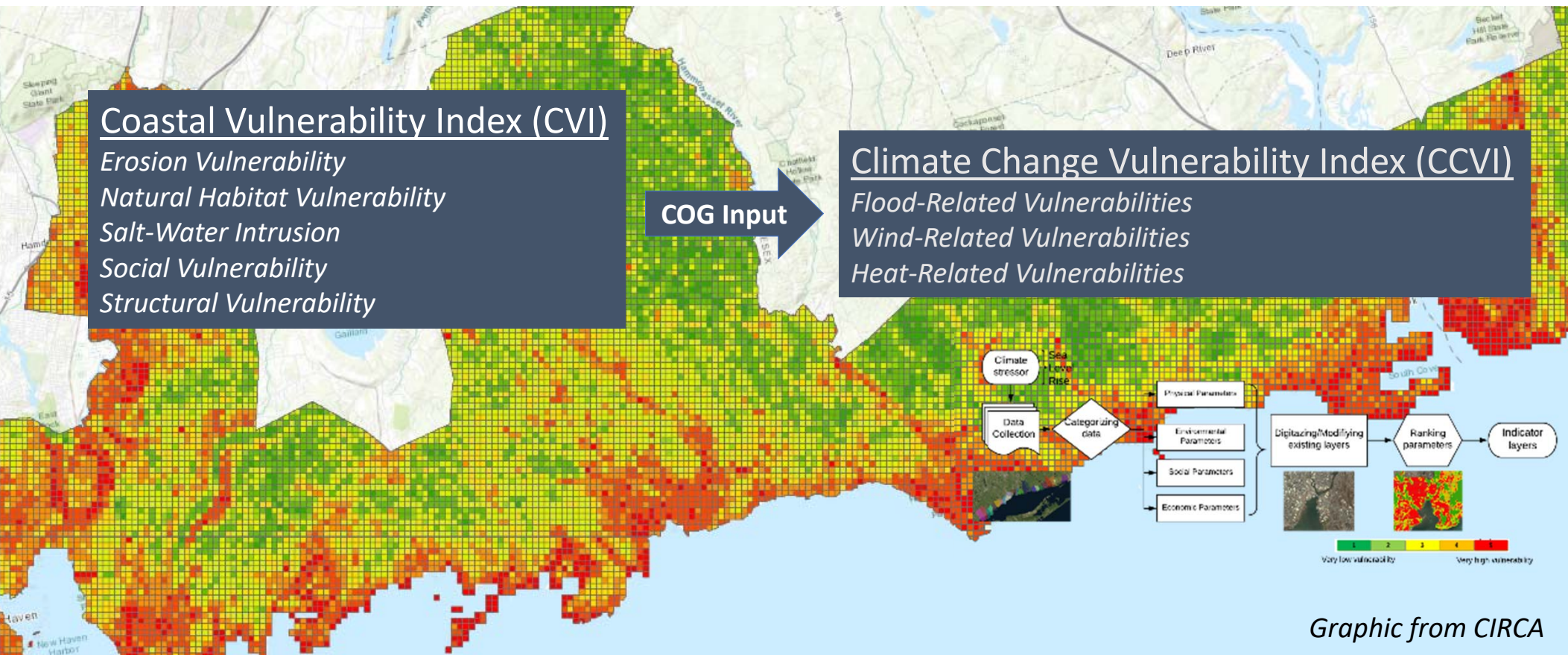


ZONES OF SHARED RISK





# Identify the Climate Challenges



# Key Terms for CCVI

**Exposure:** the degree of the stress that the particular asset is going through with climate variability. Exposure includes the change, including magnitude and magnitude and frequency of extreme events.

**Sensitivity:** the degree to which a built, natural, or human system will be impacted by changes in climate conditions.

**Adaptive Capacity:** the ability of a system to adjust to changes, manage damages, take advantage of opportunities, or cope with consequences.

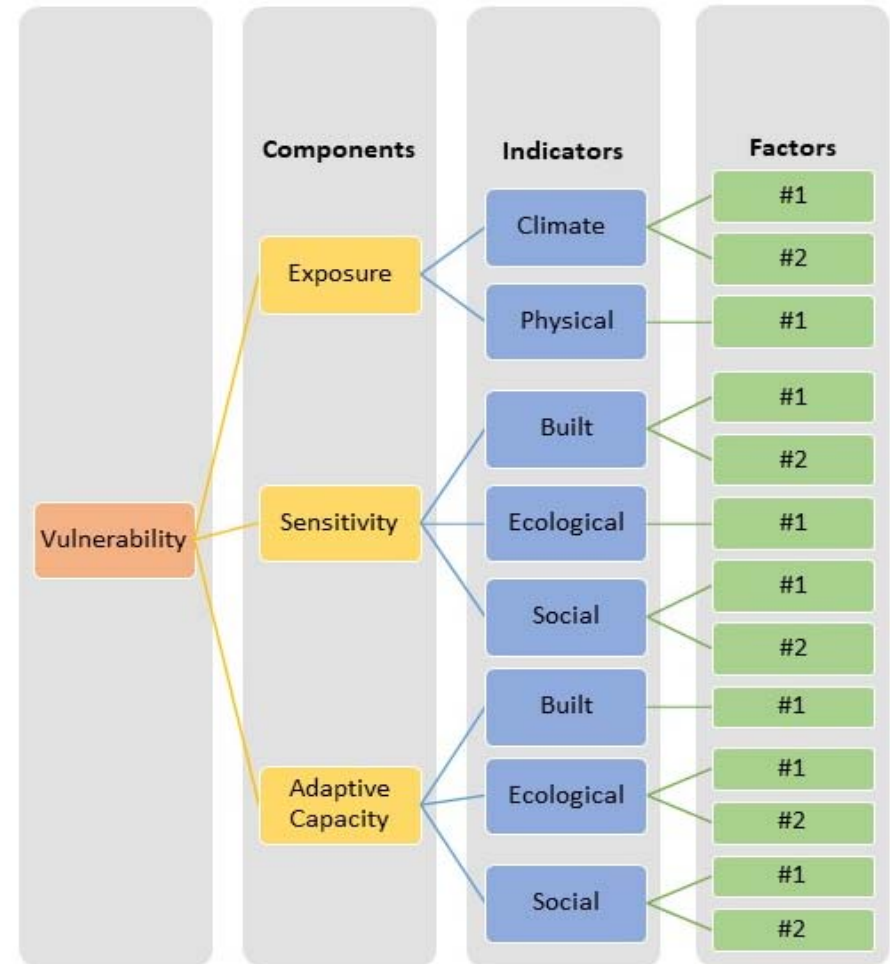


# CCVI Hierarchy

3 **components** to vulnerability:

- Exposure
- Sensitivity
- Adaptive Capacity

**Components** are broken down into **indicators**, each indicator is comprised of several **factors**.



# Flooding

## EXPOSURE

### Climate Stressor

FEMA  
Riverine  
Zones

CIRCA Sea  
Level Rise

Storm Surge

Tidal Range

Precipitation

### Physical

Impervious  
Surfaces

Erosion

Elevation  
(pooling)

Soil  
Drainage

# Flooding

## SENSITIVITY

### Built

Railways, Bus  
Yards, Rail  
Yards

Streets  
(isolation)

Septic Systems

Private Wells

Sanitary  
Sewer  
Infrastructure

Building  
Density

Critical  
Infrastructure

Flooded  
Facilities

### Ecological

Critical Habitat

Land Cover

Distance to  
Waterbodies

### Social

Median  
Income

Race and  
Ethnicity

% under 5

% over 65

%  
unemployed

Average no.  
per household

% below FPL

% over 25  
without a HS  
Diploma

Older than 5  
with Disability

Speaks English  
less than well

Population  
Density



# Flooding

## ADAPTIVE CAPACITY

### Built

Coastal Structures

Major Roadway Access

Distance to Health Facility

Distance to Shelters

LID Structures

Water and Sewer Service Areas

Regulatory Standards

Riverine Flood Protection Systems

Resilient Landscapes

### Ecological

Open Space in Flood Risk Areas

Wetland Presence and Migration

### Social

Walk, Bike, Transit Score

Religious Organizations per 10,000

Civic Organizations per 10,000

High Owner-Occupied Housing

Generator Availability

Emergency Services per Capita

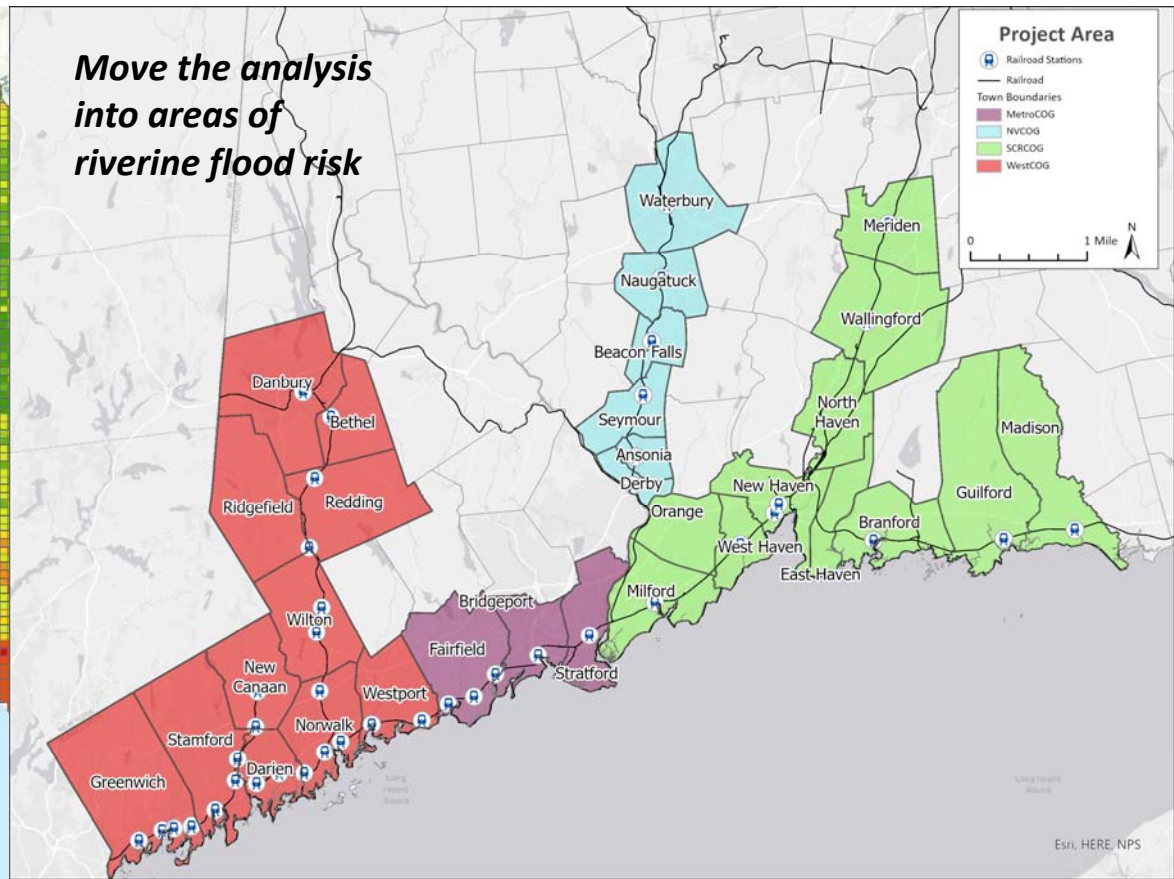
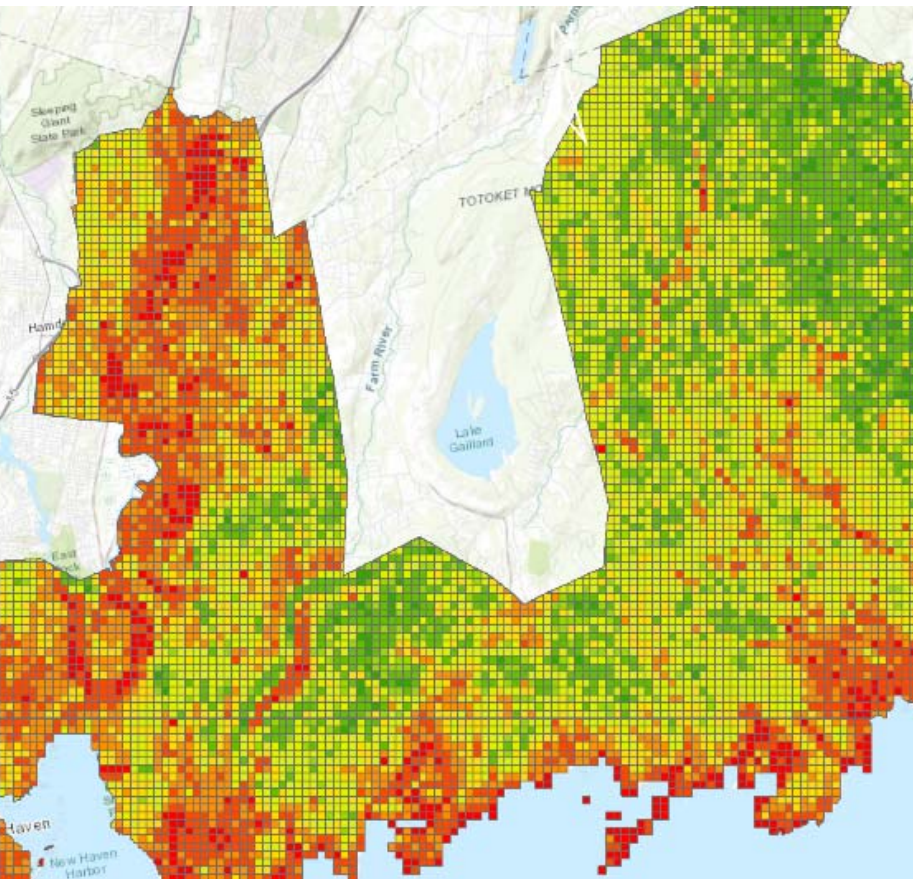
% with Property Insurance

Emergency Communication

LID Policies

Multiple Sources of Income

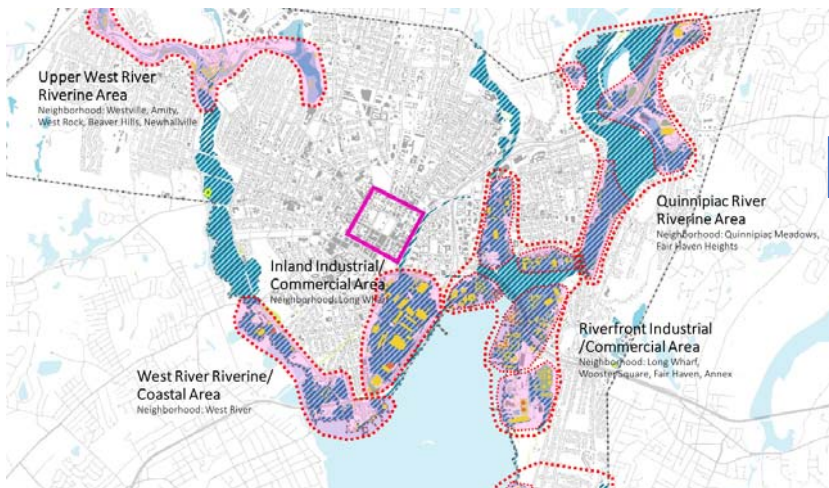
# Identify the Climate Challenges



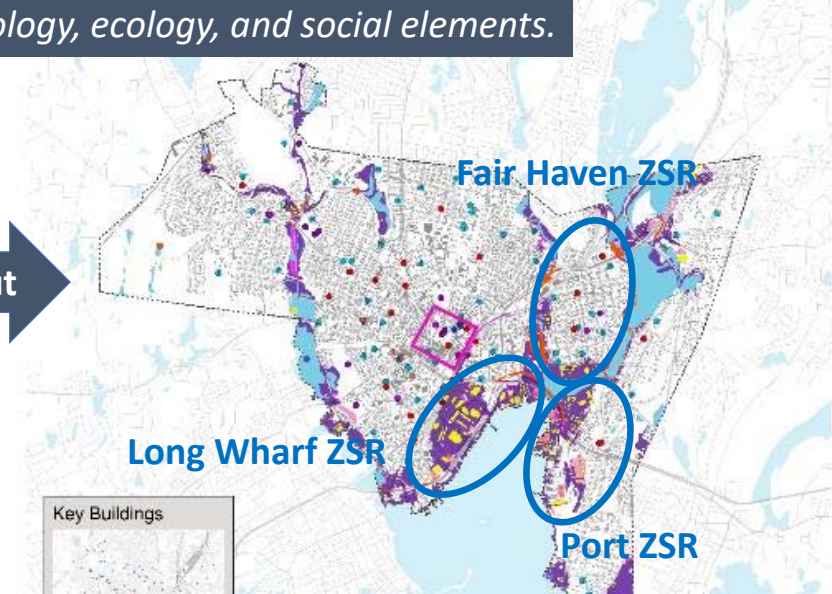
# Identify the Climate Challenges

## “Zones of Shared Risk”

*Areas of land with groups of people who face common challenges. This can include the houses, land, infrastructure, hydrology, ecology, and social elements.*

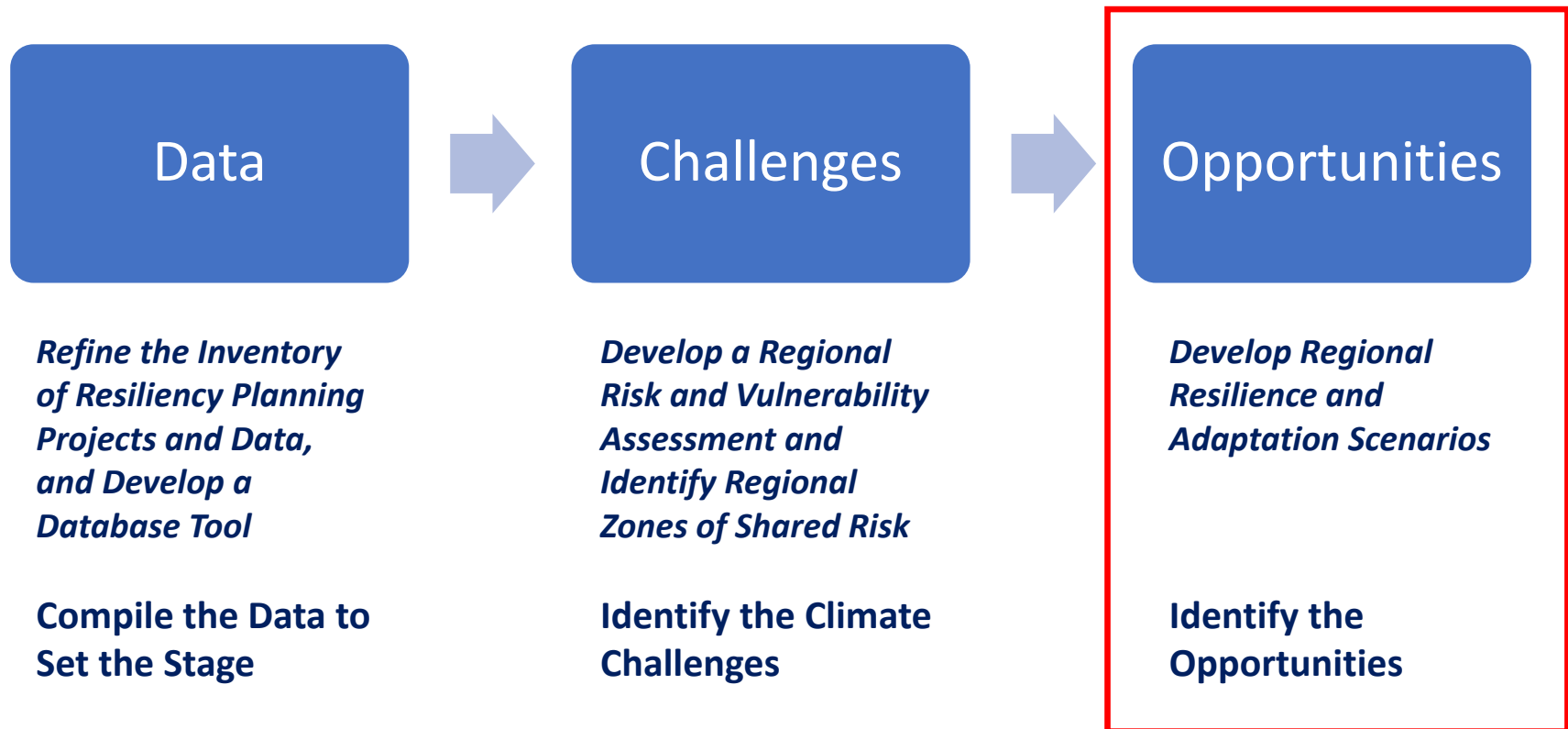


COG Input



Graphic from CIRCA

# The Path to Resilience in Three Steps





# Identify the Opportunities

- *Develop Regional Resilience and Adaptation Scenarios*
  - Develop **some** of the Zones of Shared Risk into **regional adaptation scenarios** and project areas.
  - These scenarios should address **interdependencies** and cascading climate hazards between critical systems and lifelines.
- How does a **challenge** become an **opportunity**?
  - Is TOD potential nearby?
  - Is a potential resilient corridor nearby?
  - Can we adapt structures and critical infrastructure to withstand occasional flooding?
  - Can we protect communities through healthy buffering ecosystems where critical services and hubs are on higher ground and where strong connections exist between the two?
  - Can we identify affordable housing?
  - Can we promote energy, economic, and social resilience?



# Identify the Opportunities



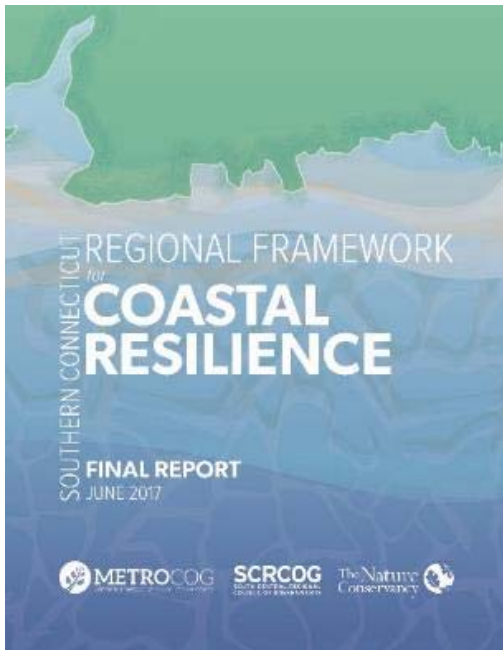
- Assess regional infrastructure challenges and opportunities
  - Interstate highways
  - Metro North, Amtrak, and CTrail
  - Water systems
  - Sewer systems
  - Eversource, UI, and others

# Identify the Opportunities



- Identify resilience corridors and resilient TOD opportunities
  - Are TOD areas in or near flood zones?
  - Are any new or adapted utilities or infrastructure needed for making TOD resilient?

# Identify the Opportunities



- Identify projects that communities can't address alone
  - The *Regional Framework for Coastal Resilience in Southern Connecticut* is a good example

# EXAMPLES OF ZONES OF SHARED RISK AND ADAPTATION OPPORTUNITIES

## ***Adapted***

- Planning and execution complete
- *Can you visualize a zone of shared risk that existed in the past?*

## ***Progress Underway***

- Community has made progress with opportunities to become resilient
- *Can you visualize patches of risk that remain?*

## ***Identified and Waiting for Action***

- Some planning work has been done
- *What kinds of opportunities can be identified for these zones of shared risk?*

# Meriden Green

*Adapted*





# Meriden Green

*Adapted*



# Meriden Green

*Adapted*

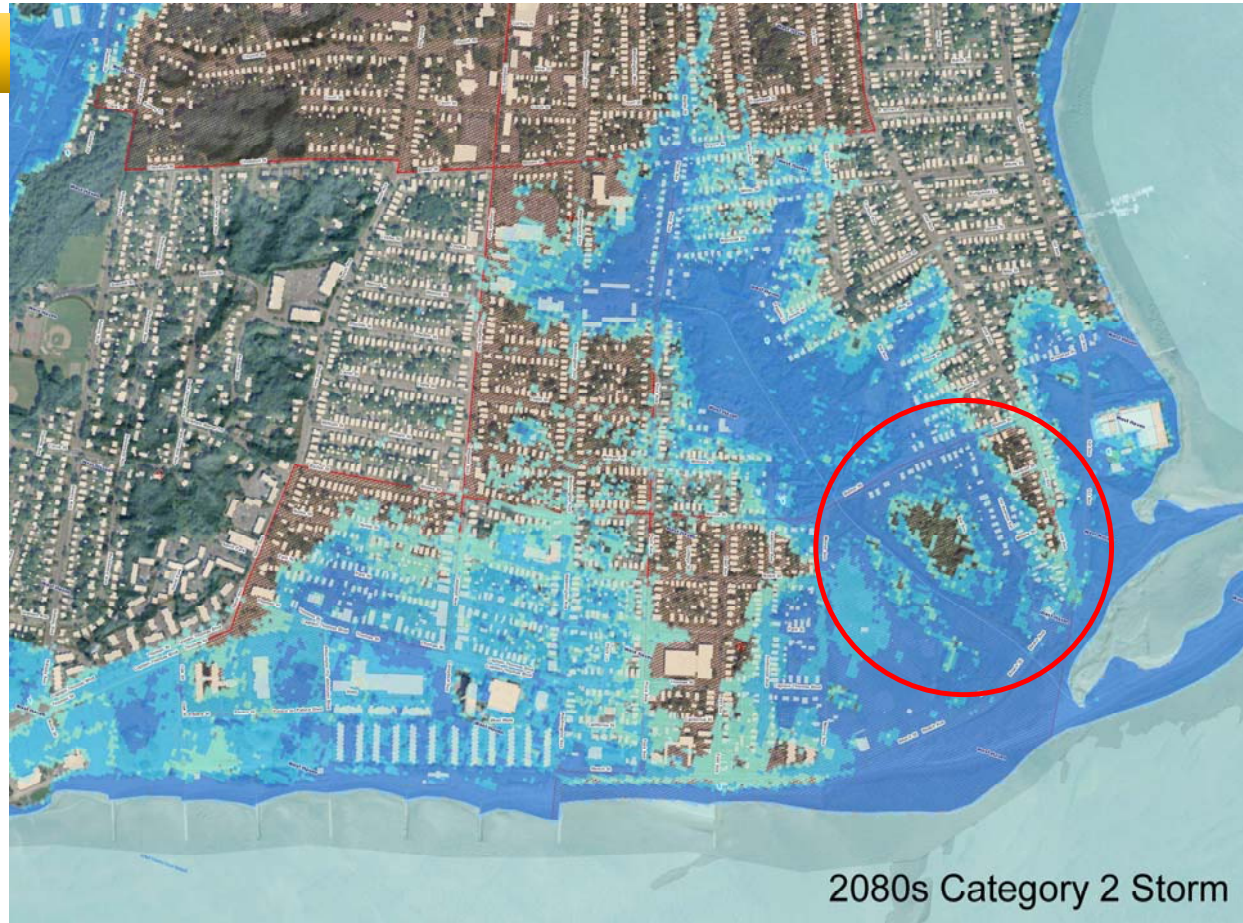




# West Haven Beach Area

*Progress Underway*

Home acquisitions





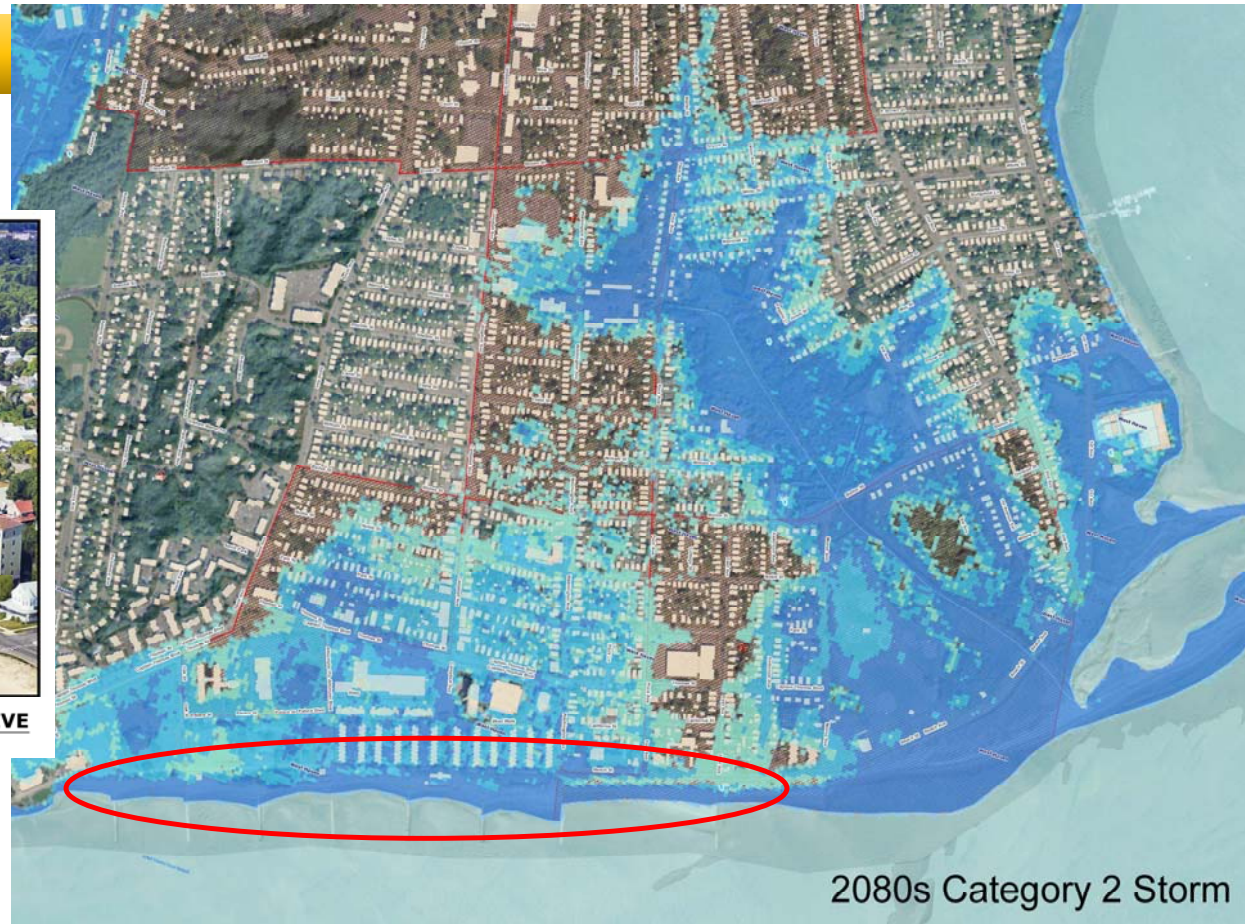
# West Haven Beach Area

*Progress Underway*

Dune ridge for flood protection



1 PROPOSED BEACH NOURISHMENT/ DUNE CREATION PERSPECTIVE  
(NOT TO SCALE)

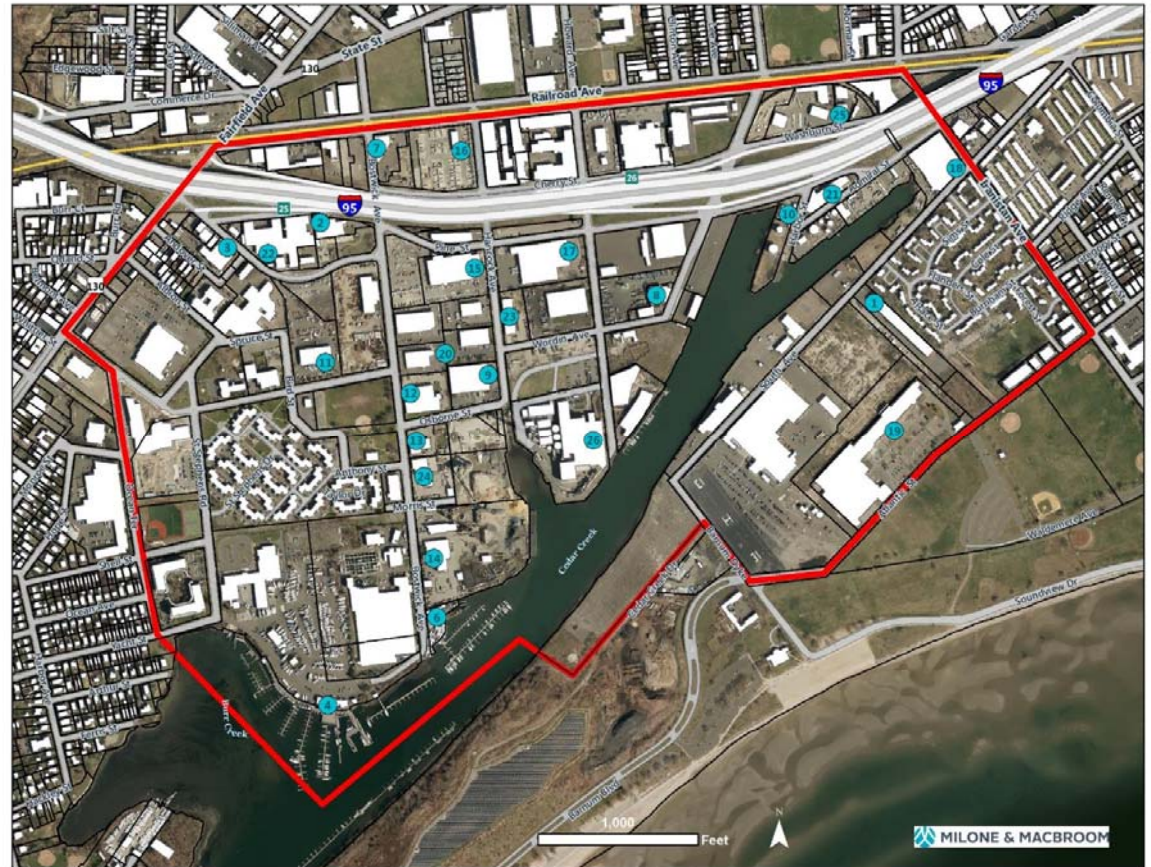




# Bridgeport West End

*Progress Underway*

Business Name	Reference Number
ABC Supply Co. Inc.	1
Blue Sky Bar Ice Cream	2
Bridgeport Biodiesel	3
Captain's Cove Seaport	4
Cedar Marina Inc	6
Devar Inc.	7
Enviro Express Inc	8
Gesswein	9
Hi-Ho Petroleum	10
Hines Bros International	11
Markal	12
Merrit Contractors Inc	13
O&G Asphalt Plant	14
O&G Earth Products Showcase	15
O&G Stone Splitter Yard	16
P.C. Richard & Son	17
Park City Green	18
Row America	19
Safety Marking Inc	20
Santa Energy Corporation	21
U-Haul	22
Wagner Pools	23
Waters Construction Co.	24
West End Lumber Co	25
Wheelabrator	26





# Bridgeport West End

*Progress Underway*



# Bridgeport West End

*Progress Underway*



## Ideas for Individual Properties to be More Resilient!

### Options

**Elevate**  
Raise structures above flood levels

**Floodproof**  
Retrofit or construct structure to prevent flood water entry

**Floodwall**  
Construct permanent or temporary barrier around structure

**Floodable**  
Allow water to flow through a building or site with specific techniques

### Institutional



### Industrial



### Commercial



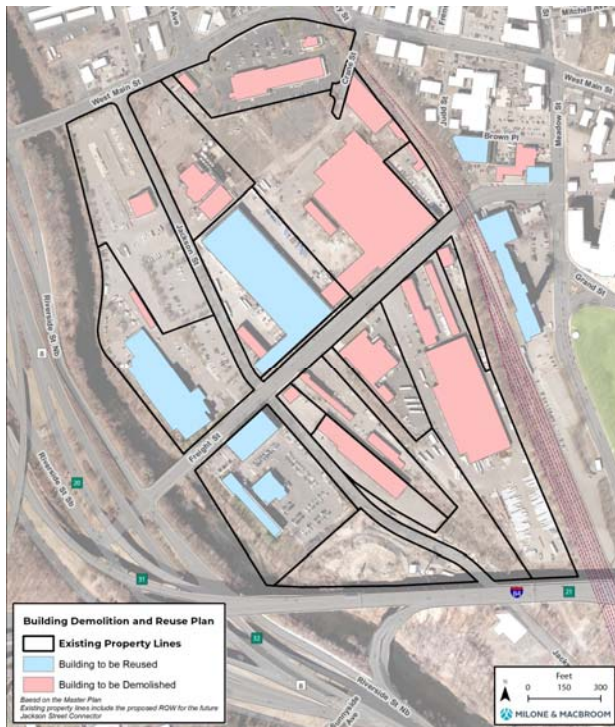
### Residential





# Waterbury Freight Street

*Identified and Waiting for Action*





# Branchville Train Station

***Identified and Waiting for Action***



# Linking Opportunities

## Opportunities We Know About

**Meriden Green**

**Freight Street**

**Branchville**

**West End**

**Long Wharf**

**West Haven Beach**

## Opportunities On the Horizon

**Danbury TOD near Still River**

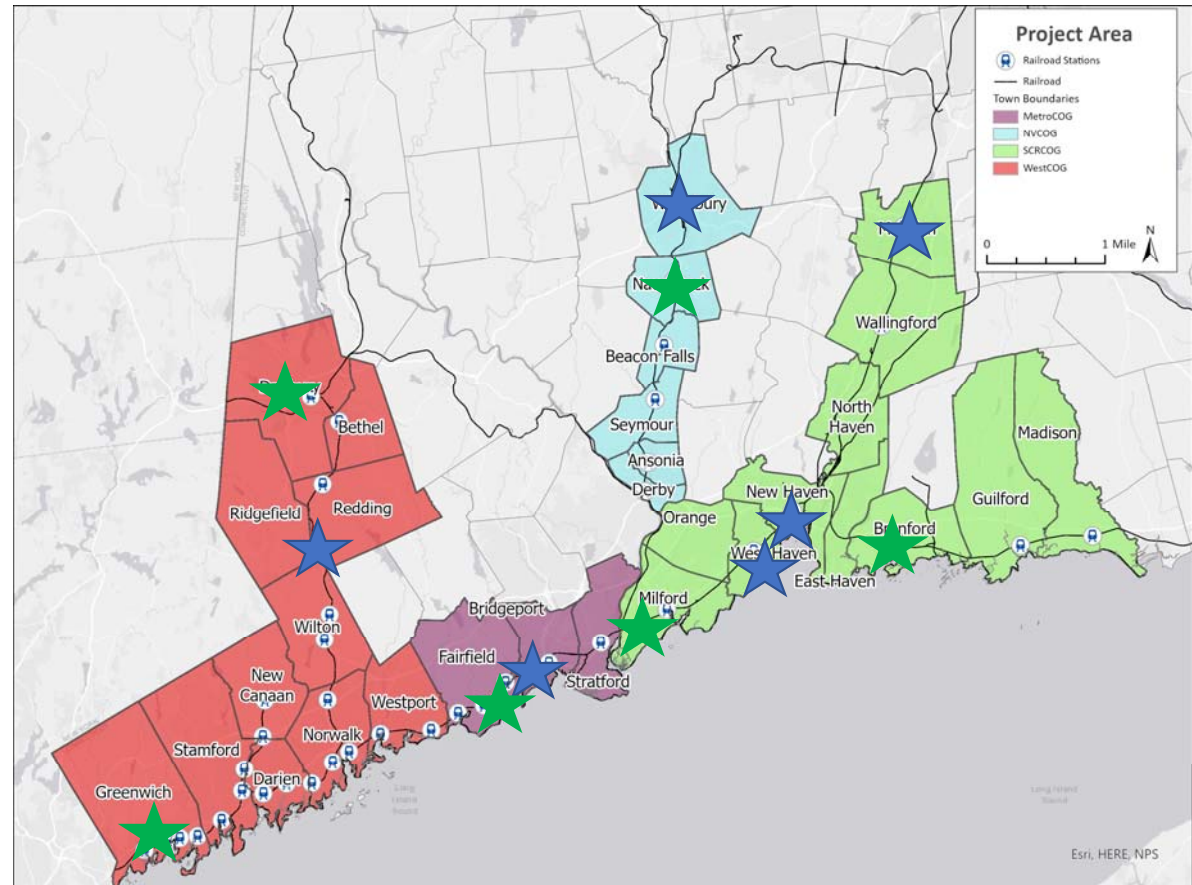
**Results of Greenwich Resiliency Plan**

**A Solution for Fairfield**

**Naugatuck TOD near Naugatuck River**

**Wildemere Beach / Devon TOD**

**Branford TOD near Branford River**





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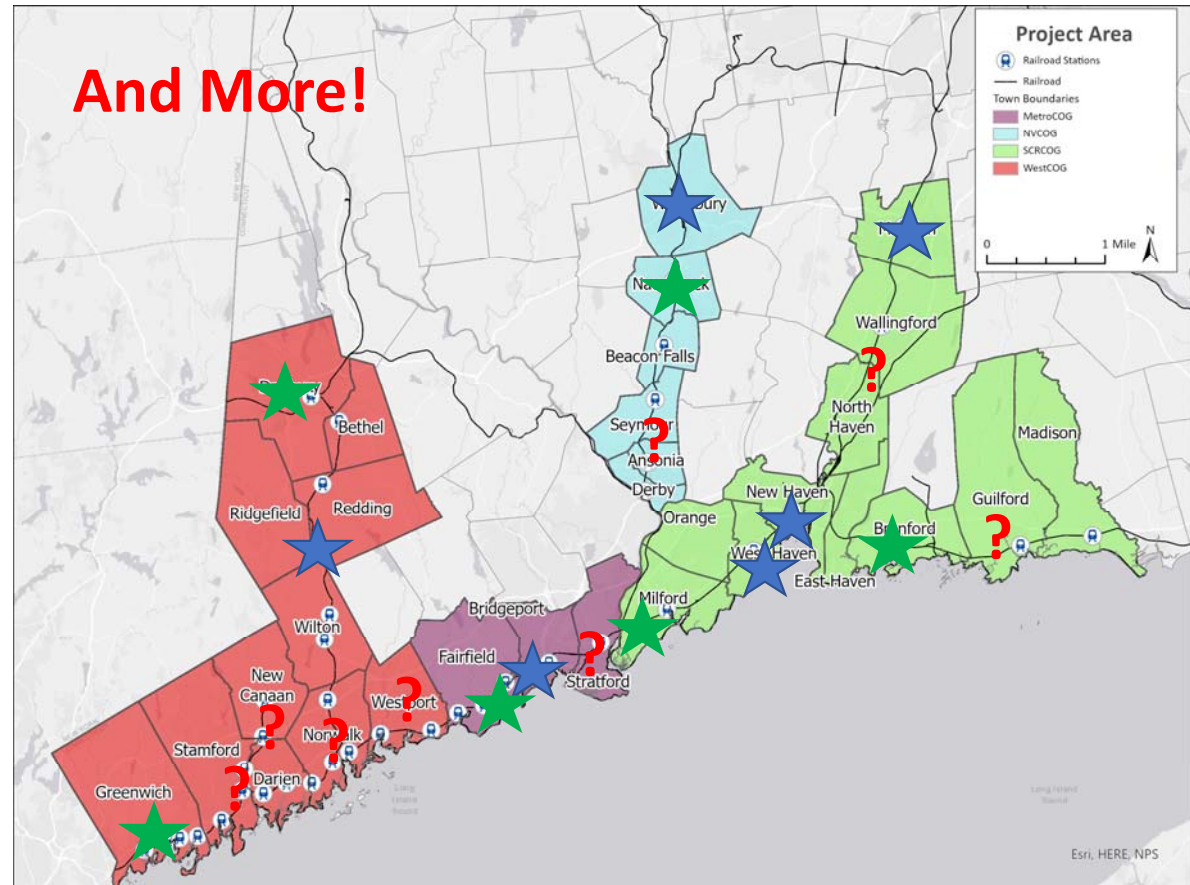
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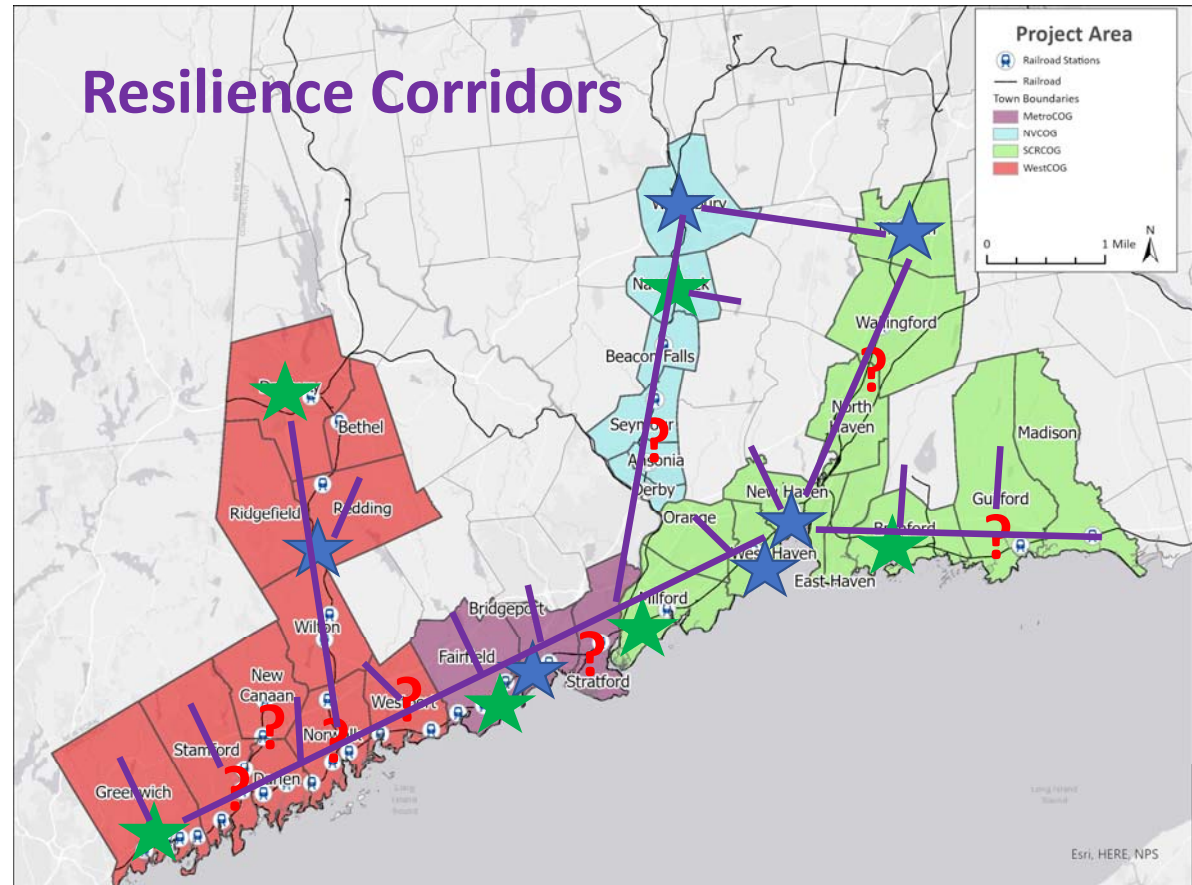
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# Resilient Connecticut Update

***THANK YOU!***

