

Moving towards Resilience

helping communities adapt to hazards and change...



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Local Solutions: NE Climate Change Preparedness

The Nature Conservancy

60+ years

3,500 staff – 50 states & 34 Countries

1 million members

Science-based & solution driven

Risk Reduction & Resilience

Coastal Resilience Network

CRN aims to provide **science, tools, process and policy** to foster decision-making on adaptive solutions, **emphasizing the important role of ecosystems** in risk reduction and resilience.

www.coastalresilience.org



Coastal Resilience Network

www.coastalresilience.org

GRENADA,
ST. VINCENT +
THE GRENADINES

PUGET SOUND

GULF OF
MEXICO

CALIFORNIA

MESO-
AMERICAN
REEF

GULF OF
CALIFORNIA

US VIRGIN
ISLANDS

NEW YORK AND
CONNECTICUT

FLORIDA KEYS

10 States - 7 Nations

Coastal Resilience Program

Objective: To lend a helping hand to communities and ecosystems to safely accommodate hazards and change...



Awareness



Risk



Choices



Action

Coastal Resilience Program



Awareness



Risk



Choices



Action

TNC's Hazards and Community Resilience Workshops

- ✓ All Hazards – Community-Driven Approach
- ✓ Strengths and Mitigation Emphasis
- ✓ Links NHMP with Master Plans

Hazards and Community Resilience Workshops



With more complete information and a process, towns can make more informed decisions to reduce risk and improve resilience.

Community Engagement and Empowerment



©TNC



©TNC



NOAA



©TNC



Giny Fullam

TNC's Hazards and Community Resilience Workshops



Planner

Fire Chief



**Tree
Warden**

**Elected
Official**



Wetlands

**Business
Owner**

PW

**Health
Officer**

The Nature Conservancy's Risk Matrix

Vulnerability and Strengths

Waterford, Connecticut (01/11/2012) Eastern Connecticut Risk Assessment Workshop

Vulnerabilities by hazards

Compare vulnerabilities by hazards, indicate H-M-L priority for action over short or long term.
V = Vulnerability
S = Strength

Risk Matrix developed by Lighthouse Consulting & The Nature Conservancy (01/2012)

Infrastructure vulnerabilities/assets	Location	Ownership	Hazard				Priority	
			Coastal Flooding	Riverine Flooding	High Winds	Frozen Precipitation	M-L	Time
V Millstone Power Plant	St. 156	Dominion Power	Coord. & Comm. w/ Dominion/FEMA/DOHS	Same	Same	Same		Ongoing
V Power Transmission	Town Wide	CL&P	Coord. & Comm. w/ CL&P/Dominion	Same	Same	Same		Ongoing
V 28 WWT Pump Stations/Collection Stations	Town Wide	Town	Assess/Locate vulnerable Man Holes that need to be made watertight to 200yr flood	Same	Same	Same	H	S
V Bridges and Roads	Town Wide	Town	Coord. with DOT on vulnerable state owned infrastructure: Rt 156 and 2	Same	Same	Same	H/H/H	L (10-20 yrs)
V New London WWT Plant	Chlor of Mill		Assess impacts of flooding				M	Ongoing
V Lake Konomoc - Water Treatment Plant			Map area					
V Isolation Points (156/213, Gardners Wood; Niles Hill Rd; Ridgewood; Bloomingdale Rd; Hunts Brook)	All risk locations	Town	Completed flood studies (FEMA and party record; community survey)				H	S (5 Yrs)
V Railroads - Amtrak & Canadian RR	Across Town		Coastal eval. Of culverts/drainage; Eliminate at-grade crossings		Tree cutting along lines		M	L
A Fire House Team Approach (decentralized)	Town Wide	Town						
A New Generator in School								
Societal vulnerabilities/assets								
V Vulnerable Populations	Town Wide	Town	Coord. w/ other Town agencies (community services)				M	Ongoing
V Recreational Facilities (BB Fields; Beaches, etc...)	Town Wide	Town	Emergency Comm. & Coord. at facilities				M	S
V Critical Social Facilities (Camp Harkness; Cultural Historic Districts; Private Schools)	Town Wide	State/Town/Private	Coord. w/ owners: make sure plans are in place; Harkness Landing, Jordan, Granville, Quaker Hill, Baptist Church School, WTFD Country School				L	S
A Shared Regional Cooperation (Evac. Facilities)	Regional	NI, EL, Town						
A Commodities/Goods Distribution Points	Mun./Complex	Town Depts.						
A Special Needs Coord. (group homes, care fac.)	Localized	Private						
A Emergency Comm. System - Interoperability	Town Wide	Town						
Ecosystem vulnerabilities/assets								
V Railroad - Transportation (Cranberry Pond Culvert)	Millstone Pt.	Various	Eval. & modify culvert for tidal flushing				M	L
V Jordan Cove Area (undersized drainage)	Jordan	Various	Coord. w/ Dominion/FEMA/DOHS					
V Goshen & Alewife Cove (ecosystem conversion)		Various	Acquire Develop. Rights; dune restoration;				H	S
V Channel Erosion	Various	Various	Acquire Develop. Rights; Education Prog				H	S
V Open Space (Maintain and Obtain)	Various	Town/State	Acquisition (marsh migration)				H	Ongoing
V/A Miller Pond (need flood storage; water source, base flow for Stony Brook)	Miller Pond	?		Assess Flood storage; Coord.			H	
A Barrier Beaches & Dune System	Harkness to Alewife	Town/State/Private						

Hazards

Choices

Cross Walk

Prioritized List of Actions

Useful Anywhere: Inland-Coastal; Urban-Suburban-Rural; Large-Small

The Nature Conservancy's Risk Matrix

Waterford, Connecticut (01/11/2012) Eastern Connecticut Risk Assessment Workshop

Vulnerabilities by hazards

Compare vulnerabilities by hazards, indicate
H-M-L priority for action over short or long term.
V = Vulnerability
A = Asset

Risk Matrix developed by Lighthouse Consulting & The Nature Conservancy (01/2012)
Hazards (flooding, wind, etc)

H-M-L priority for action over short or long term. V = Vulnerability A = Asset			Coastal Flooding	Riverine Flooding	High Winds	Frozen Precipitation	Priority H-M-L	Time S/L term	
Infrastructure vulnerabilities/assets									
V	Millstone Power Plant	Rt 156	Dominion Power	Cord. & Comm. w/ Dominion/FEMA/DOHS	Same	Same	Same	M	Ongoing

V Storm water system flooding Town-wide Flood proof manhole covers to 500 yr. H S

A Fire House Team Approach (decentralized)	Town Wide	Town	at-grade crossings	lines				
A New Generator in School								
Societal vulnerabilities/assets								
V Vulnerable Populations	Town Wide	Town	Cord. w/ other Town agencies (community services)				M	Ongoing
V Recreational Facilities (BB Fields; Beaches, etc...)	Town Wide	Town	Emergency Comm. & Cord. at facilities				M	S



Map Arrows:

Red – Infrastructure
Blue – Societal
Green - Ecological

Hazards and Community Resilience Workshops

- ❑ Since 2007, we have helped 21 communities and 5 COG/RPAs
- ❑ Strong Testimonials from Electeds, Town Staff, Residents, Business Owners and Employers
- ❑ Tried and True Process with Municipalities

Examples from Communities like yours...



Awareness



Risk



Choices



Action

Challenge of Community Resilience – Choices to Action

Technical

- Community Wastewater
- Abandonment of Roads
- Establish Alternate Egress
- Hard Shoreline Protection
- Marsh Advancement Zones

Regulations Governance Norms

- Building Codes
- Zoning Amendments
- Zoning Overlays
- Acquire Properties

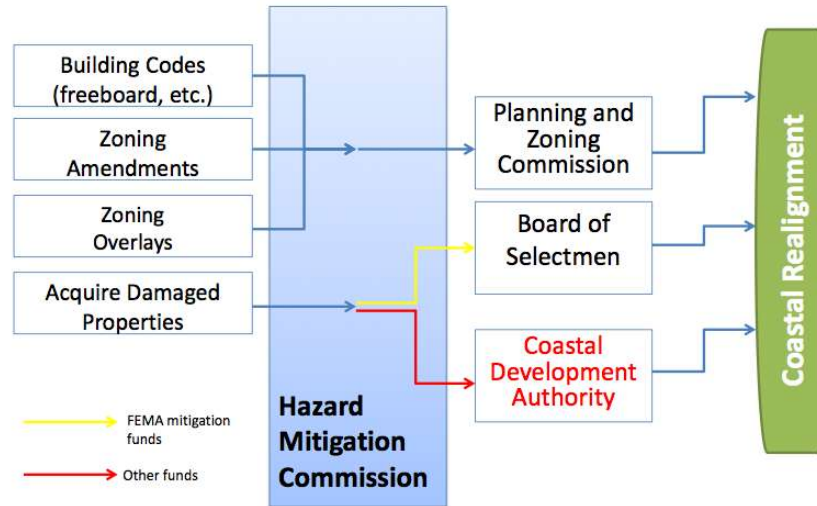
People Perspectives

- key individuals
- affected communities
- specialist advisors
- influential organizations

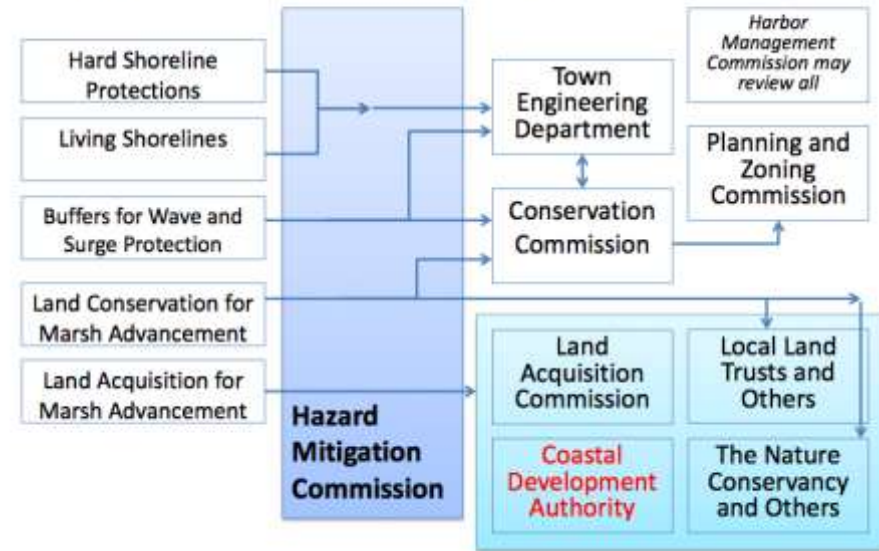


**A Challenge for “Action” is Integration
Planning – Governance - Design**

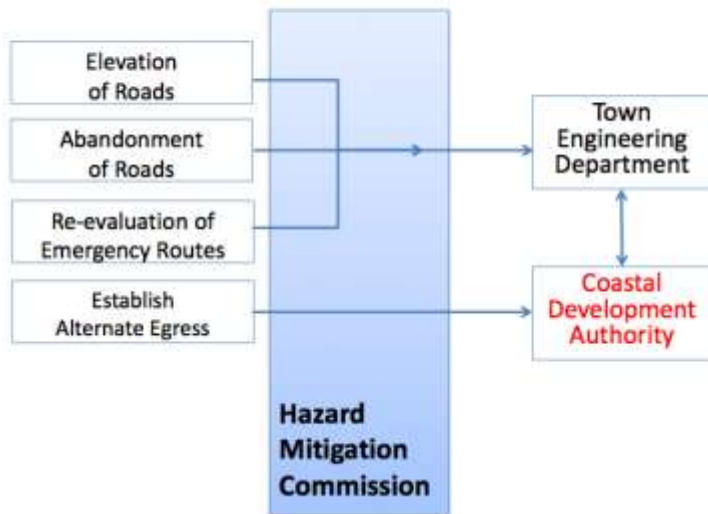
Management of Coastal Real Estate and Structures



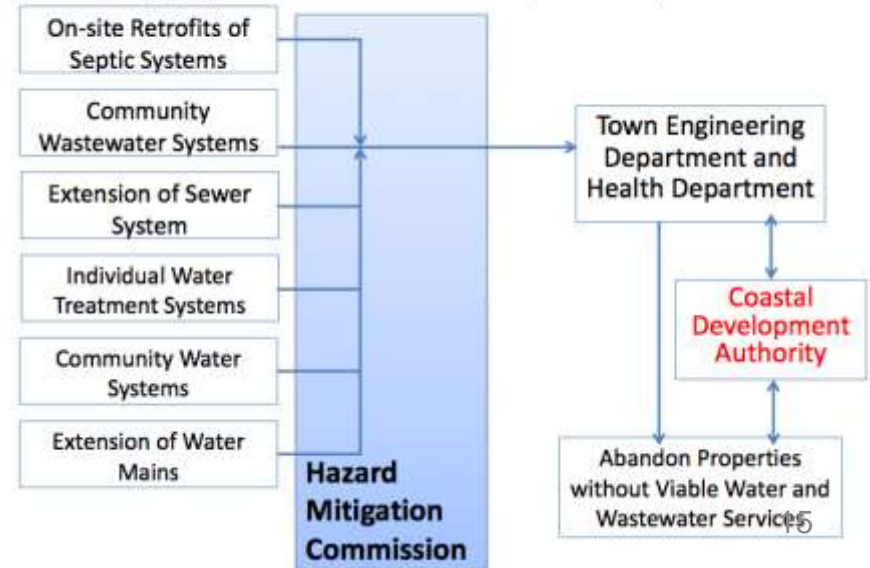
Shoreline Protection and Management of Coastal and Near-Shore Lands



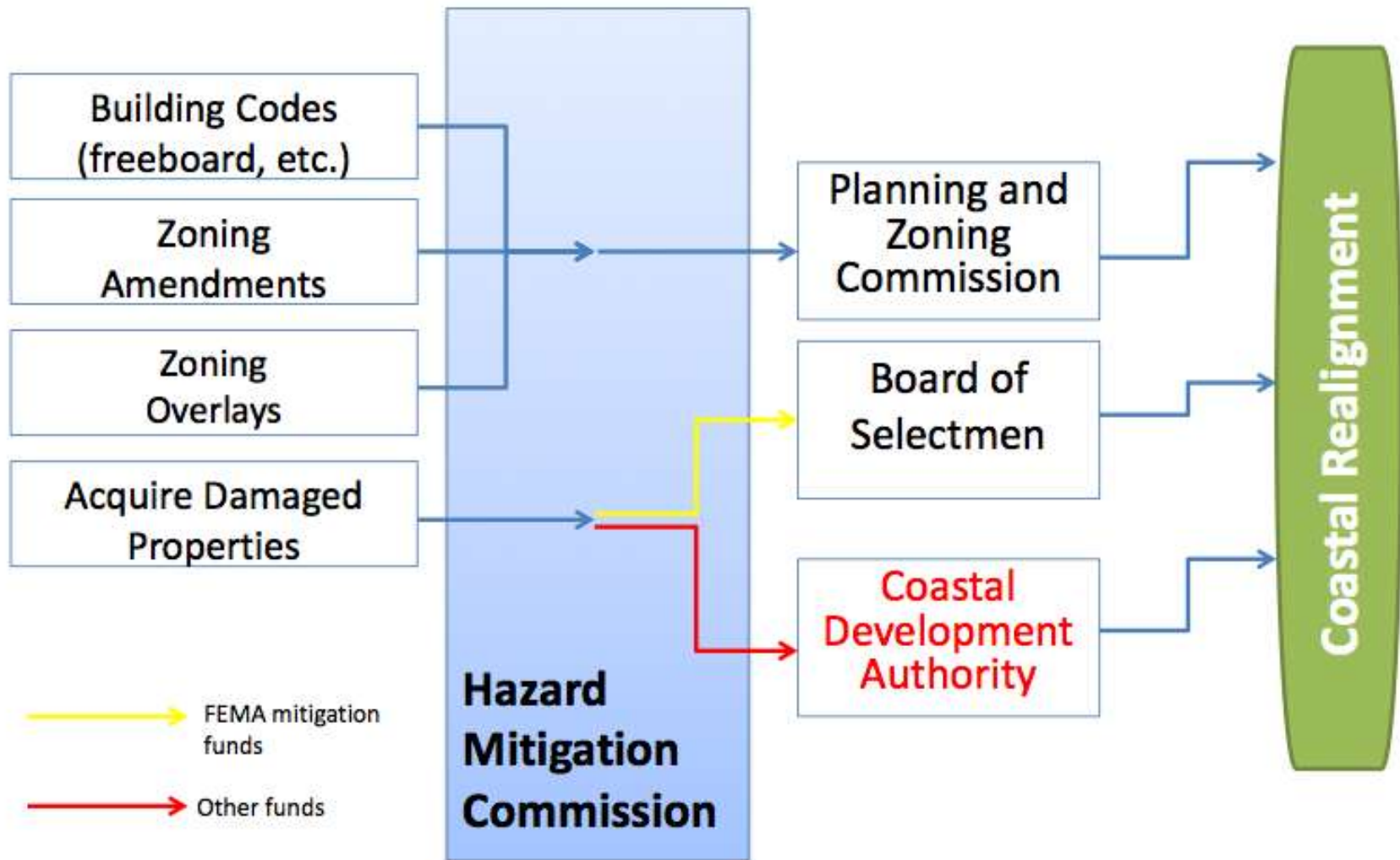
Roads and Roadway Alterations



Protection or Replacement of Water Supply Wells and Septic Systems



Management of Coastal Real Estate and Structures



Guilford Coastal Resilience Planning



Guilford, Connecticut

COASTAL RESILIENCE

NEW YORK AND CONNECTICUT

GET STARTED

The Nature Conservancy

Map Layers

Flood & Sea Level Rise

Community Planning

Future Habitat

Habitat Explorer

Switch Map

Split View

Save & Share

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The Nature Conservancy 
Protecting nature. Preserving life.™

www.coastalresilience.org

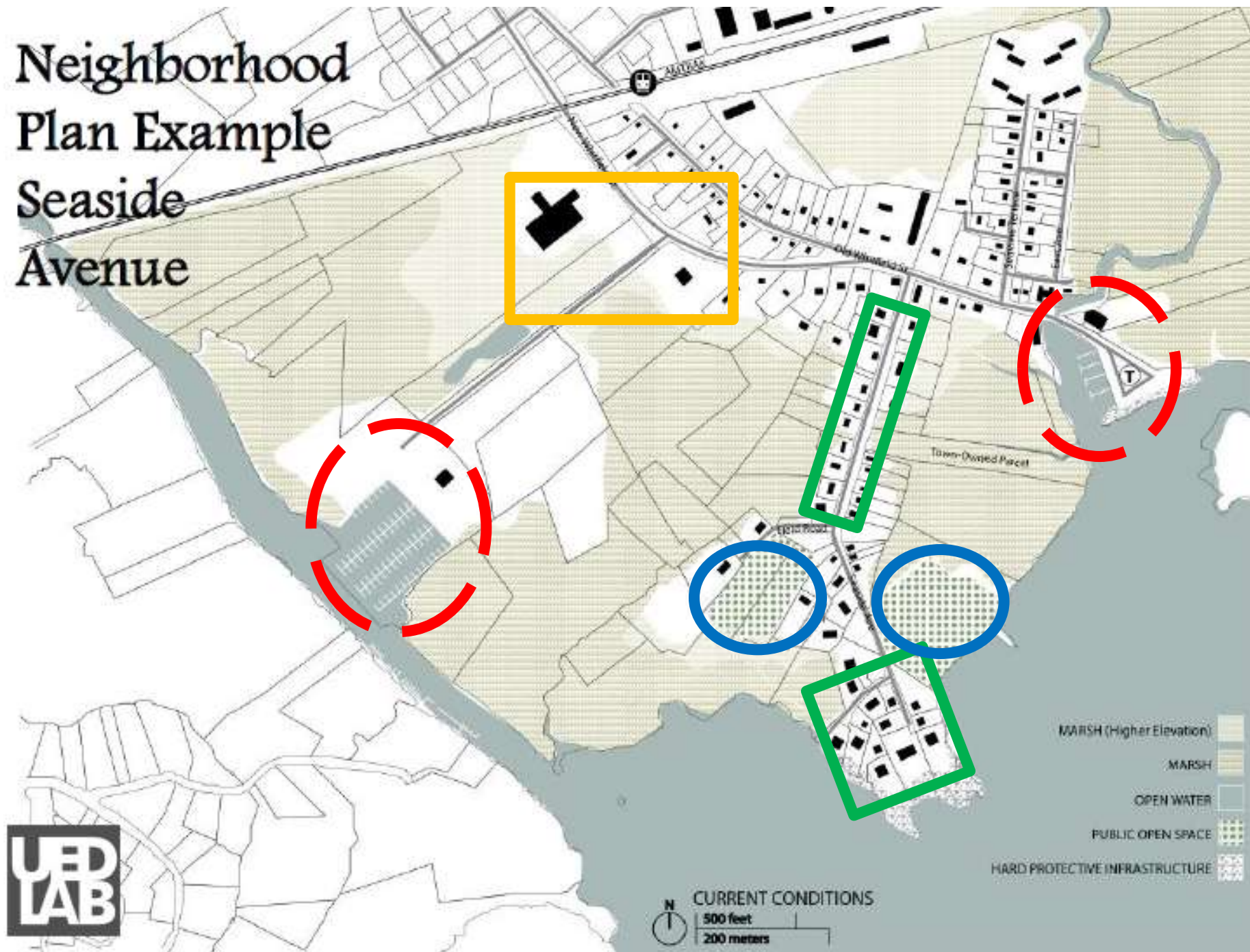
Guilford, Connecticut – Storm Sandy (Source: FEMA)



Guilford, Connecticut – Category-3 Hurricane

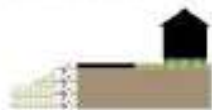


Neighborhood Plan Example Seaside Avenue



INSET 1

Coastal Development Zone
Edge Example A
(see chapter XX)



Coastal Development Zone
Edge Example B
(see chapter XX)



Neighborhood Plan Example Seaside Avenue

Coastal development zone
(dotted line area)

Consider elevating roadway

Culverts to permit
marsh migration

See INSET 1

Seaside Avenue
Temporarily
Possibly: Rezone
remaining residents to
reflect impacts to
emergency services

See INSET 2

Collective
Sewage Treatment
Wetlands become
high marsh and
transition to living shorelines

Consider collective
Sewage Treatment
or WWT for
remaining homes
(if needed)

Consider building
Public Boardwalk

INSET 2



MARSH (Higher Elevation)

MARSH

OPEN WATER

PUBLIC OPEN SPACE

HARD PROTECTIVE INFRASTRUCTURE

SOFT/LIVING PROTECTIVE INFRASTRUCTURE

DRAFT
STAGE 2 EXAMPLE
500 feet
200 meters



**UED
LAB**

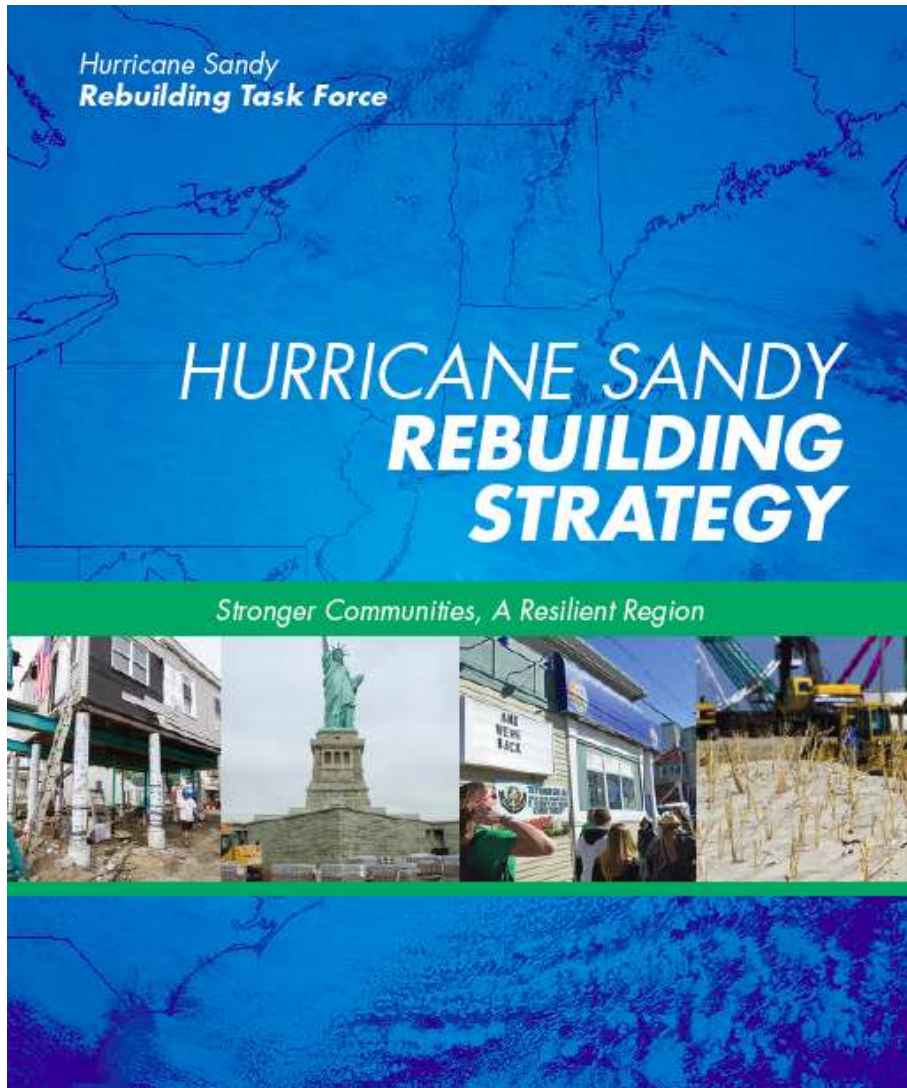


Guilford's Coastal Resilience Program



<http://www.ci.guilford.ct.us/town-documents.htm>

21st century solutions to the 21st century challenges facing our Nation



“More than ever, it is critical that when we build for the future, we do so in a way that makes communities more resilient to emerging challenges such as rising sea levels, extreme heat, and more frequent and intense storms.”

Shaun Donovan
Chair, Hurricane Sandy Rebuilding Task Force
Secretary, U.S. Department of HUD

August 2013

HUD

<http://portal.hud.gov/hudportal/HUD?src=/sandyrebuilding>

REBUILD BY DESIGN

Promoting Resilience
Post-Sandy
Through Innovative
Planning and Design

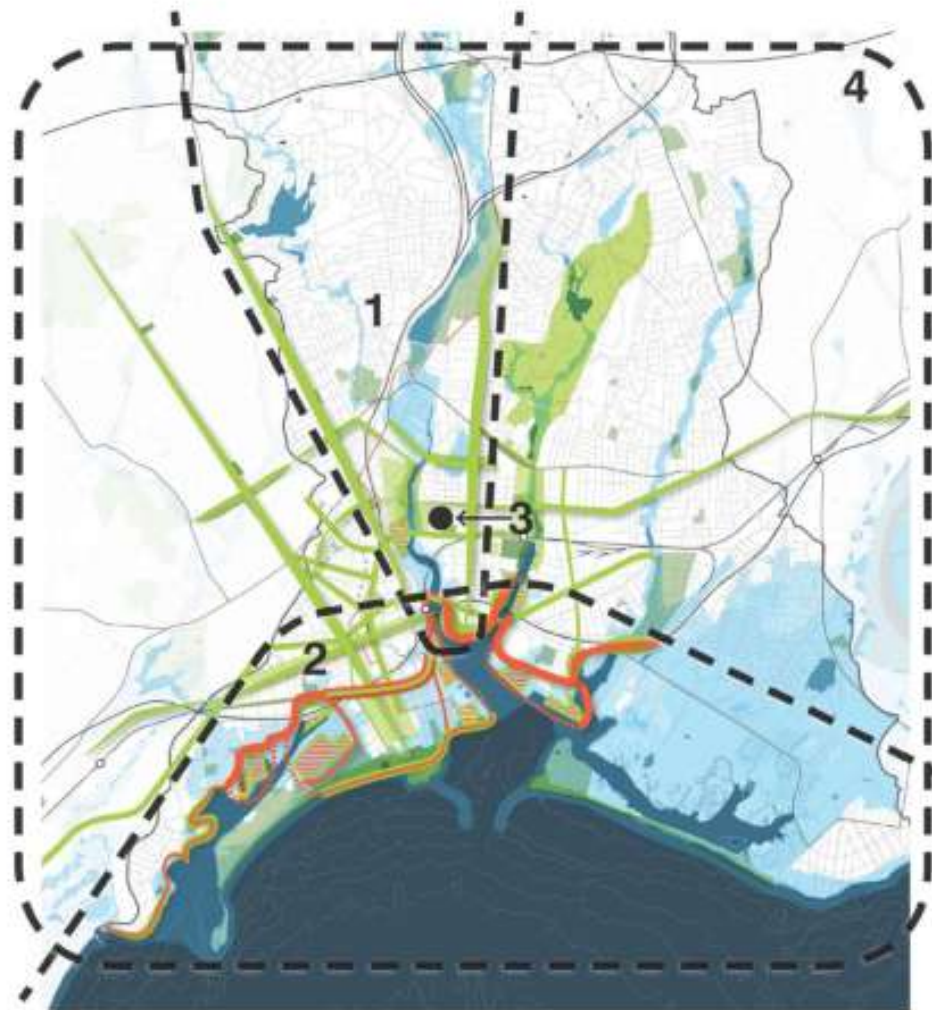
An Initiative Of
The President's
Hurricane Sandy
Rebuilding Task Force

www.rebuildbydesign.org

In Collaboration With
Institute for Public Knowledge, NYU
Municipal Art Society
Regional Plan Association
Van Alen Institute

Lead Supporter
The Rockefeller Foundation

With Additional Support From
Deutsche Bank Americas Foundation
Hearst Foundation
JPB Foundation
Surdna Foundation
The New Jersey Recovery Fund



“Resilient Bridgeport”

- ① **RIVER'S EDGE**
Pequonnock River as Armature for Revitalization
Main to East Main Streets
- ② **COAST**
Building on Backbones
Strengthening Peninsulas and Islands to protect
lowlands and critical infrastructure
- ③ **RESILIENCE CENTER PROTOTYPE**
Transitional, Catalytic Projects
Renovation, Addition and New Construction
- ④ **SOUND/CITY**
Bridgeport as Prototype for Coast Region
Regional Economics, Ecology and Infrastructure



BRIDGEPORT
146,425

3,534 COMMUTERS PER DAY



PEQUONNOCK RIVER
29 SQ MI

"Resilient Bridgeport"

REBUILD BY DESIGN: RESILIENT BRIDGEPORT

PROCESS: RIVER DESIGN OPPORTUNITIES



“Resilient Bridgeport”

REBUILD BY DESIGN: RESILIENT BRIDGEPORT

TEAM: RIVER DESIGN EXPLORATIONS



UNABRIDGED: BARNUM STATION



UNABRIDGED: KNOWLTON PARK



YALE: EAST/WEST PEQUONNOCK



WB: PEQUONNOCK RIVER PLAN



UNABRIDGED: BARNUM STATION



YALE: EAST/WEST PEQUONNOCK

Build Up Thick Adaptive Edges; Green Corridors; Revitalization

Take Home: Moving to Resilience

- ❑ Not only existing development and transit but future economic growth and redevelopment
- ❑ Pre-disaster **planning, governance and design** is in fact post-storm prevention
- ❑ Natural Infrastructure can be a cost effective part of the solution
- ❑ Optimism: Proactive **planning, governance and design** increases our flexibility & avoids future costs



Sincere Thanks



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