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Community Planning and Development
National Disaster Resilience Competition

State of Connecticut
DRAFT Phase 1 Application
Connecticut Department of Housing

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Table of Contents

Exhibit A Executive Summary	3
Exhibit B Threshold Requirements.....	5
Eligibility	
National Objective	
Overall Benefit	
Exhibit C Capacity.....	8
Exhibit D Need.....	13
Exhibit E Soundness of Approach.....	21
Exhibit F Leverage.....	28
Exhibit G Long-Term Commitment.....	30
Attachment D Consultation Summary.....	32
Attachment E Maps and Drawings.....	39
Attachment F Benefit-Cost Analysis.....	92
Opportunity for Public Comment and Hearing Notice.....	93
Substantial Amendment Criteria.....	95

Exhibit A Executive Summary

New Haven and Fairfield counties were designated as most impacted and distressed due to Hurricane Sandy, the Qualifying Disaster for this competition. Unmet recovery needs in these counties totaled more than \$158 million from housing (\$135,789,167) and infrastructure (\$22,360,508). If Connecticut were to assess all resilient repair needs additional need would be in the hundreds of millions of dollars. The framing Phase I application does not include any specific activities; however, the Idea/Concept is designed to address unmet recovery needs as well as to incorporate resilience to the Qualifying Disaster and future threats and hazards, and will meet the National Objective to directly benefit low- and moderate-income persons.

The Applicant is the State of Connecticut's Department of Housing (DOH). DOH is working with the State Agencies for Resilience (SAFR, pronounced safer) Working Group to prepare and implement the NDRC proposal. SAFR includes representatives from nine state agencies working on all aspects of resilience from safety to infrastructure to environment to economics to insurance. Additional partners include the regional Councils of Government, the Connecticut Conference of Municipalities and University of Connecticut and Yale.

The Team designed a comprehensive risk approach, incorporating the U.S. Army Corps of Engineers North Atlantic Coast Comprehensive Study Report data sets for flooding from sea level rise and storm surge, the social vulnerability index and critical at-risk assets, including 815 multi-family housing units and nearly 4000 single family homes damaged by Sandy and the infrastructure and emergency services supporting those communities. The magnitude of Connecticut's economic vulnerability is measured in billions of dollars: Sandy - \$19.9 billion (Moody's Analytics) and insured property within 30 miles of shore - \$479.9 billion (CDI).

Framing of the state's needs and approach utilized a robust process of engagement including designing an informative website; hosting three public hearings, two open houses and a design charrette; and taking many one-on-one and small group meetings with key stakeholders from municipalities, NGOs, academia and the private sector. The State's concept includes developing strategies for resilient transportation, infrastructure and housing that will allow incremental reshaping of the landscape in ways that respond to climate change. The concept, which envisions development of innovative resilience financing tools, is designed to develop resilient communities, including the transformation of public and affordable housing within the 100-year flood plain along transportation corridors located in resilient zones, which then connect down to shorefront communities via resilience corridors.

The concept is highly leveraged through spending priorities of the State including the Governor's priority of a "best in class transportation system." As a member of SAFR, Connecticut's Department of Transportation pledged to coordinate appropriate projects in their FY15 \$1.7 billion capital budget with the NDRC proposal. Bonding programs for state-sponsored housing (\$300 million) and the Clean Water Fund (\$480 million) for wastewater infrastructure upgrades as well as new programs to fund microgrids and home elevation also support the NDRC proposal.

Connecticut has demonstrated its long-term commitment to building back better through the Connecticut Climate Preparedness Plan, which established a framework for resiliency and advanced legally-mandated efforts to prepare for climate change. Specifically the state has reduced coastal vulnerabilities through the passage of two new laws, dedication of significant resources to the Microgrids program, and creation of the Connecticut Institute for Resilience and Climate Adaptation and Shore Up Connecticut, a low-interest loan program for flood-proofing.

Exhibit B Threshold Requirements

Eligible applicant. The Applicant is the State of Connecticut.

Eligible county. The eligible counties in the State of Connecticut are Fairfield (County/in PMSA 1160,1930,5760,8040) and New Haven (County/in (PMSA 1160,5480,8880). New Haven and Fairfield counties were both impacted by Disaster Number 4087, incident type: Hurricane, incident title: Hurricane Sandy for the incident begin date of 2012-10-27 and incident end date 2012-11-08.

Most impacted and distressed target area. The target areas identified as most impacted and distressed are Fairfield and New Haven counties as a result of Hurricane Sandy (DR-4087). The areas are counties previously determined by HUD to be most impacted.

Unmet recovery needs threshold. The State of Connecticut has Unmet Recovery Needs (meaning needs that have not been addressed by federal, state, or other sources) in the most impacted and distressed target areas of Fairfield and New Haven counties.

Owner occupied housing. DOH is administering an Owner Occupied Rehabilitation and Rebuilding program, targeted to assist 1-4 unit owner occupied properties addressing rehabilitation and mitigation/elevation needs. Tranche 1 (T1) CDBG-DR funding addressed unmet rehabilitation needs, alone or in conjunction with mitigation/elevation needs and Tranche 2 (T2) CDBG-DR funds addressed mitigation/elevation needs of 1-4 unit owner-occupied properties damaged by Hurricane Sandy whose rehabilitation was addressed through insurance proceeds, FEMA assistance and/or SBA assistance. We anticipate expending all T1 and T2 funding allocated to these activities. The Tranche 3 (T3) plan proposes distributing \$6,886,050 to owner-occupied housing and the remaining \$4,572,950 to multi-family, infrastructure, administration and planning and \$10M to Resilient Bridgeport RBD. DOH does not anticipate the number of houses displaced or damaged by the disaster to go below 20. The Summary Table of Unmet Need – Owner Occupied below shows the number of current applicants seeking assistance with remaining unmet rehabilitation or with unmet mitigation/elevation needs, which cannot be addressed with other sources through CDBG-DR, Insurance, FEMA, SBA. Table Legend: R/M = Rehabilitation or Mitigation; Avg. Asst = Average Assistance from other sources (Insurance, FEMA, SBA) and URN = Unmet Need.

County		# Houses	Average Cost	Total Need	Avg. Asst.	URN
Fairfield	R/M	99	\$181,579	\$17,976,315	\$114,393	\$11,324,923
New Haven	R/M	74	\$175,325	\$12,974,098	\$52,139	\$9,115,794
Total Unmet Need After Tranche 3 CDBG-DR Allocation = \$13,554,667						

Multifamily housing. DOH is administering a Multifamily Rehabilitation/Rebuilding and Mitigation program (T1 p. 53), targeted to low- and moderate-income (LMI) multifamily properties with unmet need, emphasizing state or federal public housing. There are more than 815 units of state or federal public housing located within the 100-Year Flood Plain in Fairfield County (T1, p.56) needing rehabilitation and mitigation at a cost in excess of \$240,000,000, with an estimated unmet need of at least \$140,000,000. DOH anticipated using leverage (state taxable and tax exempt bond financing, federal Low Income Housing Tax Credits (LIHTC) (both 4% and 9% credits), as well as conventional housing financing) and thus allocated \$26,000,000 in CDBG-DR funding to address these needs. To date, DOH has targeted the majority of the \$26,000,000 available on three separate public housing replacement activities (T3, p.9). The Summary Table of Unmet Need – multifamily shows remaining unmet need for rehabilitation or replacement of these units. T3 proposes to distribute \$3,000,000 to multi-family with the remaining \$8,459,000 to owner occupied, infrastructure, administration and planning and \$10M to Resilient Bridgeport RBD (T3, p.19). Not all of the funds identified in the “Estimated Assistance Other Sources” column have received commitments, therefore unmet need may be greater than estimated. Table Legend: (T.D.C. = Total Development Cost; CDBG-DR = CDBG-DR Assistance; E.A.O. = Estimated Assistance Other Sources (DOH/LIHTC/Other); URN = Remaining Unmet Need)

County	# Units	T.D.C.	CDBG-DR	E.A.O.	URN
Fairfield	911	\$315,463,287	\$23,230,000	\$191,998,787	\$100,234,500
New Haven	140	\$43,000,000	\$0	\$18,000,000	\$25,000,000
Total URN –Multifamily after Tranche 3 CDBG-DR allocation = \$122,234,500					

Summary of unmet housing need. There is unmet housing need in the most impacted and distressed counties, Fairfield and New Haven, in excess of \$135,789,167 after proposed T3 (Figures 1-3).

Infrastructure. There is damage to permanent public infrastructure from the qualifying disaster, Hurricane Sandy, which has not been repaired in the identified most impacted target areas. There are inadequate funds to complete the repairs because CDBG-DR funds allocated to infrastructure in T1 of \$4,696,110 and T2 of \$30,000,000 have been expended to fund 30 projects of the more than 40 projects identified in a DOH request for information (T3, p.11).

County	CDBG-DR Request	CDBG-DR Allocated	Unmet Need
Fairfield	\$28,909,581	\$18,062,188	\$10,847,393
New Haven	\$32,973,839	\$14,853,047	\$18,120,792

Below are the remaining target area repair needs sent to DOH. The T3 plan (p.19) proposes distributing \$1M to infrastructure and the remaining \$10,459,000 to other areas of housing, administration and planning and \$10M to Resilient Bridgeport RBD. Damage and location: New Haven County: Beacon Falls - Wastewater Treatment Plant - Storm Water Relief Sewer; Meriden - Harbor Brook channel improvements; Milford – Flood study and drainage for Point Beach, river dredging and flood monitoring; Oxford - Firehouse culvert mitigation; West Haven

– river tide gates & footbridge reconstruction, culvert reconstruction; Ansonia-Derby Valley Atmospheric Water Storage Tank. Fairfield County: Bridgeport - Marina Village redevelopment; Fairfield - South Benson storm water pump station; Greenwich - Greenwich Point Park living shoreline; Westport - Saugatuck Island Bridge. *URN = unmet recovery need for repairs and “Other Sources” = other sources of funding (ACE/FEMA/municipal)

County	Cost of Repairs	Other Sources*	URN*
Fairfield	\$15,301,536	\$4,761,250	\$10,540,286
New Haven	\$17,122,742	\$4,302,520	\$12,820,222
Total Unmet Infrastructure Need after Tranche 3 CDBG-DR Allocation = \$22,360,508			

Statement on eligible activity, resilience incorporated, national objective, overall benefit and establish tie-back. Funds will be used solely for necessary expenses related to disaster relief, long-term recovery, restoration of infrastructure and housing, and economic revitalization in the most impacted and distressed areas for which the President declared a major disaster in the aftermath of an event occurring in 2011, 2012, or 2013, pursuant to the Stafford Act. The expectation is to improve the resilience of the most impacted and distressed target area(s) to current and future threat(s) and hazard(s), including effects of climate change. Connecticut has demonstrated taking at least one permanent action to increase resilience in the target area, region or state. With respect to activities expected to be assisted with CDBG–NDR funds, the Application has been developed so as to give the maximum feasible priority to activities that will benefit low- and moderate-income (LMI) families. The aggregate use of CDBG–NDR funds shall principally benefit LMI families in a manner that ensures that at least 50 percent of the grant amount is expended for activities that benefit such persons, unless waived by HUD based on a finding of compelling need.

Benefit-cost analysis. There is no benefit-cost analysis associated with the Phase I application.

Exhibit C Capacity

General management capacity. The State of Connecticut's Department of Housing (DOH) is the Applicant and will coordinate Partners and implement the activities proposed in this application. Under P.L. 113-2, the CT DOH received \$159,279,000 CDBG-DR funds. Governor Malloy designated DOH as the principal state agency for allocation and administration of this funding. DOH currently maintains a dedicated Sandy recovery staff team that has successfully administered, managed, distributed, with sound financial and procurement processes, two rounds of CDBG-DR funding since the Qualifying Disaster (Sandy). The DOH has prepared and executed a CDBG-DR Action Plan and two substantial amendments to meet unmet housing needs of communities most impacted by the storm, including the costs of repairs, reconstruction and new construction which were not covered by insurance, FEMA, or other sources of funding as well as infrastructure repairs, mitigation projects, and planning activities (Exhibit D). Through this process DOH vetted contractors, issued invitations to bid, issued and oversaw contracts, and coordinated efforts with other agencies to receive the proper permits. DOH also manages and funds Shore Up CT, a low-interest mitigation financing program (Exhibit G). DOH's ability to initiate the Sandy program and programs like Shore Up CT show its internal control capacity to quickly launch and implement major projects successfully. In order to provide quality assurance DOH will seek advisory assistance from all Partners, including those in the interagency workgroup, State Agencies for Resilience (SAFR), which was created to facilitate this application. Members of SAFR include lead staff from agencies described below that have expressed support and committed resources to this application and building resilience in the state.

Application preparation. The Connecticut Institute for Resilience and Climate Adaptation (CIRCA) at the University of Connecticut (UConn), a Partner on this application, was contracted to support the development of this application through an MOU with a Partner agency, the Department of Energy and Environmental Protection (DEEP). Through weekly meetings and daily correspondence, CIRCA relied on DOH and Partners through SAFR to develop and review this proposal, catalogue unmet needs, contribute technical knowledge, and support community conversations and outreach. Representatives from DOH, Office of Policy and Management (OPM), Department of Emergency Services and Public Protection/Division of Emergency Management and Homeland Security (DESPP/DEMHS) and CIRCA representatives attended the Rockefeller Resilience Academy. CIRCA will participate in the application process for Phase II and continue to advise the State in its primary role as a resilience research and outreach institute.

Cross-disciplinary technical capacity. The Applicant, DOH, will work across disciplines to achieve project goals, and ensure excellent design quality via the SAFR group, partner with faculty and staff experts from UConn and Yale, and coordinate with the Connecticut Conference of Municipalities and regional Councils of Governments. The Applicant and Partners have

tremendous experience working across disciplines in the following areas: designing, planning and implementing large, complex and comprehensive projects; benefit-cost and data analysis; public works; affordable housing; environmental quality; community engagement; design and engineering; and economic revitalization. Partners' specific capacity is summarized below with additional details in Attachment A.

Cross-disciplinary technical capacity. Applicant. DOH strengthens and revitalizes communities by promoting affordable housing opportunities. The Department seeks to eliminate homelessness and to catalyze the creation and preservation of quality, affordable housing to meet the needs of all individuals and families to ensure Connecticut continues to be a great place to live and work. Major initiatives include the Governor's \$300 million, 10-year capital investment in State-sponsored Housing Portfolio and the Sandy CDBG-DR program, which included data analysis of racial or economic disparities in its Action Plan.

Partners. CT Office of Policy and Management (OPM) is a co-chair of SAFR. OPM functions as the Governor's staff agency and plays a central role in state government, providing the information and analysis used to formulate public policy and assisting state agencies and municipalities in implementing policy decisions on the Governor's behalf. OPM is the coordinator of interagency problem solving efforts, including Transit-Oriented Development, and is the liaison between municipal and state government for this application. The CT Department of Energy and Environmental Protection's (DEEP) mission is to conserve, improve, and protect natural resources and the environment as well as ensuring affordable, clean and reliable energy is available for the people and businesses. DEEP brings its experience as co-founder and co-leader of CIRCA, implementing the Coastal Zone Management program including permitting coastal structures for shoreline adaptation, administering the state's Clean Water Fund, developing energy, climate and resilience policy, and running the Floodplain Management and the state National Flood Insurance Programs. The Office of the Governor (OG) coordinates between initiatives proposed in the application and gubernatorial priorities, including the focus on State-sponsored housing revitalization and the "best in class transportation system" of the Governor's second term. CT Department of Transportation (DOT) strives to provide a safe and efficient intermodal transportation network that improves the quality of life and promotes economic vitality for the State and the region. DOT's \$1.7 billion annual budget (2015) supports many highway, bridge, rail, bus, water, bicycle, and pedestrian capital assets and operations throughout Connecticut, including many adjacent to coastal and inland waterways vulnerable to flooding. DOT brings a wealth of experience on Transit-Oriented Development (TOD); "Complete Streets" designs; Public-Private Partnerships (PPP), Design-Build (DB) projects; alternative design concepts procurement processes; and transportation asset management. The CT Department of Emergency Services and Public Protection/Division of Emergency Management and Homeland Security (DESPP/DEMHS) advises SAFR on emergency management and homeland security programs that encompass all human-made and natural

hazards, including prevention, mitigation, preparedness, response, and recovery components to ensure the safety and well-being of citizens. This includes administering FEMA's Hazard Mitigation Assistance grant programs and Public Assistance Programs and incorporating climate change risks into the Threat Hazard Identification and Risk Assessment, State Preparedness Report and Connecticut's State Hazard Mitigation Plan Update. The Department of Public Health (DPH) vision is for healthy people in healthy Connecticut Communities and is charged with protecting and improving the health and safety of the people of Connecticut. DPH's Drinking Water Section brings the perspective and needs of the State through their oversight of all public drinking water systems, whose infrastructure were directly impacted by Sandy. The CT Insurance Department (CID) provides assistance and information to the public and to policy makers by regulating the insurance industry in order to promote a competitive and financially-sound insurance market for consumers. Connecticut is one of only a few states to request voluntary completion of climate change disclosure surveys from insurance companies. CID advises SAFR on the impacts of mitigation strategies and policies on insurance in the state. The CT Conference of Municipalities (CCM) CCM is Connecticut's association of towns and cities. Its 155 members comprise 95% of the state's population. CCM represents municipalities at the General Assembly, before the state executive branch and regulatory agencies, in the courts and brings trusted community engagement capacity and regional approaches to policy and planning to SAFR. The CT Department of Economic and Community Development (DECD) advises SAFR on comprehensive approaches to economic development and revitalization that incorporate community development, transportation, education, arts, and culture as well productive redevelopment of brownfield properties by promoting smart growth principles and strengthening public-private partnerships. The University of Connecticut (UConn) is the State's land and sea grant institution. Sea Grant has expertise in outreach such as a workshop series on climate adaptation, and grant making including the current Coastal Storm Awareness Program. The UConn Connecticut Institute for Resilience and Climate Adaptation's (CIRCA) mission is to foster resilience and sustainability of vulnerable communities along Connecticut's inland and coastal waterways to the growing impacts of climate change through transferable and replicable adaptation solutions. CIRCA's technical capacity includes: ocean dynamics of Long Island Sound, downscaled precipitation and hydrology assessment, weather prediction, environmental law, economics and policy analysis. CIRCA's faculty have contributed to the National Climate Assessment and regularly advise state, national and international bodies on climate change. The Yale Urban Ecology and Design Laboratory (UEDLAB) sits in both the School of Forestry and Environment Studies and the School of Architecture. The lab studies and reshapes human settlements through research and design with the goal of advancing urban sustainability. The UEDLAB was a member of the "Resilient Bridgeport" Rebuild by Design team and has contributed landscape architecture expertise to green infrastructure and coastal planning projects in New Haven and Fairfield counties. Connecticut does not have county government, thus the regional councils of government (COGs) serve the vital role of providing opportunities and resources to plan regionally. The South Central Regional COG (SCRCOG), Western

Connecticut COG (WCCOG), and Greater Bridgeport Regional Council (GBRC) are partners, facilitate regional initiatives and represent all municipalities in our MID-URN counties. Many SAFR partners come to the project with multi-agency collaborations already underway, such as TOD, brownfield, preparedness and hazard planning.

Maintaining partner capacity and obtaining future capacity. We have secured Partners with a wide array of overlapping capacity and areas of expertise. This redundancy provides security as well as great team depth and strength. All Partners are committed to this application and have incorporated one or more aspects of resilience to the impacts of severe weather, sea level rise and climate change into their core mission or programs. Moreover, the Applicant, DOH, has run a CDBG-DR program for the past three years, and will continue to do so if funds are awarded. The Applicant and Partners are engaging additional non-profit and for-profit stakeholders in the application process. The States' procurement laws apply to the competition and to Partners that would become contractors, sub recipients, etc. should funds be awarded. The State intends to engage additional Partners in a Phase II application process, with sufficient time to procure them when applicable, prior to the application deadline. Many of the Partners have existing contracts with firms that could cover projects that will be proposed in Phase II.

Cost-benefit analysis. In order to guarantee responsible use of funding, we will use the appropriate cost-benefit analytical (CBA) tools for all project components. Our Partners have extensive experience with various CBA tools, and will be able to perform or contract for the analysis for proposed projects. DEMHS utilizes FEMA's BCA software to determine cost effectiveness of projects submitted to FEMA's Hazard Mitigation Assistance programs. DOT has an active Transportation Asset Management program with the capacity to inventory, inspect, monitor and prioritize candidate facilities for maintenance and capital project programs. DOT routinely practices scenario planning including no-build alternatives, BCA and other advanced management techniques to constrain its ongoing work program to available revenue sources.

Community engagement capacity. DOH has a commitment to resident and community engagement with established programs for community engagement included in an Action Plan and two substantial amendments for the CDBG-DR program. DOH and SAFR have engaged CIRCA, an institute dedicated to research and outreach for communities impacted by climate change, to support DOH's application. CIRCA's Director of Community Engagement is coordinating the application team. An AIA, LEED-AP nationally-recognized community design and developer is leading the community engagement processes working with the Yale UED Lab and a multidisciplinary team of highly qualified scientists, practitioners and educators. Partner experiences include Rebuild by Design, landscape architecture projects throughout northeast, rebuilding in New Orleans, resilience consultation in China, national resilience charrettes, leading a CDC that rehabilitated over 1,500 buildings, and scholarship on vulnerabilities.

Process for incorporating community feedback. The process to identify unmet needs and design approaches to address these needs includes: early and frequent consultation; documentation and response to comments and suggestions; participatory workshops; and continuing involvement of stakeholders as the projects move into implementation in a Phase II application.

Empower community leaders. DOH supports a number of initiatives to build community leadership including the CT Housing Coalition's Connecticut Emerging Leaders Network and the Affordable Housing Academy and encourages participation through regulations, rating, and ranking. Team members worked with Rebuild by Design in Bridgeport to engage community leaders through a variety of methods including the All Scales Workshop where leaders from more than 40 organizations, including many based in the impacted community, worked alongside a cadre of professionals developing proposals for resilient community development.

Contributions from diverse stakeholders. Team members have extensive experience in implementing and innovating in the area of community development and building through participatory activity. This includes research and publication about the use of social media in community development, development of the first website used as a tool for community comment, development of open house techniques that positively engage divergent voices, leadership development, and community building activities.

Regional or multi-governmental capacity. CT DOH and agency Partners work at a statewide or regional basis. For example, DEEP Office of Long Island Sound Program's staff perform work well beyond the MID-URN, including efforts with the Long Island Sound Study (regional), the Northeast Regional Ocean Council (Northeast), and the Coastal States Organization (national).

Regional resilience. Exhibits B and E elaborate on the benefits of a regional solution. Our objective is to develop best practices that can be applied throughout the state, region, and nation, where appropriate. The State has considered how a regional approach could reduce economic disparities and improve choice and opportunities using transit-oriented development with options for resilient affordable housing as a tool for economic resilience for low and moderate-income persons. DOH will work regionally through its own initiatives and through the initiatives of Partner agencies, CCM, and the MID-URN Council of Governments. Collectively, DOH and Partners have extensive statewide, regional, and national contacts.

Applicant and multi-entity organization. DOH is the lead agency making all final allocations of funding; however, the DOH will coordinate and plan all projects with Partners, specifically those of SAFR, including the CCM and COGs to ensure benefits are shared regionally.

Exhibit D Need

Vulnerability. Sandy demonstrated the vulnerability of the Connecticut coastline. As part of the New York metro area, Fairfield and New Haven counties form part of the nation's most densely populated coastline. As a result, Connecticut has the second highest exposure of vulnerable coastal assets on the east coast. With more than \$542 billion in assets (or 64% of properties) at risk to coastal storms, only Florida has a greater exposure. Since 1950 NOAA has recorded over 600 severe floods in Connecticut (CT Natural Hazard Mitigation Plan Update, 2014). Though a number of flood control measures exist, most of the coast remains directly exposed to floodwaters.

This exposure will be exacerbated by climate change. As described in the U.S. National Climate Assessment U.S. Northeast Region, New England saw more than a 70% increase in the amount of precipitation falling in very heavy events between 1958 and 2010. Combined with flooding due to sea level rise and storm surges, Connecticut can expect to see more frequent flooding. The state will see a slightly higher than average rate of sea level rise due to post-glacial regional subsidence and it is estimated that by 2050 the Connecticut coast will see a rise in sea levels between 27-50 cm (Kopp et al., 2014). The coast is also vulnerable to nor'easters, which have been striking with greater frequency and intensity since the 1970s. (NEA, 2009)

Comprehensive risk assessment approach- mapping physical vulnerabilities. The U.S. Army Corps of Engineers (USACE) recently completed the North Atlantic Coast Comprehensive Study Report, which included a detailed analysis of vulnerabilities of the state's shoreline. USACE identified areas vulnerable to inundation using SLOSH modeling conducted by NOAA. It established an exposure index to describe population and infrastructure density, social vulnerability, and environmental and cultural resources, which were combined to identify areas with a higher flood risk (Figures 4-11). This assessment identified 15 areas meriting further analysis, eight of which fall within the MID counties (Guilford, Branford, East Haven, New Haven, Milford-Fairfield, Westport- Norwalk, Darien, Stamford-Greenwich) (Figures 12-13).

Our vulnerability assessment therefore focused on providing a more detailed analysis within these previously-identified areas to help guide eventual project selection. Vulnerable areas were mapped based on the following factors: 1) within the 100-year flood zone, 2) expected to be affected by sea level rise by 2050, 3) have the least topographic change, 4) are built on glacial deltas or filled wetlands, 5) become isolated due to limited or impassable egresses during times of flooding, and 6) experiencing erosion based on CIRCA's analysis. Next, areas of historic flooding were identified using 1) flooding extent during Sandy, 2) individual properties damaged following Sandy, 3) areas with repetitive and severe repetitive loss properties, and 4) areas with the greatest damage during Sandy and Irene (measured by expenditure through FEMA's IHP grants). Third, areas of social vulnerability were identified by 1) the Social Vulnerability Index (SoVI®) composite score and 2) low or moderate income areas (identified by HUD for FY2014) (Figures 14-29).

Vulnerable typologies. Connecticut includes a range of urbanized coastal conditions that repeat. These vulnerable typologies include complex geology where flooding risk is closely tied to local physical features. The variegated character of the coast makes large-scale collective coastal engineering works, designed to prevent floodwaters from entering, technically challenging and costly. Because of the site variability each community will eventually need to determine how they choose to respond to a changing environment. Despite the apparent physical heterogeneity, the communities that were hardest hit by Sandy and previous storms share many common physical characteristics and land use patterns. These patterns repeat again and again along the state's coastline (Figure 30) and can be grouped into vulnerable typologies (Figure 31). These areas are vulnerable due to both their physical geography and their land use patterns. Understanding the shared characteristics between these areas will help guide responses and prioritize resources. Each typology is described briefly below.

- **Critical infrastructure located on low-lying banks of estuaries.** These areas are vulnerable to flooding from both heavy precipitation and coastal flooding. It can be difficult, expensive, or impossible to relocate these assets to higher ground. Disruption of these critical facilities has cascading impacts on public safety and post-storm recovery.
- **Dense urban areas in low-lying floodplains.** Many of the state's largest cities, e.g. Stamford, Norwalk, Bridgeport, and New Haven, are vulnerable to pluvial and coastal flooding due to their low elevation and proximity to Long Island Sound.
- **Potentially isolated peninsulas and impounded marshes.** Many primarily residential areas are connected to higher ground by low-lying causeways that routinely flood during storms, leaving residents isolated and with limited access to emergency vehicles. These roadways typically cut across marshes, and this disrupts the flow and drainage of stormwater. These restrictions to flow, or impoundments, can be beneficial by limiting or delaying coastal flooding, but conversely they may exacerbate flooding in times of heavy precipitation and may disrupt local ecology. Homes along the fringe of the wetlands are particularly vulnerable to these fluctuations. Over time these areas could become increasingly isolated as sea levels rise. Strategic planning is needed to prioritize investment in retrofitting these connections.
- **Low-lying peninsulas.** Unlike the previous typology, these neighborhoods do not have areas of high ground to serve as areas of refuge. Due to their low elevation the entire access road can become impassable. While elevating homes can protect buildings, access to these properties can be restricted and other systems, including septic and stormwater infrastructure, may fail. Given the potential for high flood depths and wave action there is an enhanced risk of erosion and more dynamic changes in landform as sea levels change.
- **Low-lying, low-density developments.** Many developments on the fringe of wetlands or built on fill are vulnerable due to their low elevation, gently sloping ground, and high groundwater levels, all of which create drainage challenges. Constructing typical coastal defense structures in these areas can be difficult due to the technical challenges with drainage and ecological concerns (i.e. inhibiting marsh migration). These projects may also be relatively more expensive as the low-density development increases the proportional cost.

Exposed beach backed by marsh. These areas are highly vulnerable due to the risk of flooding both from the tidal wetland behind and directly from the Sound. Due to the connections between these two dynamic environments, the ground between them is similarly vulnerable to more dynamic changes as sea levels rise. These narrow areas of high ground (often a sand barrier) are also critical to protecting the marsh, which in turn protects the larger community further inland. These areas are more challenging to protect with structural interventions due to the difficulty of protecting tidal wetlands while restricting the movement of water, high ground water levels, and highly dynamic landforms.

Social and economic vulnerabilities. After reviewing the best and most current scientific data related to our vulnerabilities with experts and community members, we will explore opportunities for specific projects in an extensive planning process (described in more detail in Exhibit E). This process will rely on a more comprehensive assessment of social, infrastructural, and economic vulnerabilities. It will also be informed by recent studies from ACE outlining suitability of coastal infrastructure, a study on long-term land cover changes expected from rising sea levels in Fairfield and New Haven counties, as well as planned transportation, power, water, communications and municipal infrastructure projects. The key social and economic factors that will inform that process are described below.

Housing vulnerability. Flooding and a rising sea level will significantly affect coastal communities, which are home to 60% of Connecticut's population. Sandy damaged 2,853 single-family homes in Fairfield County and 1,165 in New Haven County and more than 32,000 homes lie within Connecticut's 100-year floodplain (CT Natural Hazard Mitigation Plan, 2010), which places over \$18 billion at risk according to FEMA. Where homeowners have maintained the equity in their homes as their only major financial asset, there is a risk of severe financial impacts from flooding. Much of the historic housing stock, in many cases originally designed as seasonal beach cottages, is not adapted to weather strong storms or new flooding risks. Much of the housing stock pre-dates 1990, the first year when provisions addressing wind and flooding damage were included in state law (CT Natural Hazard Mitigation Plan Update, 2014). Substantial and sustained investment is required to adapt these communities to new conditions.

Damage to multifamily housing developments from Sandy was concentrated in Fairfield and New Haven Counties. In total, 1,298 units sustained damage. Three public housing properties (581 units) sustained the most damage. In total, eight public housing properties (815 units) in the FEMA 100-year floodplain need to be elevated, rehabilitated or relocated at a total cost of \$240,000,000 with an unmet need of \$140,000,00. All 815 units are in Fairfield County in Bridgeport, Stratford, Norwalk and Milford (Figure 1). Where public and affordable housing does exist, it is in need of upgrades to mitigate against the effects of climate change. However, equal access to the coast is valuable from a social as well as economic perspective, as it means that an economically-diverse community can live and work around centers of prosperity and economic development. The texture of the coastal society and the success of waterfront

businesses, such as shipping, fishing, aquaculture and water-based tourism, depends on the maintenance of economic diversity within the community. Thus, it is important to retain housing diversity along the coast.

Impacts to infrastructure. Aging infrastructure overall is a challenge which will become more of an issue during extreme weather events. The east-west transportation corridor is particularly challenged as it runs through the coastal towns, and suffers from very high traffic volumes. The coastal east/west corridor is a critical travel link for the Northeastern U.S. because there is no alternative passenger rail route between New Haven and New York City. In several locations the rail line roadbed is the first line of coastal flood defenses as it passes over rivers or through tidal wetlands. I-95 & CT-15 are the primary highway links between New York City and Boston. During storms vulnerable points along these routes hinder the movement of residents and emergency vehicles. This network is affected by flooding due to insufficiently-sized drainage infrastructure and was not designed to accommodate changing precipitation patterns and sea levels.

The water infrastructure was similarly impacted. Local drinking water systems were impacted by Sandy and most systems lost street power; smaller public water systems lost water supply due to the lack of emergency power. In some cases street power was lost for 5-7 days, which made large water system generators vulnerable to failure. Further interconnections between public water systems do not exist in most situations, thereby making the sharing of drinking water during emergency events a particular vulnerability across the two counties. Sewer and wastewater treatment systems were also impacted. By design wastewater treatment plants are located close to receiving waters at the low points so sewage can be cost-effectively fed to the treatment facility without pumping. Many plants were inches away from extensive damage during Sandy and had storm characteristics been slightly different, could have been severely disabled. A rise in sea level may have serious repercussions on the functioning of plants and sewer networks (Fisk *et al.* 2007). Several cities (Norwalk, Bridgeport, New Haven) still have combined sewer systems which are often overwhelmed during times of heavy rain, leading to discharge of untreated or partially-treated waste. A DEEP study found that up to 10% of sewer service areas and up to 5% of pumping stations could be affected by a 1m rise in sea level. Both sea level rise and erosion can undermine private septic systems in the coastal zone. Existing flood defenses, such as berms and surge barriers, were designed for historical storm events and may become vulnerable to overtopping and offer reduced protection as the climate changes.

The state's power generation and supply infrastructure is particularly vulnerable. A significant percentage is in need of retrofitting to protect facilities from flooding. For example, despite protective barriers, a Bridgeport electrical facility has begun to experience occasional flooding at high tide (McCarthy, 2013). Many substations are similarly vulnerable.

Social impacts. We know from Sandy and Irene that storms can cause acute social disruptions. For example, in some instances members of less affluent communities were reticent to evacuate from vulnerable areas due to concerns that their residence might fall victim to looters.

Additionally residents may not understand the risk of staying as a result of vague warning terminology or preconceived notions of safety formed by previous storms (NOAA, 2013). For others, there are physical obstacles: among Medicare recipients in the state of Connecticut, 16,240 people currently rely on medical equipment such as ventilators, oxygen concentrators, dialysis, and enteral feeding (CT DESPP, 2015). For transit-dependent communities interruptions in public services may have cascading impacts if the interruption causes lost wages, or in some cases loss of a job because a person cannot get to work.

Following a disaster, residents need passable roads, functional transportation services, and access to communication networks before normal life can resume. When interruptions of those services persist or recur frequently people may choose to move elsewhere which can lead to lower home values or “checkerboard” communities. When disasters cause residents to relocate, they lose connection to their immediate community (Weil, 2012). Studies show that such disruptions are particularly difficult for lower income demographics (Weiss, 2012).

Proactive planning to identify and minimize the flooding risk and to prioritize development that is adapted for the floodplain or located on higher ground is essential for sustaining the long-term vitality of those communities. Forward-looking development strategies are essential to help maintain socially and economically diverse shorefront communities by ensuring that there is a range of housing choices in these communities. Connecticut’s shorefront communities have a long, historic connection to the coast and their neighborhoods, roadways, and architecture are closely knit to the specific coastal geography. Because of these close connections the disruptive impacts of storms and climate change have the potential to strongly impact the social fabric. Preparation for these impacts can help minimize these social disruptions; however, this requires an organized and sustained planning process. It is necessary to create a forum that facilitates collective learning among community members, subject matter experts, public agencies and private interests. To do this effectively requires assisting community members who may not have adequate access to information or may not have been actively involved in previous planning efforts. Additional attention is needed to communicate with individuals who are non-native English speakers and those with disabilities.

Supporting economically or socially distressed areas is a priority for the State. A CCM report on disproportionate burdens shows that 4 out of the 25 towns in the state categorized as distressed are on the state’s coast (see map). In the MID counties, the distressed municipalities of Bridgeport, West Haven, New Haven and Waterbury were impacted by Sandy. The report states that “Despite their numerous challenges, these communities ... are often regional cultural centers, state cultural centers, employment hubs, and the locations for emergency care centers. They are crucial to the success of the state as a whole. The State has a moral and economic imperative to provide increased assistance.”

Our proposal would support progress toward this longer-term goal (Exhibit E). Using economic development along coastal communities’ rail lines as a driver of economic revitalization will provide for a more resilient economy and will provide additional housing for low and moderate income people (Exhibit E). Increased public transportation options will allow

for a higher quality of life and safe egress under storm conditions for the elderly and others who may not have the option of personal transportation. Access to regional transportation networks also opens up job opportunities, creating a more resilient economic base.

Impact on population groups - risks and opportunities. Many of the areas most impacted by Sandy are also areas with a high percentage of low and moderate-income (LMI) residents (Figures 32-36). When looking at areas potentially impacted by a modeled future Category 3 hurricane an even greater number of LMI census tracts will be affected, particularly in Stamford, Norwalk, Bridgeport, and the greater New Haven area. This clustering of low-income neighborhoods near the coast indicates that there may be disproportionate effects on low-income communities. The Social Vulnerability Index (SoVI) provides another lens and highlights a clustering of socially vulnerable areas in the floodplain particularly in urban areas (Figures 24-29). Minorities (8-67%) and the elderly (13-27%) make up a significant percentage of the populations in many of the impacted communities (Table).

Exacerbating conditions. The state's vulnerability to flooding is exacerbated by several characteristics outlined below; however, addressing flood risks also provides opportunities to simultaneously address these challenges.

- **Extensive brownfields:** Connecticut's industrial history along rivers and the coastline left a legacy of contaminated or potentially contaminated properties. These contaminants can be quickly mobilized during floods or more gradually as water tables rise and shorelines erode.
- **Environmental justice (EJ) concerns:** Several municipalities with unmet needs have state-defined environmental justice communities and traditionally disenfranchised groups.
- **Challenged but improving inter-municipal coordination:** The home-rule tradition in the state has limited inter-municipal planning for transportation, water management, and flood control.
- **Heavy reliance on transportation networks vulnerable to flooding:** The coastline features the densest transportation corridor in the state. Low to moderate income neighborhoods often depend on public transportation for access to work and for egress during emergencies. During major storm events, floodwater can inundate critical transportation infrastructure such as rail lines and underpasses, making evacuation difficult or impossible and hampering recovery efforts.
- **Large income disparities and a shortage of affordable housing in communities of economic opportunity.** Many of the most vulnerable citizens are in need of quality affordable housing. In order to address these needs in an era of constrained resources it is important to add new housing as well as preserve affordable housing presently serving households in need. Connecticut has the second most unequal household income distribution in the country and has had the greatest growth in household income inequality (Hero 2009). Connecticut's highest-income households (top 5%) received a quarter (24.9%) of all the income in the state. The poorest 20% received 3.3% of all income. The Gini Index (a

measure of inequality) for Fairfield County in 2007 was 0.534, one of the highest in the nation (see Figure 38).

Direct and indirect economic impacts. The maritime and tourism sectors are particularly vulnerable to sea level rise, flooding and increased storm activity (Connecticut Climate Adaptation Subcommittee, 2010). The maritime sector, with several deepwater seaports, accounts for nearly \$7 billion of gross state product (Apex, 2010) and employs approximately 400,000 people (Pomeroy, 2013). Tourism is a growing industry (Cartensen, 2003) that could be harmed by disruption of transportation, supporting businesses or diminished coastal environments (Ashton *et al.* 2008). Between 2010 and 2050, the impacts of climate change could cost Connecticut \$9.5 billion in GDP and approximately 36,000 jobs (Sandia Report, 2010). Using FEMA HAZUS10 loss estimation methodology it is estimated that a 100-year flood in Connecticut would incur over \$4.9 billion in residential property damages, \$13.6 billion in other property losses, and \$101 billion from business interruptions (McCarthy, 2013). Insurance claims data indicate that disruptions in business operations, including supply chains, are frequently a direct result of failures in infrastructure networks and are often more costly than direct property damages (Brandes *et al.* Urban Land Institute, 2013). Economic disruptions the state's coastal communities has a cascading impact on the state and regional economy.

Actions taken to address this vulnerability. After experiencing Irene, Sandy and Nor'Easter Alfred back to back, Connecticut invested in preparedness, recovery and mitigation. HUD CDBG-DR Sandy Recovery funds (totaling \$159,279,000) are being used to rebuild and elevate homes, protect the coastline and critical infrastructure, raise roads, install microgrids and backup generators, and plan for coastal resilience. Bridgeport, a finalist in Rebuild by Design, received \$10 million to fund the "Resilient Bridgeport" plan. Many new programs have been established (Exhibit G). The Clean Water Fund provides \$480 million for wastewater treatment and sewer upgrades and has set aside \$103 million that could be used for green infrastructure and sea level rise adaptation. The State also oversees multiple mitigation grants that benefit municipalities totaling millions of dollars in support. The State Legislature passed *An Act Concerning Connecticut Global Warming Solutions* (2008), which called for the Climate Preparedness Plan, finalized in 2013 (Exhibit G). The SCRCOG and the GBRC recently partnered with the Connecticut Nature Conservancy (CT TNC) to develop a coastal resiliency framework. CT TNC and the UConn CLEAR/Connecticut Sea Grant run workshops on resilience for municipal staff. Eversource and United Illuminating, two major utility companies, have invested in preventing future outages. The USACE Sandy Recovery projects in Connecticut include beach restoration (Prospect Beach and Woodmont Beach), breakwater repair (Bridgeport and New Haven), flood protection investigations (Fairfield, Milford and East Haven), hurricane barrier repairs (Stamford) and erosion control (Morris Cove).

Barriers to more resilient solutions. Based on data gathering from 154 municipalities, a recent study identified the top barriers to adaptation as a lack of funding, lack of public information, and prioritization of other issues (Boyer, *Sea Grant Law and Policy*, 2012). Connecticut is a home-rule state where municipalities are self-governing with no county government. The creation of SAFR, and the corresponding planning process has already improved state and regional coordination. Financing needed investments and communicating risk remain substantial barriers. If awarded, our proposal will further a regional approach, prioritize extensive education initiatives, and increase the profile of climate change impacts and preparedness statewide.

Financing improvements to public and private properties and infrastructure will be challenging because of the increased cost of the building techniques required to construct an insurable property in areas where risks are so high. Furthermore, financial incentives between the federal, state, local governments and private entities are currently misaligned and thus do not encourage resilient building in the flood zone.

Insurance coverage. Connecticut's repetitive-loss buildings, many of which are insured by NFIP, have incurred \$218 million dollars in damages (CT Natural Hazard Mitigation Plan update, 2014). The highest concentrations of these repetitive-loss structures are found in Milford, East Haven, and Westport. Recent changes to the NFIP have already begun to affect the market and this is likely to contribute to increased costs of living and a decrease in affordable housing in areas vulnerable to flooding, particularly in shorefront communities. An urgent concern is the lack of adequate insurance coverage. One of the largest barriers to adequate coverage is the perception that it is too expensive or unnecessary. Many property owners, when faced with a tight budget, neglect insurance coverage, particularly those on a fixed income. Others allow their insurance to lapse after their mortgage is paid off.

Exhibit E Soundness of Approach

Consultation process. Outreach activities are described in greater detail in the consultation summary form in Appendix I, and they are briefly summarized here.

Stakeholders. The State Agencies For Resilience (SAFR) formed the core team. SAFR reached out to the chief elected officials in all impacted communities and held interagency calls with each that responded. Team members met with several municipalities and they shared details about specific vulnerabilities revealed during Sandy, their continuing recovery needs, and opportunities to leverage projects. Their needs ranged from more immediate and concrete needs, such as an emergency generator for elderly housing to larger, longer-term social vulnerabilities.

Contact list. We developed an extensive contact list, which will support participation in Phase II. SAFR identified a diverse set of stakeholders and their primary contacts. Team members then identified additional contacts through their extensive professional networks in a diverse range of organizations with emphasis on those serving vulnerable populations. As research evolved, we used a snowball approach to identify and engage more stakeholders.

Vulnerable populations. Team members consulted early on with vulnerable populations and stakeholders including regular consultation with the Connecticut Publicly-Assisted Housing Resident Network and outreach to the Fairfield County Environmental Justice Network (FCEJN) and the Connecticut Coalition for Environmental Justice (CCEJ). Team members reached out individually to potential partners, resulting in many potential partnerships to be developed during Phase II. Additional stakeholders for this project include the housing organizations, environmental organizations, advocates, neighboring Tribal Nations and states, organizations that represent vulnerable populations, individual community members, and employers.

Public outreach. Our outreach to the general public and residents of impacted areas included: publication in the state's primary newspaper, the *Hartford Courant* and *La Voz*, a statewide Spanish-language newspaper; radio announcements submitted to multilingual stations; flyers distributed to libraries, public housing, town halls, and houses of worship; social media including Twitter and blogs; and use of multiple existing listservs from groups such DOH, the CT Association of Conservation and Inland Wetland Commissions, the CT Housing Coalition and TNC. We also created a website with information, resources, the proposal, an opportunity to comment and synopses of the public hearings and open houses.

Public hearings. Three public hearings with open houses provided opportunities to comment on the draft proposal and engage through interactive activities on broader concepts including: unmet needs, vulnerabilities, coastal typologies, resilient landscape visual vocabulary and preference exercise, the approach (strategies for solutions to unmet needs), and a comment and idea station

(allowing comments on the draft proposals and brainstorming innovative approaches). These meetings were held in the MID counties, Fairfield and New Haven, as well as the State Capitol. They were accessible by public transportation.

Design and collaboration process. Our process built upon a number of prior engagement initiatives, many of which included deep participation by vulnerable populations. The results of the engagement undertaken for Rebuilding by Design (with bike tours, an All Scales Workshop, and many stakeholder meetings), The Nature Conservancy's (TNC) Coastal Resilience Planning (including the Coastal Resilience Tool and technical assistance to planning agencies), the Regional Plan Association's SustainableNYCT Plan, and several community-based green infrastructure and living shorelines projects were incorporated in the development of this proposal. Local and the State Conservation and Development and hazard mitigation plans, historic aerials and maps, plans for adjacent areas such as the Eastern CT Sustainability Plan, the Sustainable Knowledge Corridor Plan for the Capital Region, and state and agency plans were also reviewed. This was supported by a design charrette with regional planning organizations at the South Central Regional COG where an outline of the proposal was presented and critiqued. This meeting included representatives from CIRCA, CONNDOT, DEEP, Yale UEDLAB, the Greater Bridgeport Regional Council, the Shoreline Task Force, TNC and the Western CT COG.

Influence on the proposal. Collaboration with stakeholders, partners, and citizens has shaped this proposal in the following ways: addressing multiple needs for comprehensive resilient community development; building on local expertise in finance and insurance; and building replicable solutions for future state, federal and local funding. The cumulative impacts of risks and vulnerabilities identified include populations that lost homes, jobs, and educational continuity for their children as a result of dislocation and transportation failures. Access to health care and public safety due to flooded streets was a concern. Indirect risks and vulnerabilities identified in the target area include sources of contamination. Looting was also identified as a fear causing many to remain in unsafe homes during storm events.

Future plans. Our plans for collaboration, outreach, and communication for Phase II include continuing to work with identified stakeholders, building on Phase I, and developing strategies for working closely with stakeholders in and adjacent to proposed projects. Presentations and workshops will be held in conjunction with regular meetings of residents and neighborhood associations. Stakeholder involvement will continue to include framing issues, determining priorities and communicating preferences. Continuing education and technical assistance will facilitate growth in the ability to fully engage stakeholders in technical discussions. Workshops and charrettes will allow deep engagement in design. Advocacy groups will continue to advise on engaging vulnerable organizations and participate alongside individuals impacted by proposals.

Concept - Approach to addressing risk. A critical role for the State is to ensure a basic level of safety and provide functional infrastructure networks that can deliver emergency services when disasters occur. Connecticut's coastal evacuation and emergency services route network is dependent on the major east-west transportation corridor (95, 1, 15, Metro-North). The vulnerability in the transportation network is most apparent at the local level where many egresses are partially flooded or completely impassable at low-lying points. Such pinch points often occur in underpasses beneath the Metro-North rail line and causeways over creeks, rivers, and wetlands. As these transportation networks lose functionality they increase the risk to residents and increase demands on emergency workers during the storm. Following a storm (and moving forward as sea levels rise) these flooded egresses may impact home values as neighborhoods that are most isolated during storms may come to be seen as riskier and less desirable places to live (Figure 39 & 50).

Connecticut's complex geology and topography (figure 40) means that the most vulnerable areas (shown in blue and green) occur in patches along the coast. This geography also complicates the response to rising sea levels and makes collective, engineered flood control measures (i.e. storm surge barriers, reinforced dunes) more technically challenging and costly. The state's topography also creates opportunities, however, as ridgelines often extend down to the coastline. These high corridors can become a critical connection and lifeline back to the inland areas. By identifying these resilience corridors and strategically investing in their long-term functionality, the state can enhance the safety and livability of shorefront communities in the floodplain. By connecting these corridors back to regional transportation networks, the state can begin to create a resilient network ready to adapt to future flooding.

Resilience zones. This unique physical environment also means that each impacted community within the Sandy-affected area contains areas of high ground (often the historic center of the community), which can serve as resilience zones. These areas can provide safe havens during a storm and over time can eventually house the most critical facilities, resilient housing, and provide key services during storms. Increasing investment in these resilience zones provides an opportunity to increase the economic resilience by strongly tying back to the regional transportation network and regional economic opportunities. Thus these investments have the potential to represent a 'no regrets' approach to climate adaptation as these same investments strengthen communities and economic opportunities in the short term and between storms.

Resilience hubs. The communities most impacted by Sandy are closely linked to this regional transportation network, which provides a unique opportunity to encourage more resilient redevelopment. As seen in Figure 41 many of the most impacted communities are home to the most vulnerable populations including West Haven, Bridgeport, Norwalk, and Stamford. They are also many of the same areas previously identified by the CONNDOT as locations with high rates of poverty with rail service. This map highlights areas where more than 11.6% of the

population is living below the poverty line (shown in green). These areas present opportunities to simultaneously support economic development while building more resilient communities.

Connecticut faces an acute shortage of workforce housing and many of the existing affordable housing units are vulnerable due to their location within the floodplain. Their vulnerability is expected to increase as sea levels rise. We propose addressing these needs by creating new incentives to support the development of mixed-income transit-oriented developments within these resilient hubs (Figure 42). Creating new workforce housing in mixed-income developments would create new opportunities to access desirable job markets and educational institutions in Fairfield and New Haven counties. Encouraging this development would contribute to creating more economically and socially diverse communities and create opportunities to leverage public-private partnerships to address the state's housing needs. Encouraging this development also aligns well with the Governor's prioritization of investment in transportation. Connecticut's economy is closely tied to the northeast regional corridor and demographic and market trends suggest that demand is rising among younger demographics for housing in more compact, walkable communities with access to multiple modes of transportation. Retaining younger residents is an important contributor to the state's long-term economic health.

Creating more attractive centers and providing more housing options will also provide families with housing choice. This will help families select housing locations within their own communities. In the most vulnerable neighborhoods there is the potential that following a disaster some families may not have the financial resources or may choose not to risk future loss or disruption by rebuilding in place. Other residents may find the associated costs of living within the floodplain too high. Providing alternative housing within the same community and school district will help maintain cohesion and ensure their continued diversity. Socially cohesive communities have been shown to be more resilient in the face of disaster and therefore actively supporting formal and informal communities will help shorefront communities become well adapted to the inherent risks of living in such a dynamic environment.

Resilience corridors. The resilience zones are one component of the network (Figure 43) needed to reduce the risk of future disasters. The resilience zones provide support and help ensure the livability of more vulnerable shorefront communities. The two are connected via resilience corridors, which will link critical facilities (hospitals, fire stations, power generation) and provide greater continuity of service to the lower-lying communities. Currently shorefront communities are accessible by a network of roadways many of which become impassable during bad weather or king tides. These vulnerable points have not been systematically mapped and prioritized at the state level. We therefore propose prioritizing and focusing investment along strategic ridgelines to ensure that shorefront community has at least one secure egress.

These resilience corridors will gradually be raised above the floodplain to ensure emergency access and evacuation (Figure 44). Strategic land-use and other infrastructural changes will support this strategy. For example, these corridors could provide additional services

to intermittently flooded properties including community parking. For highly urban areas these can become reinvestment corridors providing new commercial services and more resilient housing close to the desirable waterfront areas, but outside of the floodplain. These retrofits can be combined with other initiatives such as providing enhanced drainage and water storage, increasing the resiliency of the electrical grid by burying utility lines and establishing microgrids, and integrating other modes of transportation such as expanding walking trails and bike paths and connecting them directly with coastal parks. Providing this lifeline will enhance the safety of shoreline residents and may help stabilize the long-term property values. More importantly strategically mapping the vulnerabilities in the existing transportation network and prioritizing urgently needed investment along key roads will help infrastructure funds go farther. The precise form of these resilience corridors will vary depending on the physical geography, existing land uses and housing densities, and local planning and zoning and other federal, state and local regulatory requirements. However, they would all be designed to link directly back to the local and regional transportation networks (Figure 45). Investment along these corridors, which directly link with regional and local level transportation networks, will maximize the immediate co-benefits for residents. These corridors can enhance connections within neighborhoods as well by making it easier to access public beaches and train stations via improved bike paths and walkways. These corridors would also be designed to connect critical facilities, given that many (including regional power generation facilities) are located in the floodplain (Figure 42). Ensuring that the facilities remain accessible during times of flooding can limit the potential damage, shorten recovery time and reduce the costs of storm events. The creation of distributed power and emergency centers at resilience nodes will further expedite recovery. Infrastructure investment within this zone can be further refined to reflect physical conditions and the level of future risk. For example, as sea levels rise, edge roads, which are closer to the water and more prone to inundation, could become less intensively used. Investments could be focused on protecting the more elevated interior roads along ridgelines (Figure 46). Alternately, communities could elect to invest in these edge roads and adapt them to provide additional flood protection, perhaps through the construction of a multi-purpose berm (Figures 47-49).

Shorefront communities and the coastal zone. Additional investment is needed directly in the most vulnerable shorefront communities and along the coastal zone to protect and gradually flood-proof existing neighborhoods. More proactive management is also needed for buffering ecosystems and drainage networks to support the continued livability of shorefront communities. When considering the specific types of interventions needed, it is helpful to remember that the variegated character of the state's coast means flooding risk is closely tied to very local physical features. Because of this local variability each community will need to determine how they choose to respond to a changing environment. However, recognizing the shared characteristics between these areas helps identify how resources can be more efficiently invested. While each community will require a uniquely designed approach based on site-specific considerations, there are also many steps that can address shared challenges and common needs.

- **Expanding access to financing for mitigation measures.** The financing mechanism described subsequently will support elevation, flood proofing, and enhanced floodwater management to continue the long-term transition to more resilient shorefront communities.
- **Creation of resilience nodes that can serve as a refuge during flood events.** Nodes within low-lying communities can provide safe places for emergency operations, parking and access to key goods and service within walking distance.
- **Prioritizing safe access along a resiliency corridor.** This will ensure emergency access to and from the shoreline and reduce the potential for loss of life and property.
- **Enhancing stormwater management with green infrastructure.** Investing in green infrastructure networks to control flooding will enhance the livability of the most vulnerable neighborhoods and will facilitate ecological resilience. These enhancements can be leveraged in conjunction with roadway reconstruction and on-going sewer separation investments (Figure 50).
- **Encouraging mitigation through participation in the Community Rating System.** Only three communities within Fairfield and New Haven counties currently receive discounted insurance premiums through their participation in the CRS. Expanding participation has the potential to save shorefront communities \$3.9 million dollars annually. Currently the administrative burden is too high for many municipalities, therefore the feasibility of dedicating new resources through the state or regional organizations will be explored.
- **Enhancing or creating naturalized storm buffers.** Greater protection is needed along the coast to ensure that existing buffer areas such as dunes and wetlands continue to provide protection as environmental conditions change. There are many opportunities to construct, enhance, or restore protective areas both onshore and offshore while enhancing public access, biodiversity, and the aesthetic value of coastal recreational areas. These potential projects such as dune reinforcement, beach nourishment, or the creation of living breakwaters have been shown to reduce the risk of wave damage, erosion, and stabilize the shore with time.

Financing resilience. Innovative financing mechanisms are needed to support the long-term transition. We intend to lower barriers to investment in resiliency projects in the state through a partnership modeled on Connecticut’s Green Bank. The Green Bank is the most successful example in the country of financing investing in renewable energy and energy efficiency projects. This program, which may build directly on existing initiatives in the state, will be designed to provide a combination of grants and low interest options for low and moderate-income homeowners and renters, neighborhood associations, taxing districts, municipalities and small businesses. Using a mix of grants and low interest loans can help address gaps in existing mitigation grant programs to reach low and moderate income residents who may not participate in other programs due to the financial hardship required to provide the soft costs up-front or may be reticent to incur additional debt. There are remaining details on how the financing mechanism would be designed, which will be outlined in Phase II; however, Connecticut is very well positioned to take on these challenges. As a state we are known across the country as a center for

financial businesses and insurance, we have the experience of the Green Bank and we already operate three resilience financing programs: the first in the nation microgrid program, Shore Up CT and the Clean Water Fund.

Coherence with existing policy goals. This proposal is closely aligned with the growth management principles outlined in the state’s Conservation and Development Plan including their goals to 1) “Redevelop and revitalize regional centers... with existing or currently planned infrastructure” 2) “Expand housing opportunities and design choices to accommodate a variety of household types and needs” and 3) “Concentrate development around transportation nodes and along major transportation corridors.” The plan also outlines “priority funding areas” where development is actively encouraged. These areas are designated based on five criteria, two of which are designation as an Urban Area and areas within a ½ mile of existing mass-transit stations. There is very clear coherence between the priority development areas and the areas identified by this proposal as key resilience zones. Furthermore this proposal is closely aligned with the Department of Housing’s 2010-15 Consolidated Plan for Housing and Community Development. This plan outlines a vision where “Housing developments will be clustered around pedestrian-friendly areas, in close proximity to employment and commercial centers, schools, public transportation, and around established infrastructure. Connecticut will revitalize its urban and regional centers with mixed-use, mixed-income housing and community development, providing a safe and clean environment to attract an economically and socially diverse workforce.” Additionally, the coastal components of this proposal are closely aligned with the Long Island Sound Study’s Comprehensive Conservation and Management Plan.

Exhibit F Leverage

Outcomes - Long-term solutions and co-benefits. This proposal outlines a long-term vision for moving closer toward recreating more resilient coastal communities where structures in the flood zone are adapted to withstand occasional flooding and protected by attractive buffering ecosystems, where critical services, infrastructure and transport hubs are located on safer ground, and where strong connections exist between the two, allowing emergency access. This transition cannot be achieved with one proposal; however, by heavily leveraging other on-going and planned projects we can make substantial progress in selected communities. This proposal outlines interventions across coastal communities, but primarily focuses on expanding opportunities to create new mixed-income, mixed-use, transit-oriented development in resilient centers. Our proposal includes phased projects with components that will be implemented in the short-term and require upfront funding and components that will support longer-term resiliency. The funding mechanisms, including providing for the long-term maintenance and programmatic costs, will be described for each individual project in Phase II.

Sustainability and revitalization. Promoting development oriented toward regional and local transit networks will reduce climate and air quality impacts from transportation and reduce the pressure on undeveloped land. Expanding housing choice within resilience zones will expand access to regional economic opportunities and help support economically and socially diverse communities. Providing additional housing opportunities within the community also supports long-term community resiliency and social cohesion as residents affected by flooding will have ample housing choices within their own community.

Measuring success. Project-specific metrics will be developed for each program component in Phase II. These metrics are likely to include the number of affordable housing units created outside of vulnerable flood zones or where mitigation measures to achieve greater resilience have been implemented, number of housing units and/or amount of commercial building space built or renovated within $\frac{1}{2}$ mile of a rail station or a bus station, number of property owners with access to affordable financing for mitigation measures, reduction in the number of households with limited or lack of egress from their neighborhoods during times of flooding, and the number of towns participating in the Community Rating System, and reduction in the number (or value) of properties exposed to flood risk.

Leverage - role of partners and stakeholders. The Applicant's partners include State agencies that are involved in major infrastructure projects being undertaken on a multi-decadal time scale (Exhibit C). CONNDOT has committed to coordinating applicable activities in its Capital Infrastructure Plan with the CDBG-NDR proposal. Many of their assets are adjacent to tidal waters and have a direct role in coastal resiliency. The regional partners, CCM and the COGs (Exhibit C), as well as engaged municipalities (Attachment D) will be key to implementation and

maintenance of projects and have been active in the developing this application. Members of the CIRCA Advisory Committee, including representatives from the insurance industry, private electric and water utilities, former legislators, CT TNC, Connecticut Fund for the Environment, CT Audubon and municipal and regional officials voiced support and willingness to advise the application. The Applicant will engage this committee, and the CDI, on impacts of proposed projects on insurance premiums (Exhibit C).

Co-benefits as leverage. Using transit-oriented development as a tool for economic resilience has the potential to highly leverage private investment as well as public funding from the Governor's second-term priority of a "best-in-class transportation system." Combining multiple upgrades for resilience at the same time i.e., installing green infrastructure for stormwater management while also raising a road, can diversify the funding pool for the same project.

Committed and potential leverage. The State has committed funding to prepare the CDBG-NDR application, including best available science-based vulnerability assessment tools and mapping, planning for regional resiliency that can be applied throughout the state. Many potential sources of leverage for projects in Phase II have been identified including: Connecticut DOT 2015-2019 Capital Infrastructure Program \$1.7Billion FY 2015; State-Sponsored Housing Portfolio revitalization \$300M plan; Clean Water Fund \$480M 2015 (\$103M set-aside for green infrastructure and adaptation); Drinking Water State Revolving Fund \$133.6M SFY 2014&2015; Connecticut Microgrid Grant and Loan Program \$23.1M to date; Shore Up Connecticut home elevation loans \$25M; bond funds under the State's Hazard Mitigation Buyout Assistance Program \$4M; Bond Funds for Beach Erosion or Flood Control Project; Connecticut Institute for Resilience and Climate Adaptation with a seed budget of \$2.5M, but also actively pursuing research grants from federal agencies including NOAA, USDA, EPA, NSF and USAID. The EPA Long Island Sound Study and Connecticut Sea Grant dedicate hundreds of thousands of per year to research investigating coastal issues. The Applicant is also actively reaching out to foundations including the Fairfield County Community Foundation, the Community Foundation for Greater New Haven and the Tremaine Foundation. The Applicant is seeking advice from the Connecticut Green Bank, the Connecticut Housing and Finance Authority and the Housing Authority Insurance Group on successful public-private partnerships for financing (Exhibit E).

Exhibit G Long-term Commitment

Commitment. Connecticut is committed to adapting its coastal communities and this vision is articulated in The Connecticut Climate Preparedness Plan released in 2013. This established a framework for resiliency and advanced legally-mandated efforts to prepare for climate change. Two task forces, the Connecticut Long-Term Recovery Committee and the Shoreline Preservation Task Force, laid the foundation for two new laws: *An Act Concerning the Permitting of Certain Coastal Structures by the Department of Energy and Environmental Protection* and *An Act Concerning Climate Change Adaptation and Data Collection*. The first required the state to consider sea level rise in the state's civil preparedness plan, applications to the Clean Water Fund, state and municipal plans of Conservation and Development, and municipal evacuation or hazard mitigation plans. It also required developing best practices for coastal structures and authorized beneficial use of dredge materials for coastal protection, building on previous legislation authorizing living shorelines (PA 12-101). The second act led to the creation of the Connecticut Institute for Resilience & Climate Adaptation (CIRCA) which was established to conduct research, outreach and education projects to increase the protection of ecosystems, coastal properties and other lands subject to the effects of rising sea levels.

Improving the built environment. One year after Sandy, Governor Malloy announced the creation of a fund, administered by CT DOH, that provides financing for property owners to mitigate flood risk, branded Shore Up CT. The legislature supported this program with \$25 million in bond funds. Shore Up CT helps property owners located in flood zones VE or AE finance or refinance property elevations and retrofitting for flood and wind proofing. Eligible properties include those not otherwise eligible for mitigation assistance programs such as second homes, commercial properties, and owner occupied multi-family units. The program elevates all residential properties higher than the minimum standard to the 500-yr flood height plus an additional foot of freeboard. On average, this adds 3' of protection. This requirement is designed to address the fact that FEMA only identifies the 100-yr flood height and does not currently integrate sea level rise projections into its risk analysis. Shore Up's goal is to complete 20 loans by the end of the first 12 months. Although slightly behind that trajectory, an increase is expected in the spring construction season. Applications have been well correlated with areas hardest hit by Sandy, demonstrating that the program is reaching targeted towns. As the average loan for home elevation is approximately \$125,000 the \$25 million approved bond amount has the potential to improve 200 +/- homes within the initial investment. The program is a Revolving Loan Fund so it can assist homeowners well into the future.

Easements. In areas impacted by both Irene and Sandy some residents have chosen to relocate outside of the floodplain, rather than elevate or flood-proof their homes. In the Old Field Creek area of West Haven floodplain easements have been acquired through the Natural Resources Conservation Service (NRCS) Emergency Watershed Protection Program within the U.S.

Department of Agriculture. The easements will prevent future damages, disruption, or risks to public safety. The easements will also improve water quality and provide critical habitat areas.

Building codes. Changes to building codes and zoning regulations must be enacted at the municipal level. Several coastal communities have enacted regulations providing an additional safety margin for vulnerable structures. Darien, Greenwich, Stamford, and New Haven all require an additional foot of freeboard above FEMA’s base flood elevation (BFE) for all new residential, non-residential buildings, and manufactured homes in the VE, A, AE flood hazard zones. Bridgeport, Fairfield, Stamford, New Haven and East Haven require dry flood-proofing 1 foot above BFE for commercial structures within the AE zone. Stratford requires an additional foot of freeboard for structures in the VE zone. Bridgeport recently added additional design and building guidelines and amended zoning regulations to facilitate elevations.

Floodplain management. Connecticut's Flood Management statutes go beyond FEMA’s requirement. Specifically, all activities (meaning proposed state action in a floodplain or any proposed state action that impacts natural or man-made storm drainage facilities that are located on the property determined to be controlled by the state) be in compliance with the requirements of CGS 25-68d(b) and Section 25-68h-I, and through 25-68h-3 of the Regulations of CT State Agencies. This includes any projects using public funding, whether federal or state. For example, housing projects in a floodplain and using CDBG funds must be elevated to the 500-yr flood elevation. Section 25-68d requires certification of any activity or critical activity within the floodplain, especially “critical facilities” comply with the NFIP and all critical facilities must be elevated to the 500-yr flood elevation. Furthermore, proposals must promote long-term non-intensive floodplain uses and have utilities located to discourage floodplain development. The Connecticut Coastal Management statutes seeks to ensure coastal development proceeds in a way that protects natural resources, minimizes risks to life and property, minimizes shoreline armoring and promotes water-dependent uses including public access.

Microgrids. The state has dedicated an additional \$15,000,000 to the Microgrid Pilot Program. Microgrids include an isolation system so the grid can provide power despite large-scale outages. Two of the initial projects will benefit Bridgeport and Fairfield, communities heavily impacted by Sandy. The Bridgeport project will help prevent critical infrastructure (City Hall, Police Headquarters, Senior Center) from going offline during major events. The Fairfield Public Safety Microgrid project will benefit the town’s emergency operation center, police station, fire department headquarters, a cell tower and the homeless shelter at Operation Hope.

Attachment D Consultation Summary

Agency Name or Stakeholder Group (if applicable)	Agency Type - Target Population (If applicable)	Type of Outreach	- Method of Notification (email unless otherwise noted) - Materials Provided
<i>CT State team</i>	<i>Academic institutions, state government agencies, and regional planning agencies-planning decision-makers and resources</i>	<i>Meeting</i>	<i>- Overview of NDRC application process, preliminary scoping of approach, identify resources, identify engagement partners</i>
Fairfield Environmental Justice Network	Non-profit- environmental justice communities	Invitation	-Solicited input on the application and for outreach to EJ communities, invited organizations to attend public hearings/open houses
CT Coalition for Environmental Justice	Non-profit- environmental justice communities	Invitation	-Solicited input on the application and for outreach to EJ communities, invited organizations to attend public hearings/open houses
CT State team	<i>Academic institutions, state government agencies, and regional planning agencies-planning decision-makers and resources</i>	Meeting	- Identify key themes, strategies, agency priorities, and challenges for resiliency; break-out sessions to discuss coastal resiliency strategies

CIRCA and CT DOH	Approach strategist, community engagement consultant, & state applicant	Meeting	-Review draft concepts, solicit feedback, identify housing needs and approaches to resiliency
CT State team	<i>Academic institutions, state government agencies, and regional planning agencies-planning decision-makers and resources</i>	Meeting	-Review drafts of application sections, discuss strategy
Southern Connecticut Regional Council of Governments (SCROG)	Regional Planning Agency	Meeting	-Review of application process, identify existing resources/plans and redevelopment priorities, coordinate efforts, discuss partnership
CT State team	Application team & CT DEEP	Meeting	-Discuss state commitment to resiliency i.e. policy changes, legislative proposals, municipal progress, and particular CT DEEP programs
CT State team	Application team & CT DOI	Meeting	-Discuss insurance purchasing trends re: disasters, repetitive loss; discuss costs of insurance and funding rules; identify major insurance topic (drought)
CT State team	<i>Academic institutions, state government agencies, and regional planning agencies-planning decision-makers and resources</i>	Meeting	-Discuss leverage opportunities, Rockefeller conference, important dates

CIRCA and CT DEEP	Application team & CT DEEP	Meeting	-Brainstorm Green Bank potential, discuss economic drivers to resilience, identify leverage opportunities
CIRCA, CT DOH, and CT OPM	Application team & state agencies	Meeting	- Discuss procurement and partners process
CIRCA and Shore Up	Application team & state funding mechanism	Meeting	-Discuss the low interesting funding resource for flood-zone properties to raise the building height or retrofitting for flood and wind protection
CT State team	<i>Academic institutions, state government agencies, and regional planning agencies-planning decision-makers and resources</i>	Meeting	-Discuss progress
CT Advisory Committee		Meeting	-Discuss progress
CT DPH, Aquarion Water Company, Darien Water Co., South Norwalk Electric and Water	Utilities	Meeting	-Discuss storm damage, long-term resiliency needs; Discussed needs (including unmet needs) with the three largest municipally-owned public water systems in Fairfield and New Haven Counties (South Central CT Regional Water Authority -New Haven; Norwalk First Taxing District, South Norwalk Electric & Water - Fairfield)
Westport, CIRCA, & State Agencies	Municipal and state decision-makers, CIRCA application team	Meeting	-Introduce NDRC process, discuss storm damage, long-term resiliency needs

Westport	Municipal	Informational Outreach	Westport provided OPM with list of proposed resiliency projects (micro-grid, relocate utilities and emerg. facilities, purchase tidal marshes, education such as Hazard Awareness Week)
Norwalk, Western CT COG, CIRCA & State Agencies	Municipal and state decision-makers, CIRCA application team	Meeting	-Introduce NDRC process, discuss storm damage, long-term resiliency needs
Norwalk	Municipal	Informational Outreach	Norwalk provided OPM with list of proposed resiliency projects (rental assistance, education/outreach, WWTP strengthen)
West Haven	Municipal	Informational Outreach	-West Haven provided description of their unmet needs
South Norwalk Electric and Water (SNEW)	Utility	Informational Outreach	SNEW provided CT DPH with potential vulnerability information
New Haven, CIRCA & State Agencies	Municipal and state decision-makers, CIRCA application team	Meeting	-Introduce NDRC process, discuss storm damage, long-term resiliency needs
New Haven	Municipal	Informational Outreach	New Haven provided OPM with their leveraged opportunities, Stormwater Management Pilot program Study (June 2010), coastal resiliency strategies, and remaining at risk areas
Milford, CIRCA & State Agencies	Municipal	Meeting	-Introduce NDRC process, discuss storm damage, long-term resiliency needs
Milford	Municipal	Meeting	Milford provided leveraged opportunities, hazard mitigation plan, and their application to create coastal resilience through "community

			planning, neighborhood planning, and the community rating system)
Vic Puia W. Locks Ct, E.M.D.	Local Government	Email	Received feedback on town needs and for storm response and shelter operations.
Stamford	Municipal	Meeting	
Stratford	Municipal	Meeting	Site visit and town meeting
New Haven (town engineer)	Municipal	Email	
EPA LISS (Mark Tedesco)		Educational & Meeting	-Met and taught class
USFW/EPA LISS (Georgia Basso)		Educational & Meeting	-Met and taught class
Bridgeport (Steve Hladun)	Municipal	Meeting	-Discuss green infrastructure for coastal adaptation
Floodplain Society (David Murphy)	Professional Organization	Meeting	
Yale	Academic- students	Educational & Meeting	-HUD grant as class project, environmental protection clinic on municipalities with unmet needs, land use law clinic on TOD in Clinton

Eligible grant area	All applicable stakeholders	Public Hearing and Open House	-Newspaper, email, radio -draft application, discussion of unmet needs, resiliency strategies, typologies, vulnerabilities, community visioning
Eligible grant area	All applicable stakeholders	Public Hearing	-Newspaper, email, radio - draft application
Eligible grant area	All applicable stakeholders	Public Hearing and Open House	-Newspaper, email, radio -draft application, discussion of unmet needs, resiliency strategies, typologies, vulnerabilities, community visioning
Libraries in New Haven and Fairfield Counties	Libraries- residents of both counties	Email notice of hearings	-Informed them of grant application, forwarded flyers for the public hearings/open house for distribution and posting -provided flyers and information to stay engaged
Northwest Hills Council of Government	Regional Planning Agency	Email	-Mailing list for updates -provide notice of hearings
Lower Connecticut River Valley Council of Governments	Regional Planning Agency	Email	-Mailing list for updates -provide notice of hearings
Capitol Region Council of Governments	Regional Planning Agency	Email	-Mailing list for updates -provide notice of hearings
Southeastern CT Council of Governments	Regional Planning Agency	Email	-Mailing list for updates -provide notice of hearings
Northeastern CT Council of Governments	Regional Planning Agency	Email	-Mailing list for updates -provide notice of hearings

South Central Regional Council of Governments	Regional Planning Agency	Email, Advisory Position	-Mailing list for updates, interagency advisory role -provide notice of hearings
Greater Bridgeport Regional Council (GBRC)	Regional Planning Agency	Email, Advisory Position	-Mailing list for updates, interagency advisory role -provide notice of hearings
Conservation Technical Advisory Committee (to GBRC)	Advisory to regional agency	Email	-Provide notice of hearings
Acronym List: DOI, DEEP, OPM, SNEW, WWTP, Yclep, EPA LISS, USFW			

Attachment E Maps and Drawings

Figure 1: Hurricane Sandy Impacts – unmet needs for multi-family housing

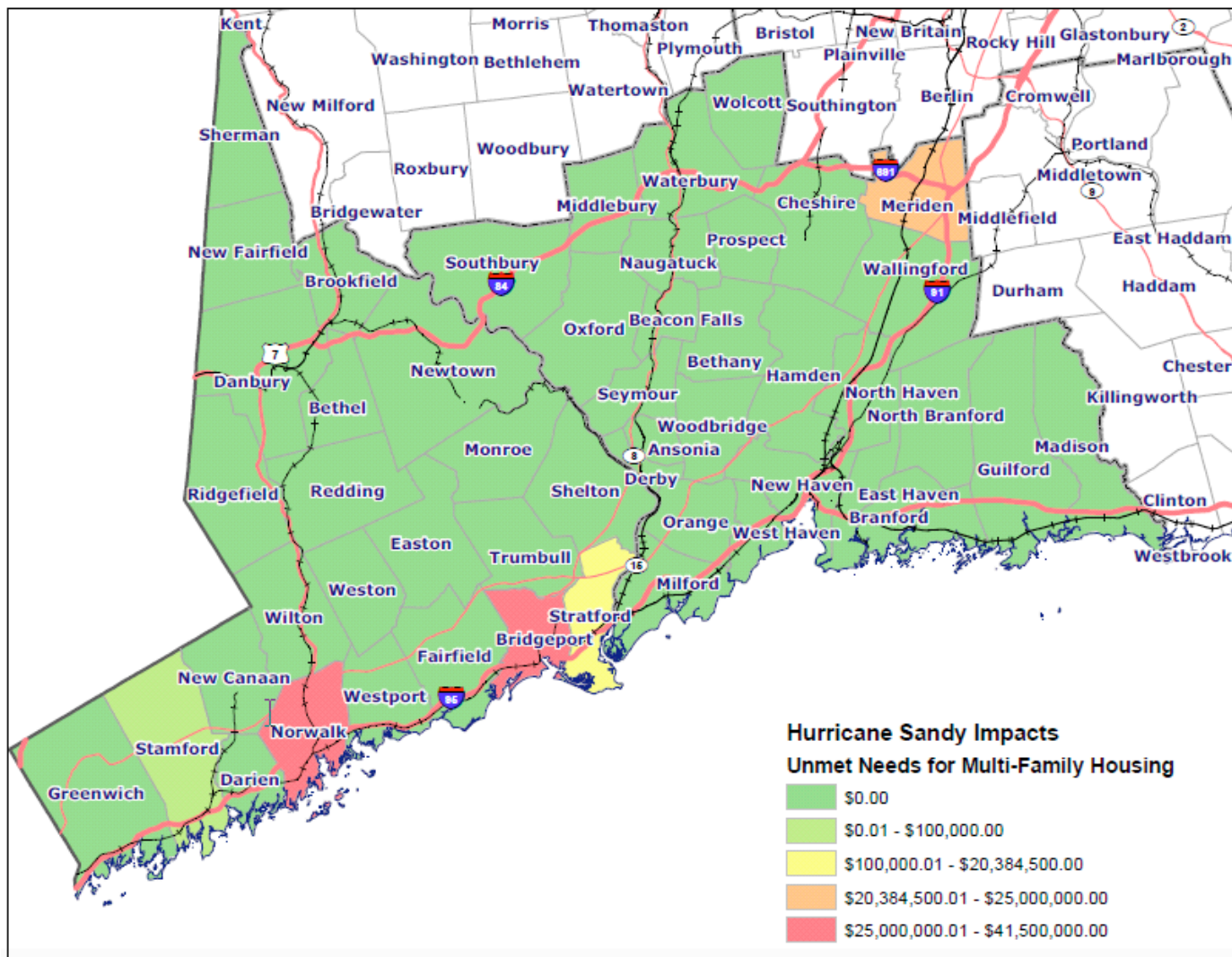


Figure 2: Hurricane Sandy Impacts – unmet needs for owner-occupied housing

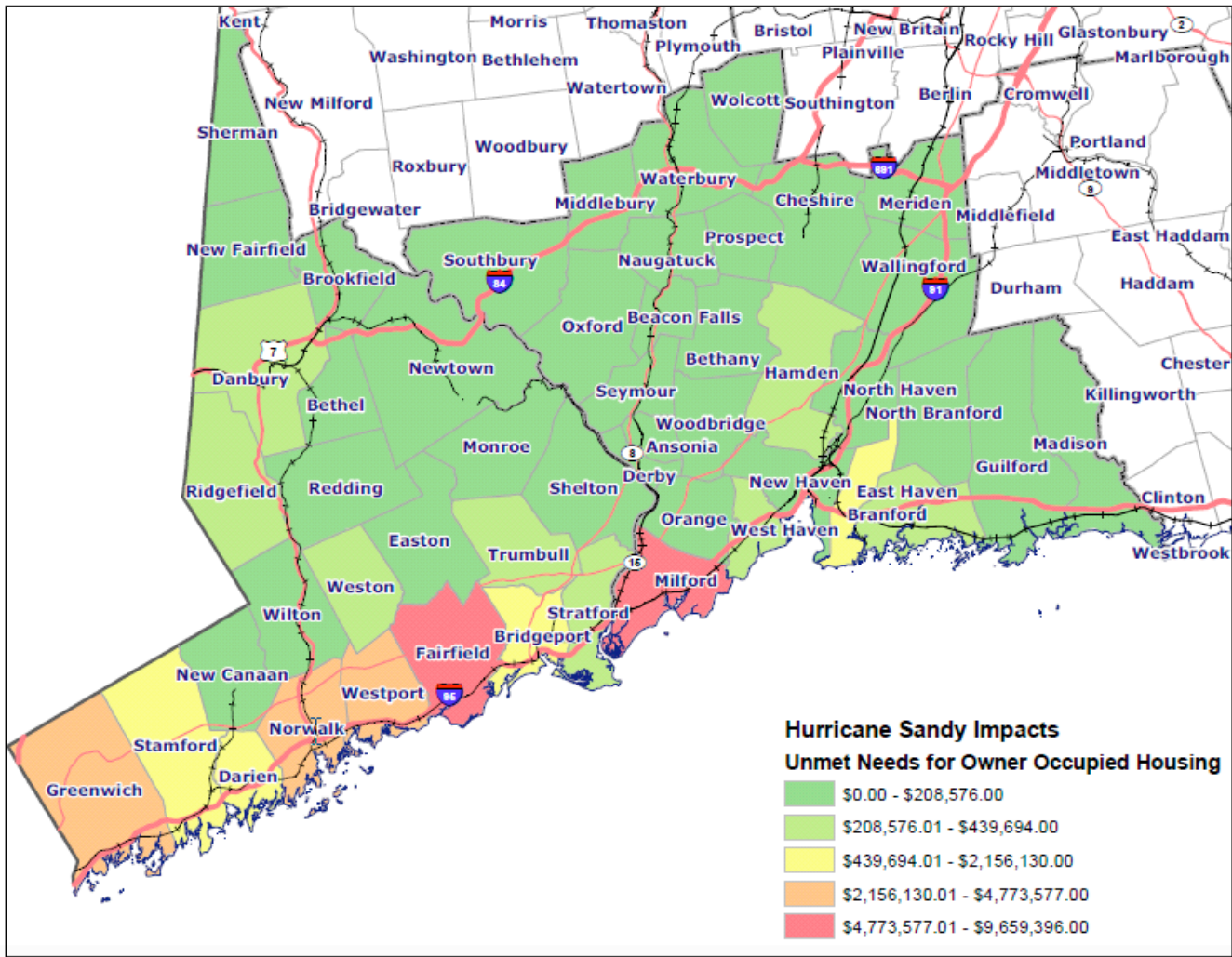


Figure 3: Hurricane Sandy Impacts – total unmet housing needs

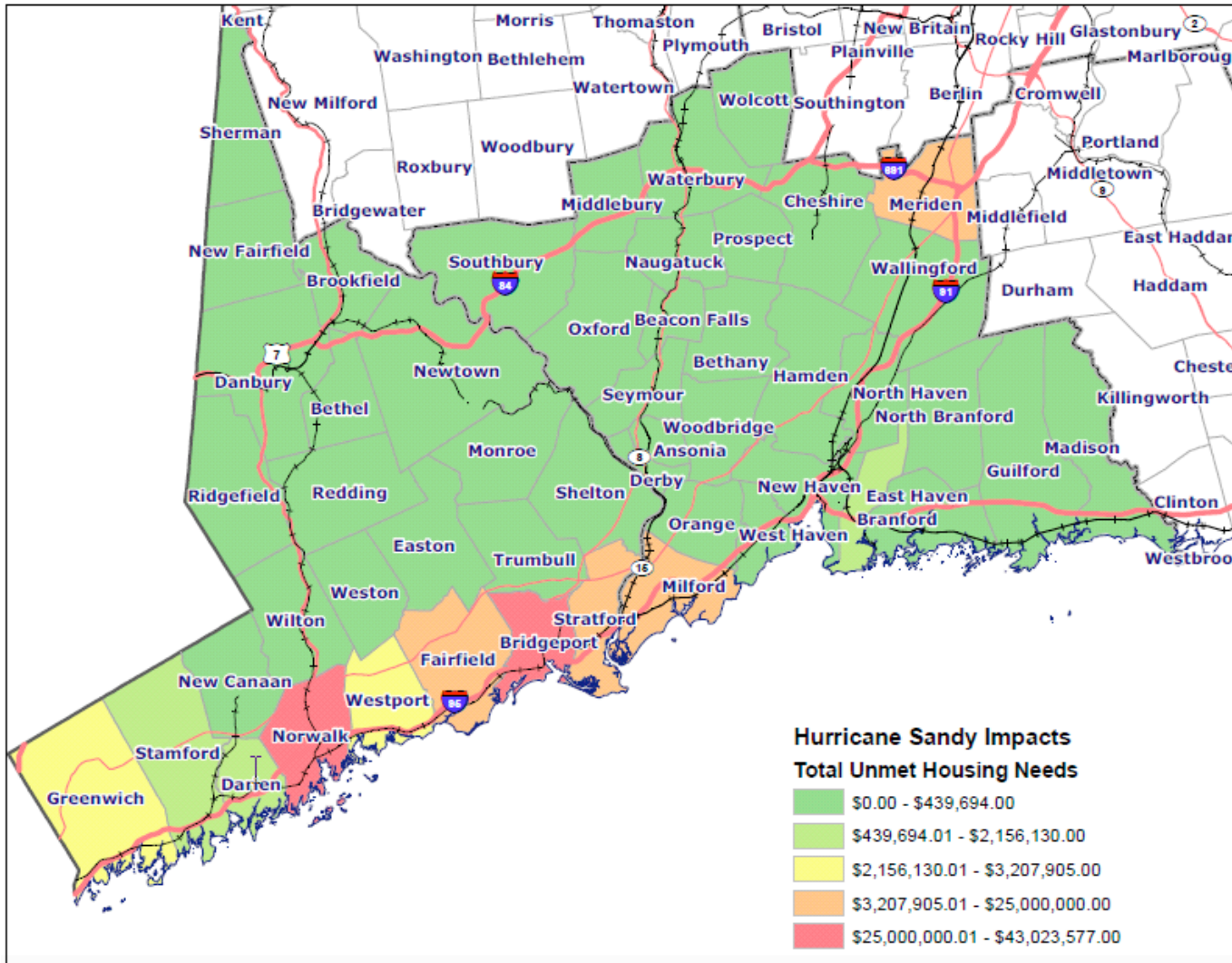


Figure 4: Army Corps of Engineers Environmental Risk Index for Fairfield County

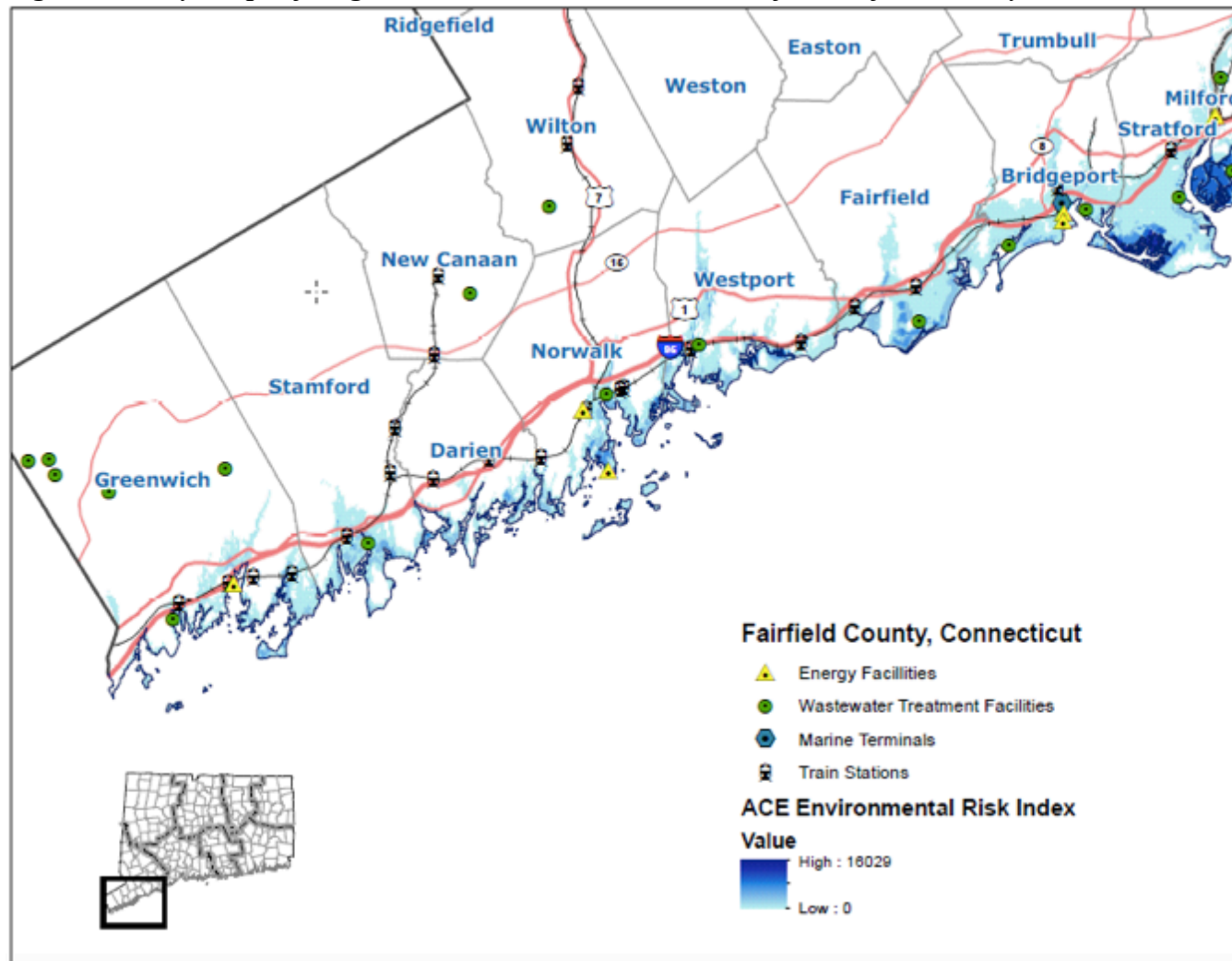


Figure 5: Army Corps of Engineers Environmental Risk Index for New Haven County

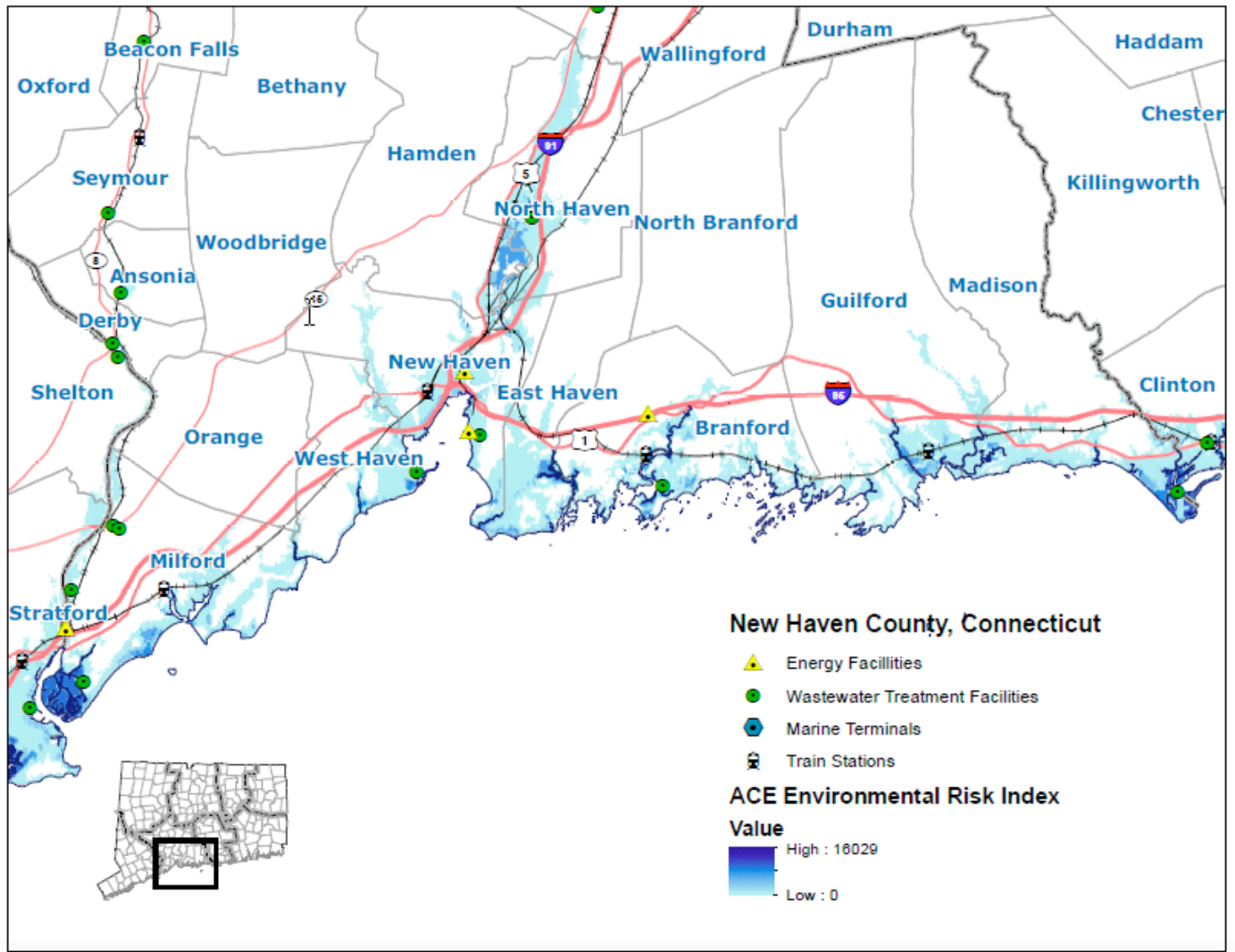


Figure 6: Army Corps of Engineers Social Risk Index for Fairfield County

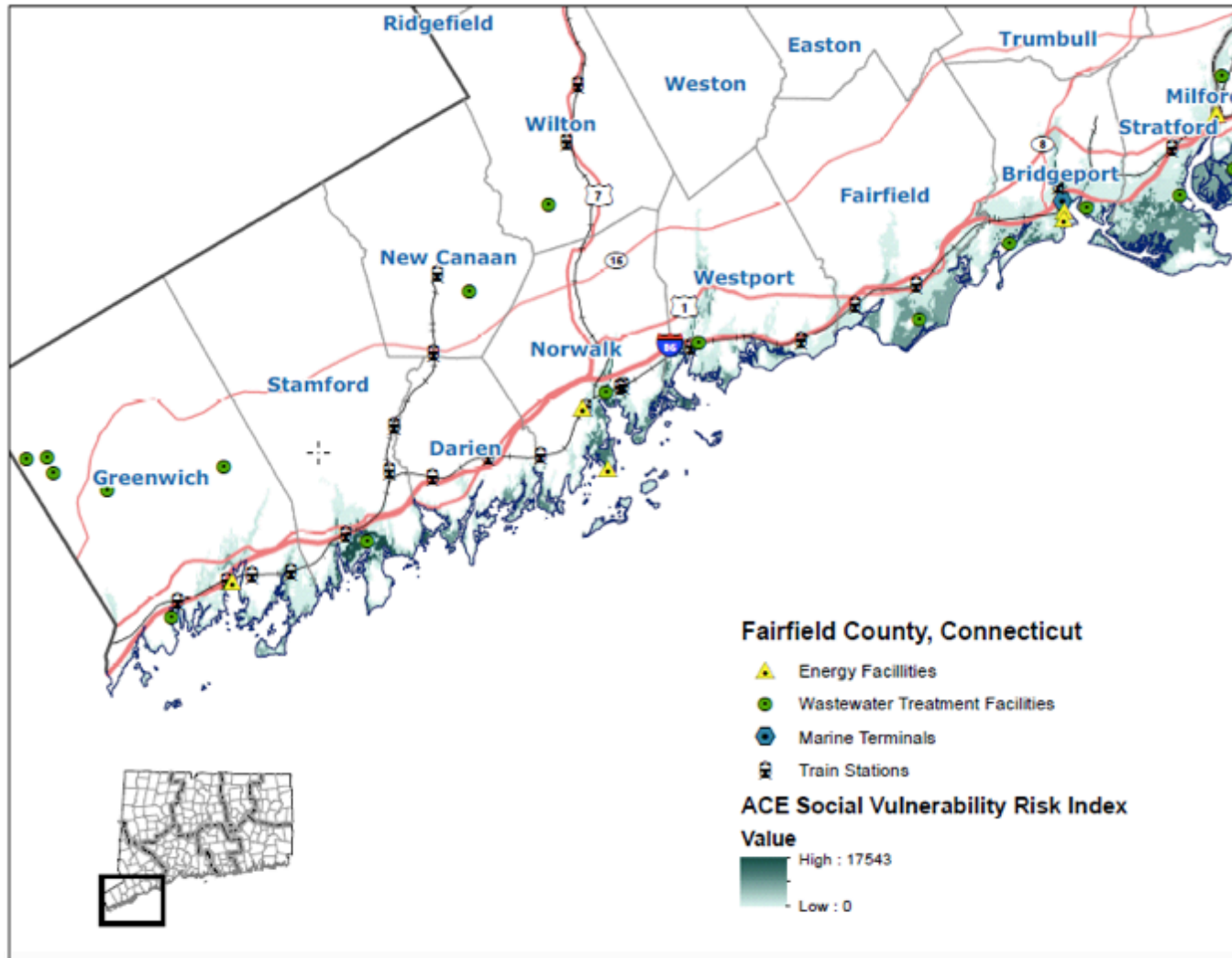


Figure 7: Army Corps of Engineers Social Risk Index for New Haven County

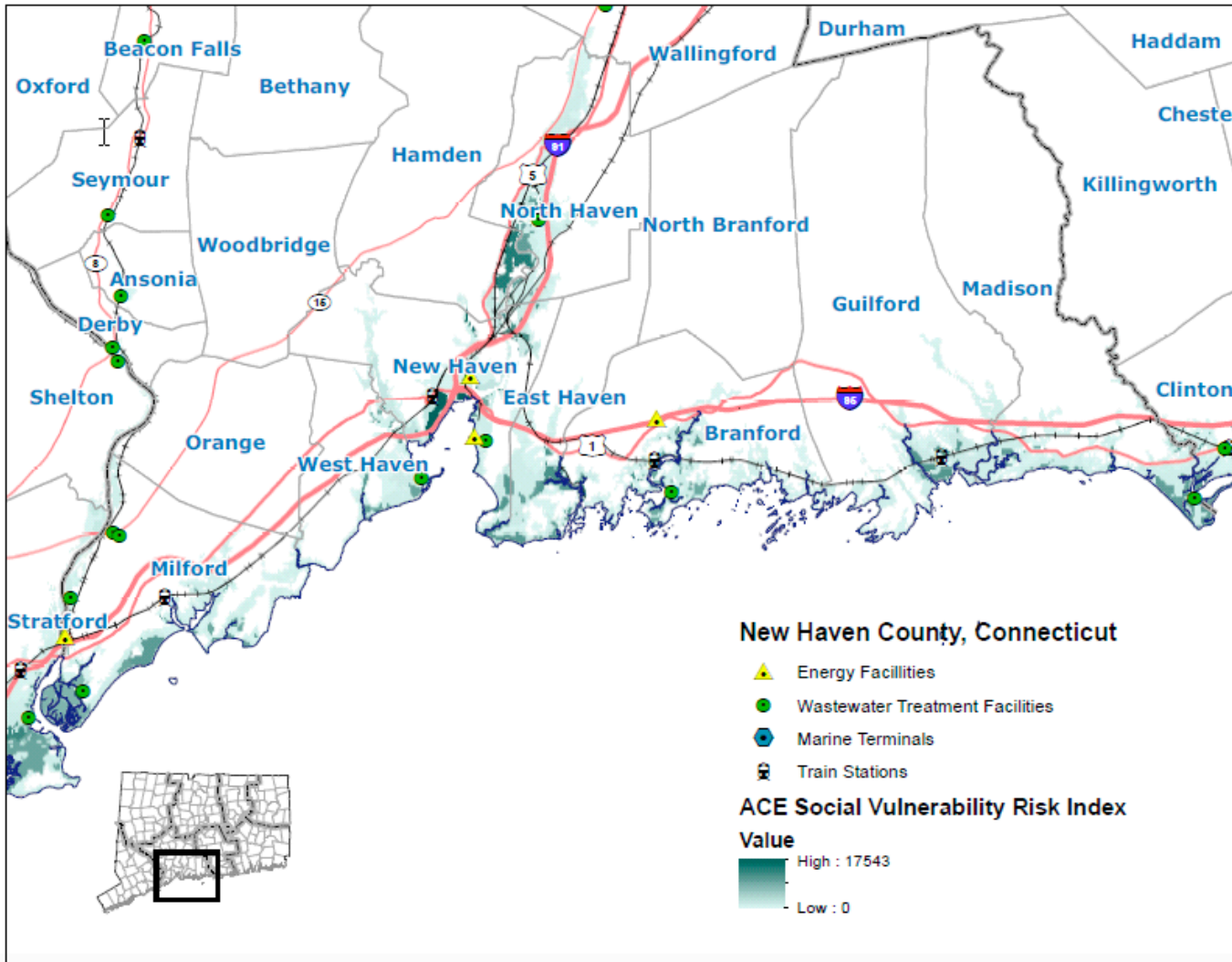


Figure 8: Army Corps of Engineers Infrastructure Risk Index for Fairfield County

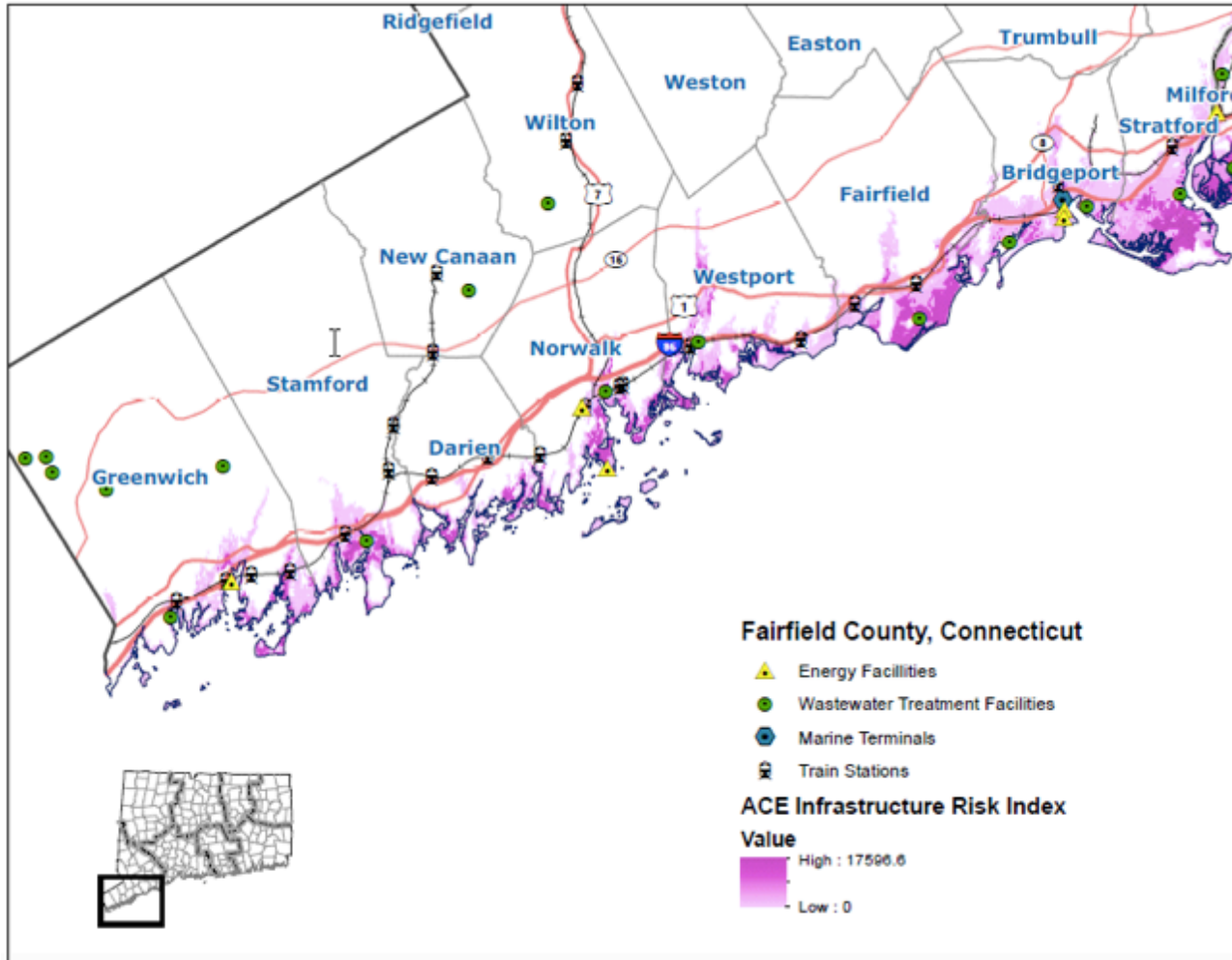


Figure 9: Army Corps of Engineers Infrastructure Risk Index for New Haven County

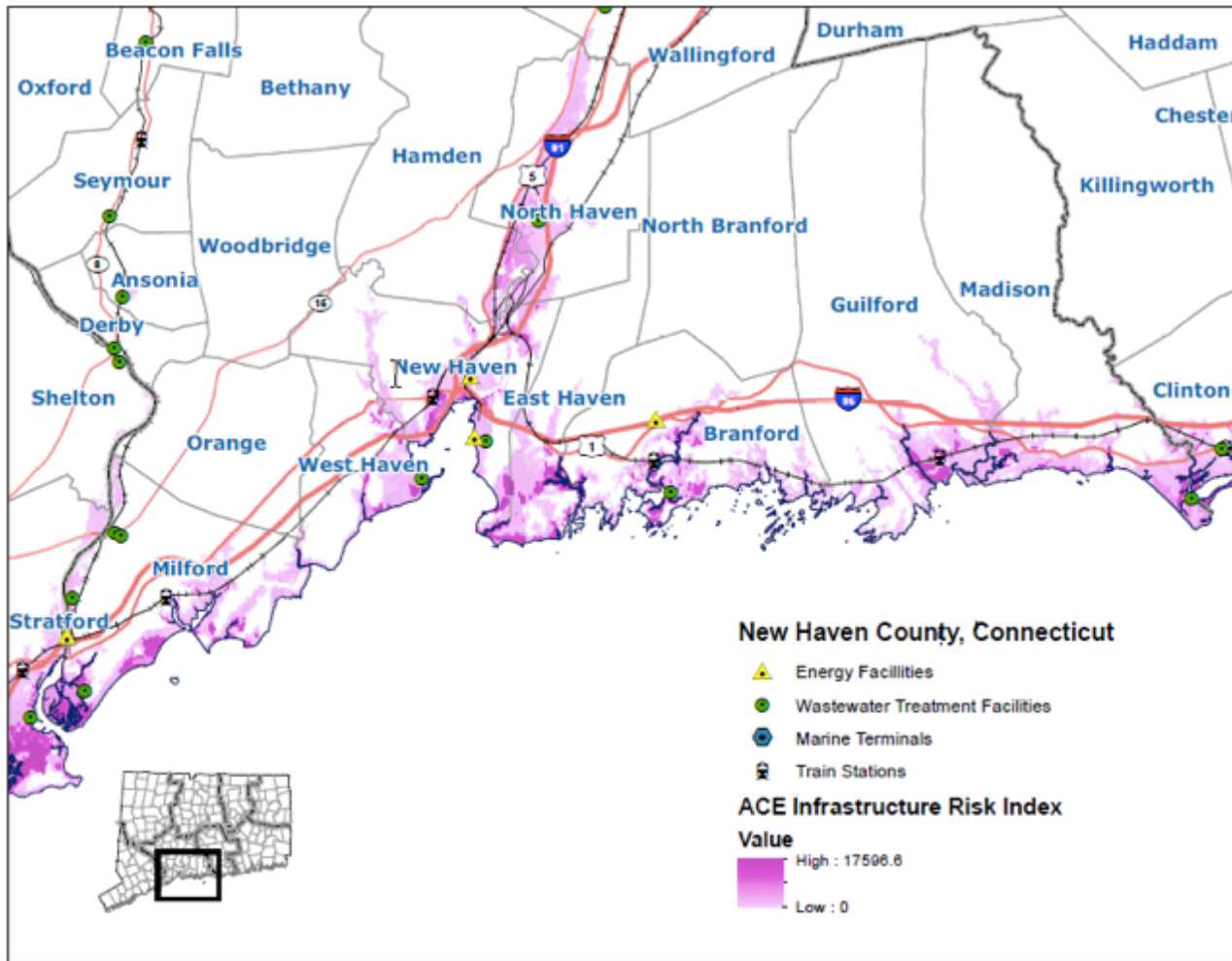


Figure 10: Army Corps of Engineers Composite Risk Index Value for New Haven County

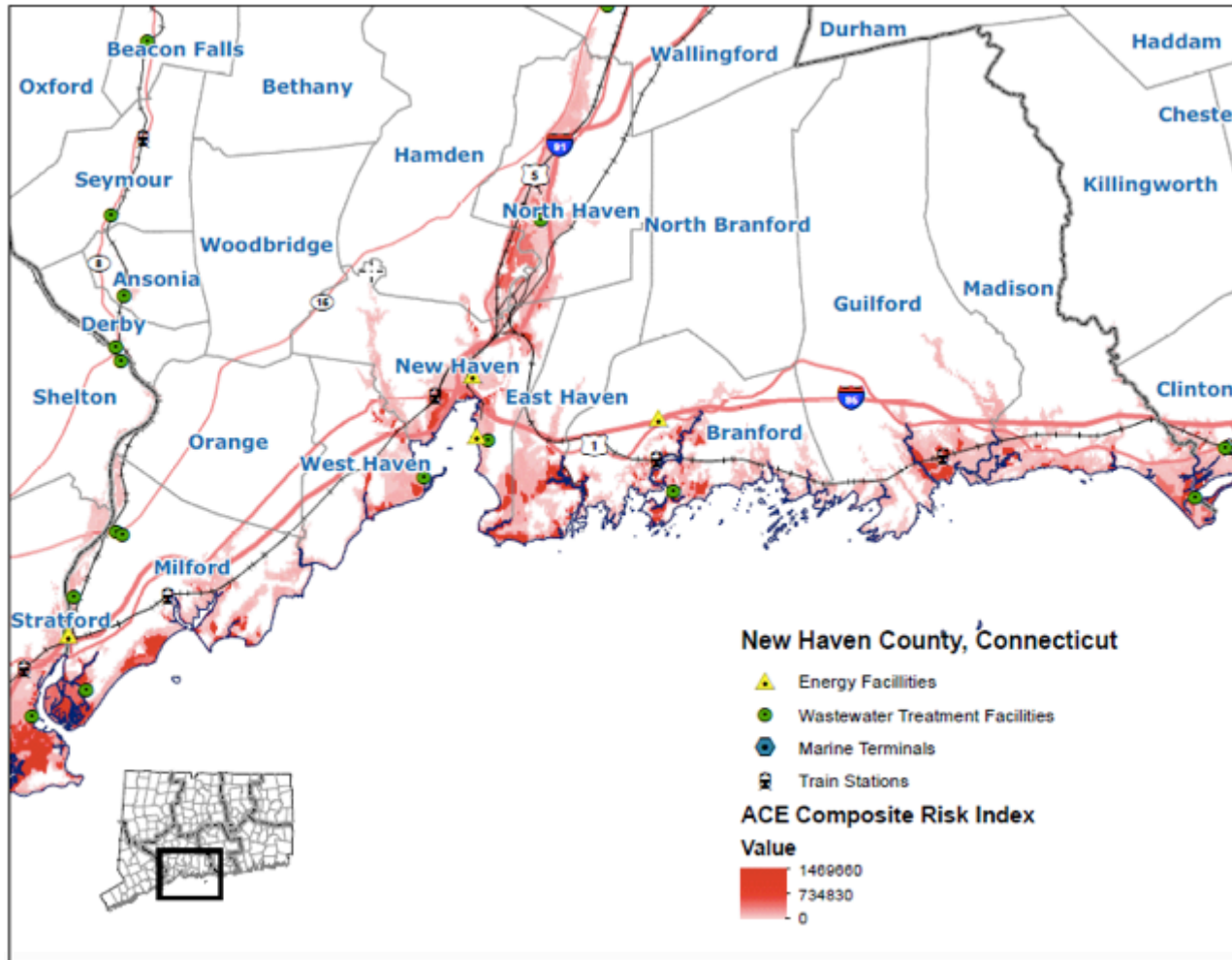


Figure 11: Army Corps of Engineers Composite Risk Index Value for Fairfield County

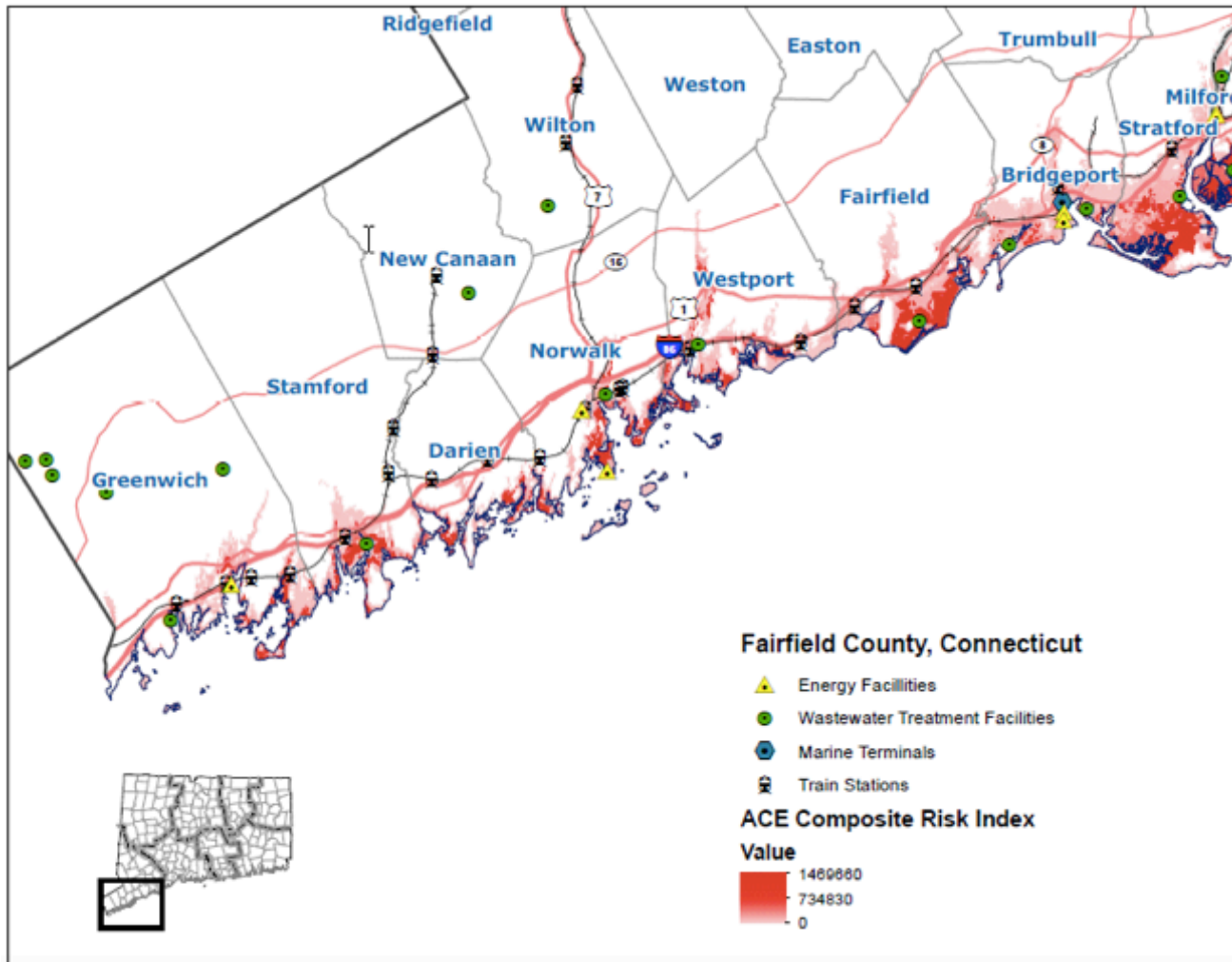


Figure 12: Army Corps of Engineers Risk Areas Fairfield County

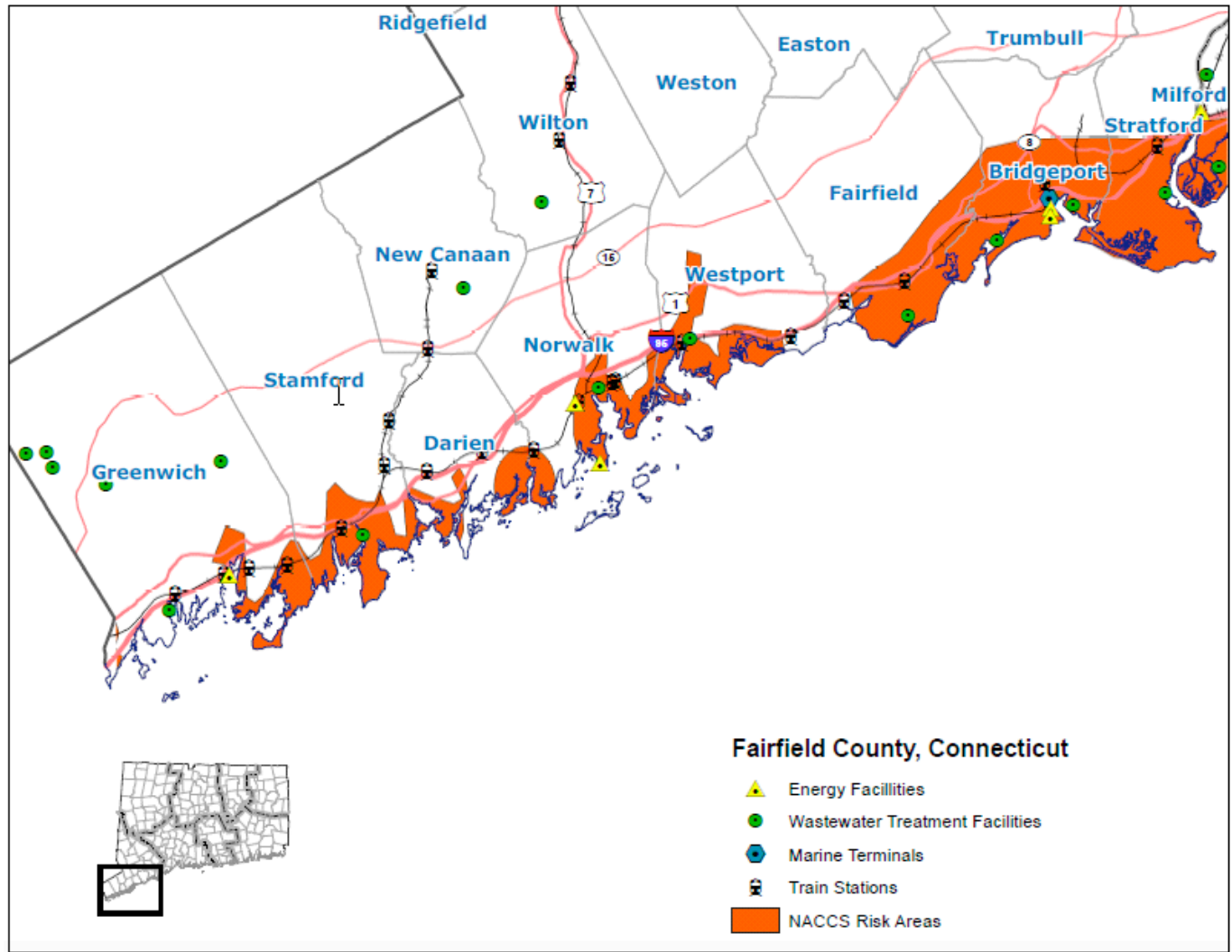


Figure 13: Army Corps of Engineers Risk Areas New Haven County

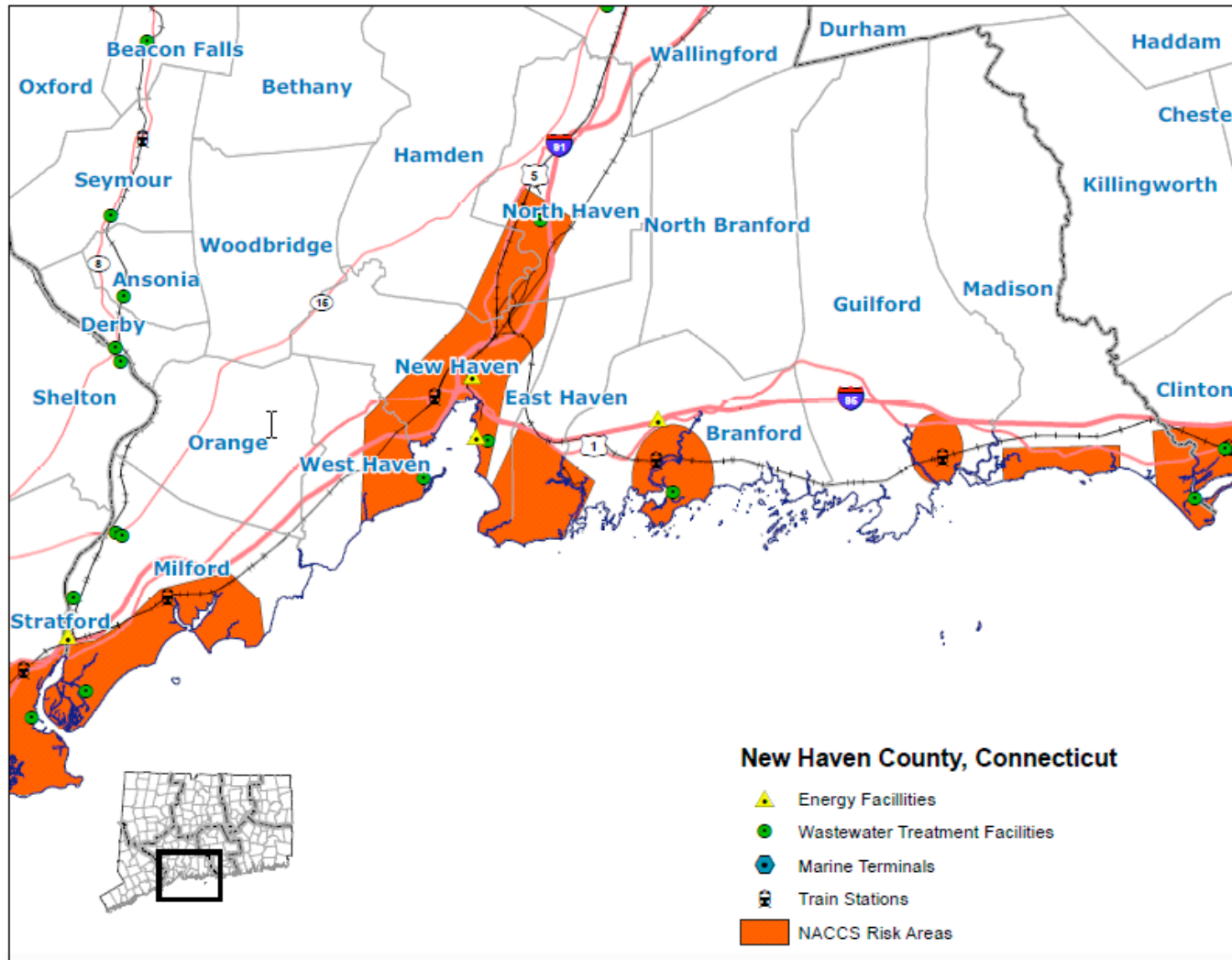


Figure 14: FEMA Flood Hazard Areas for Fairfield County

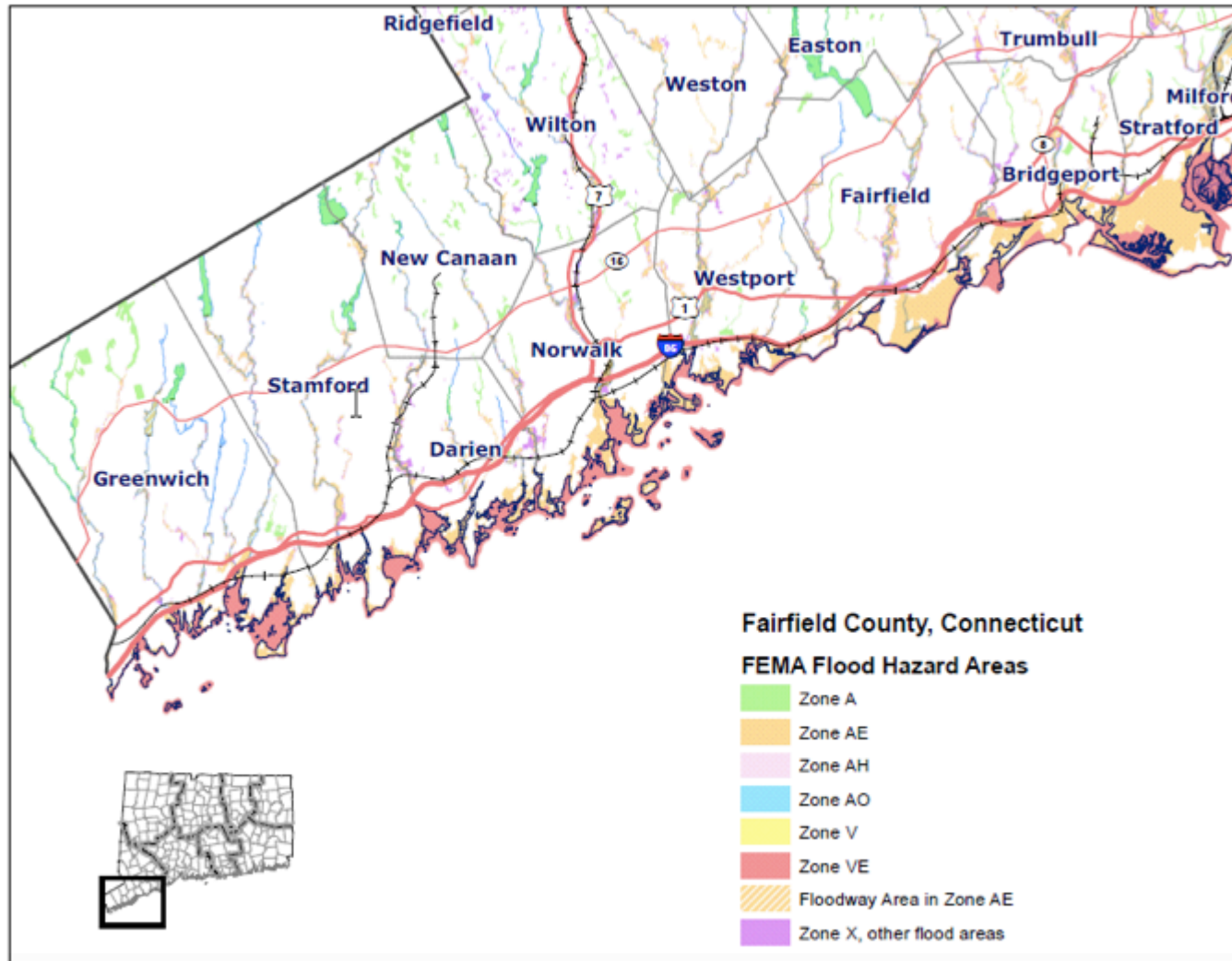


Figure 15: FEMA Flood Hazard Areas for New Haven County

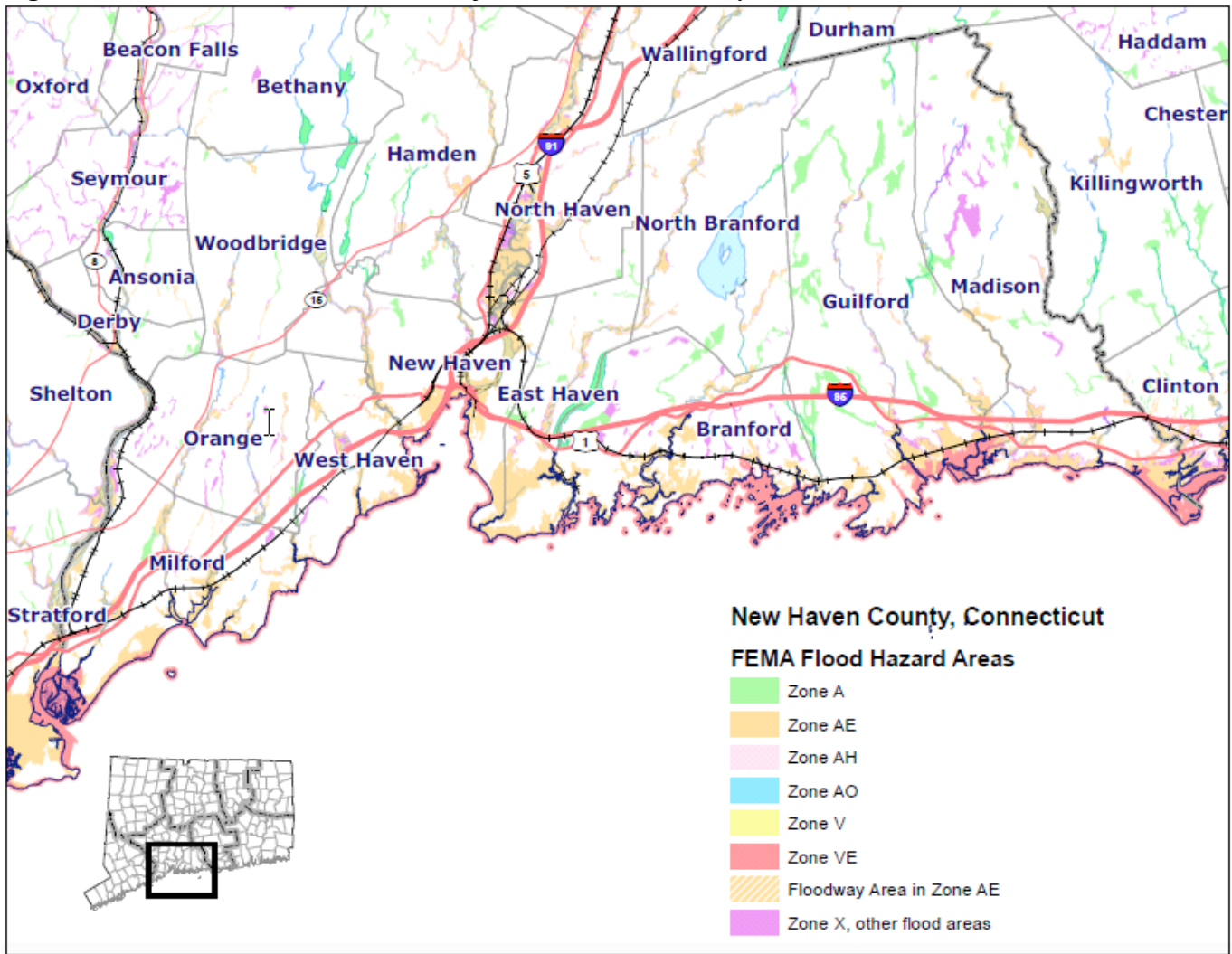


Figure 16: Quaternary Geology of Fairfield County

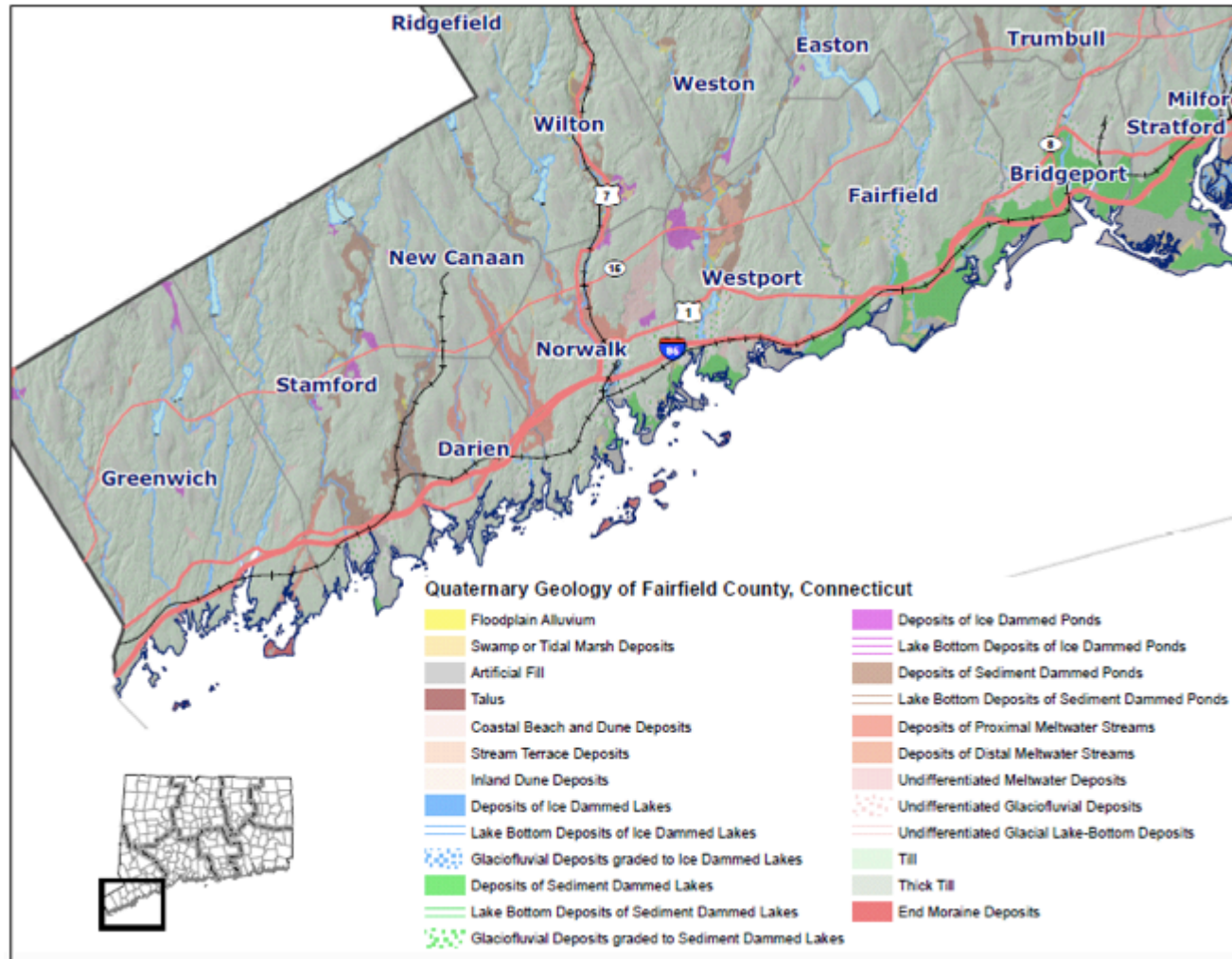


Figure 17: Quaternary Geology of New Haven County

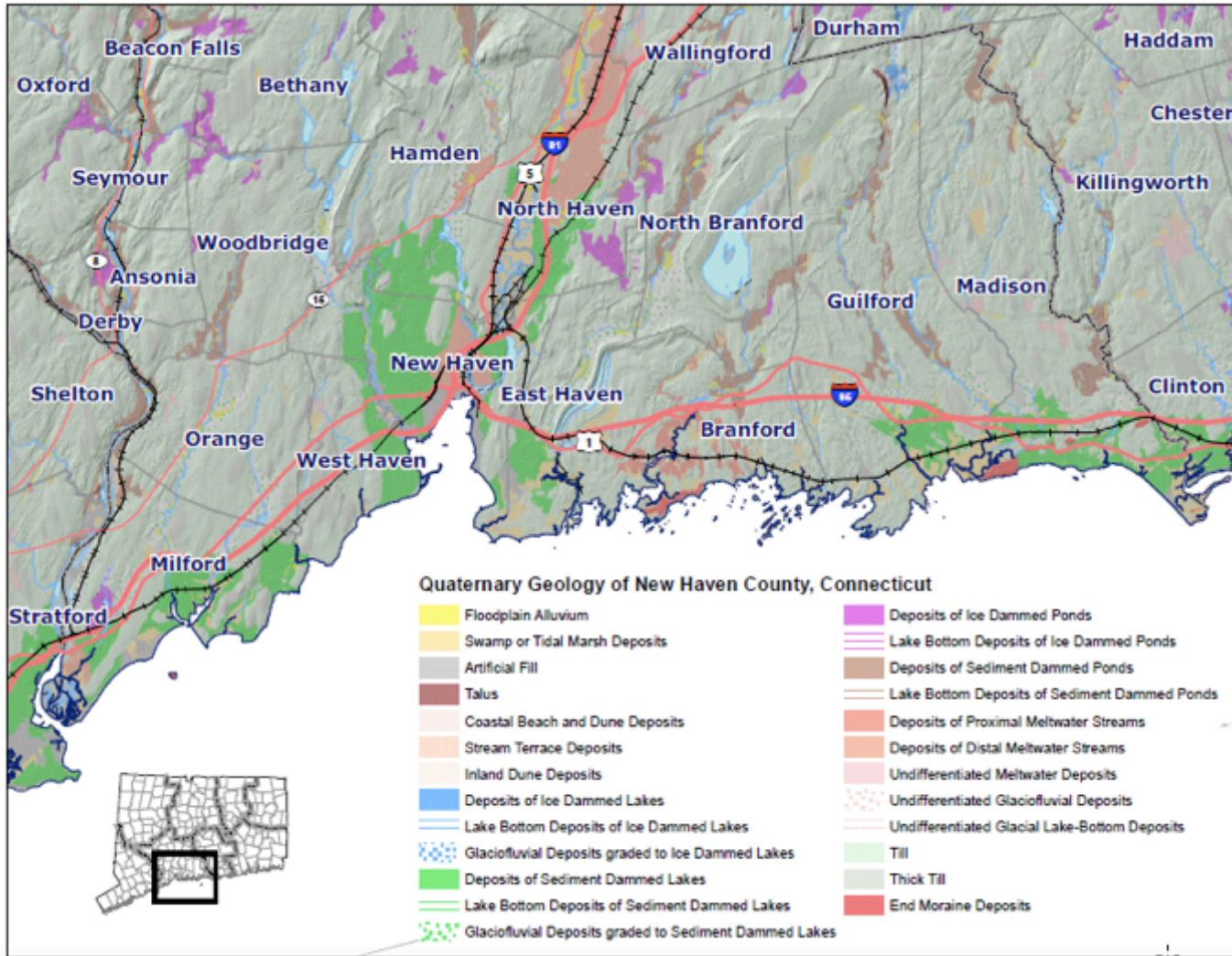


Figure 18: Hurricane Inundation Areas in Fairfield County

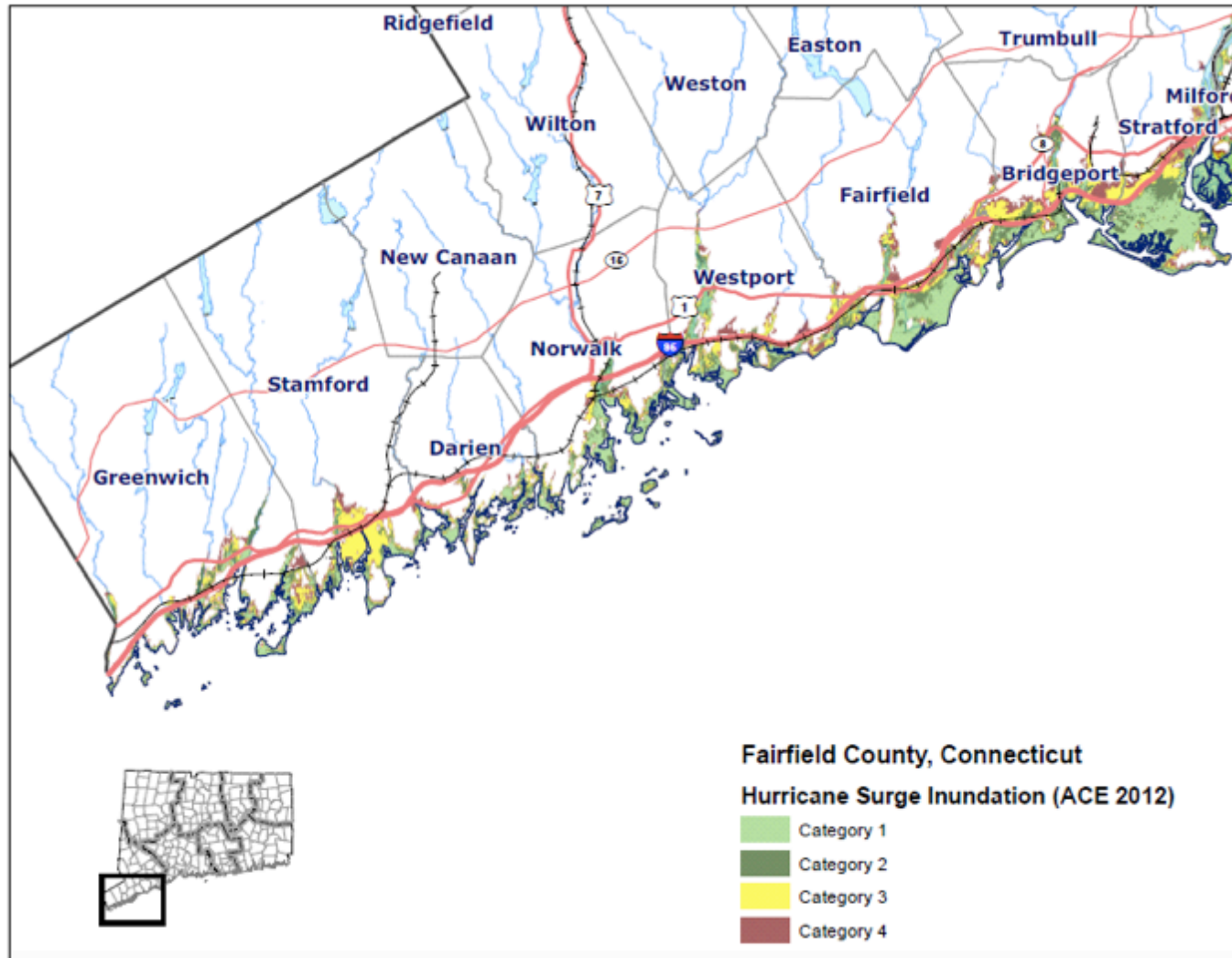


Figure 19: Hurricane Inundation Areas in New Haven County

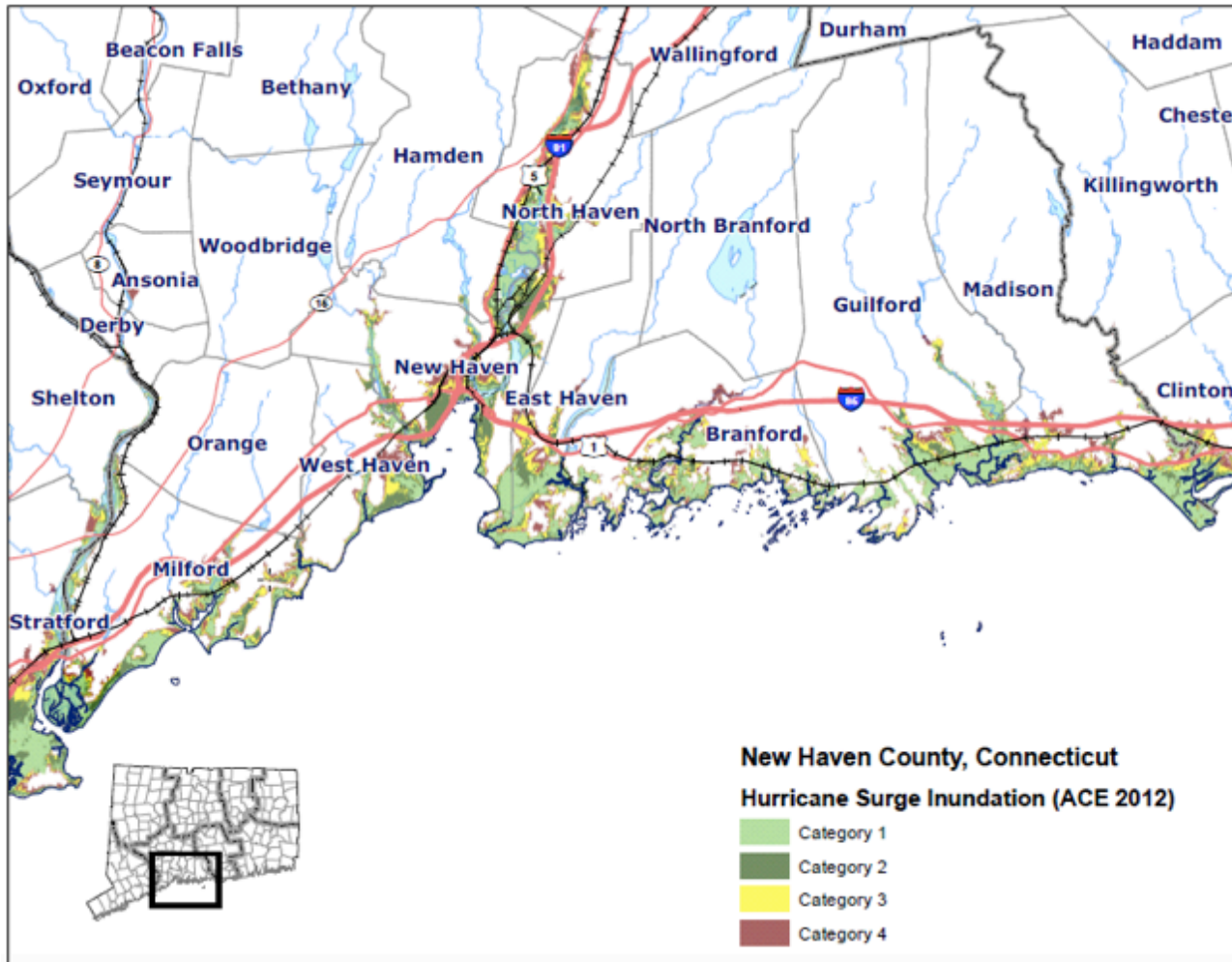


Figure 20: An example of an area expected to be affected by sea level rise (12")

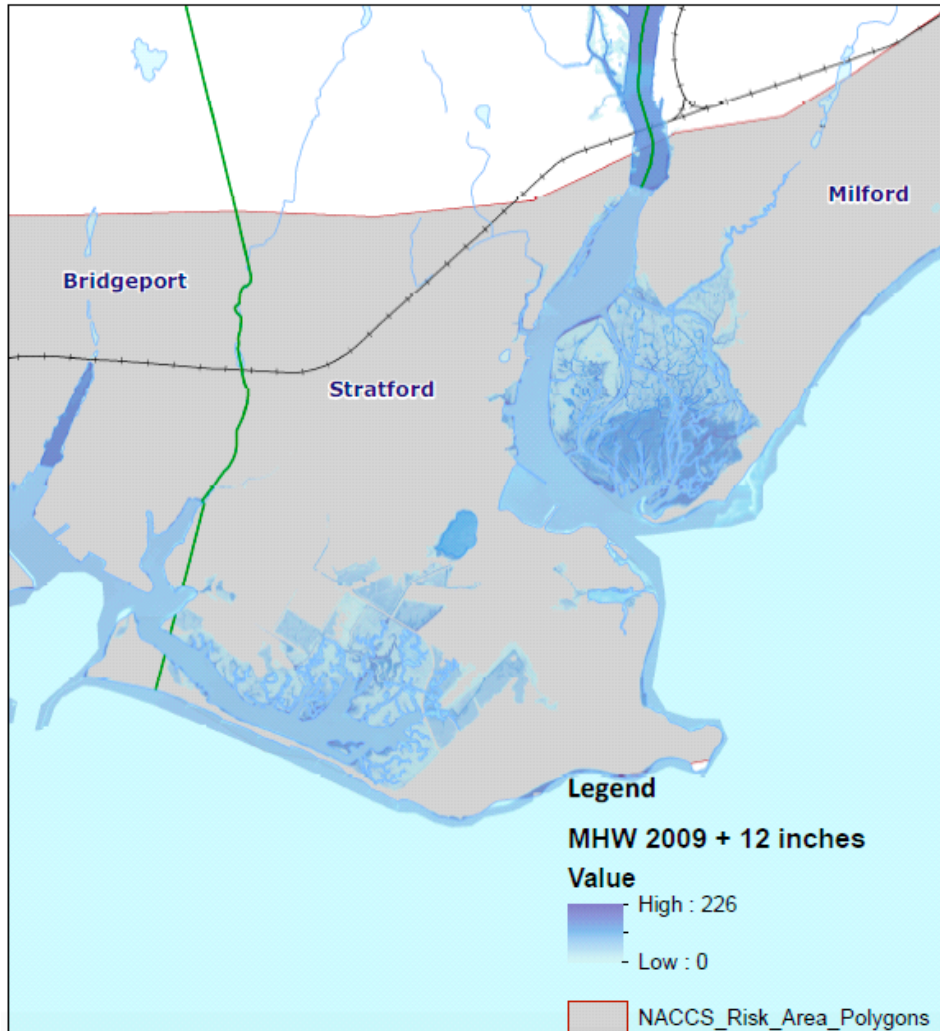


Figure 21: The value of repetitive loss structures total

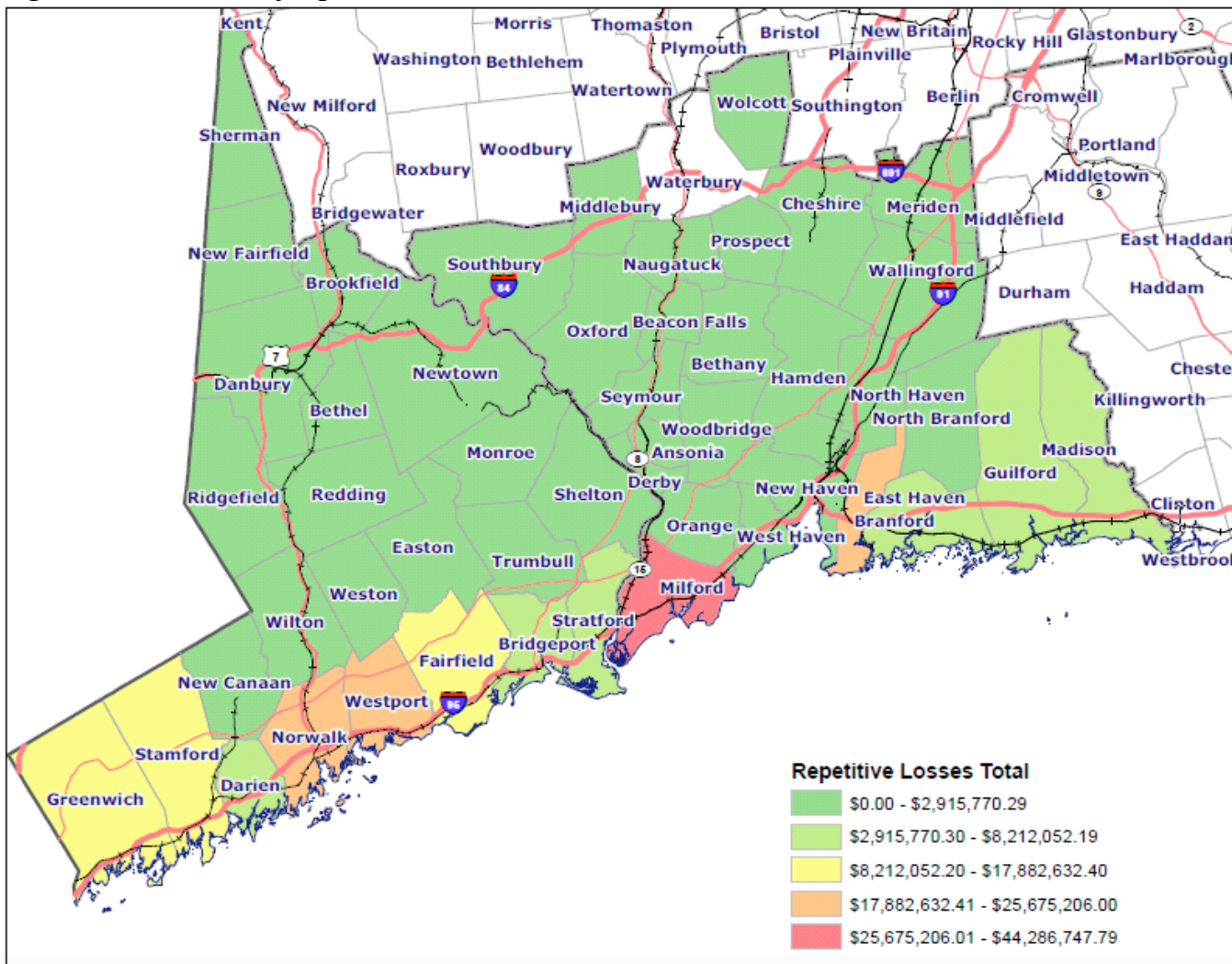


Figure 22: Total payments for severe repetitive loss structures

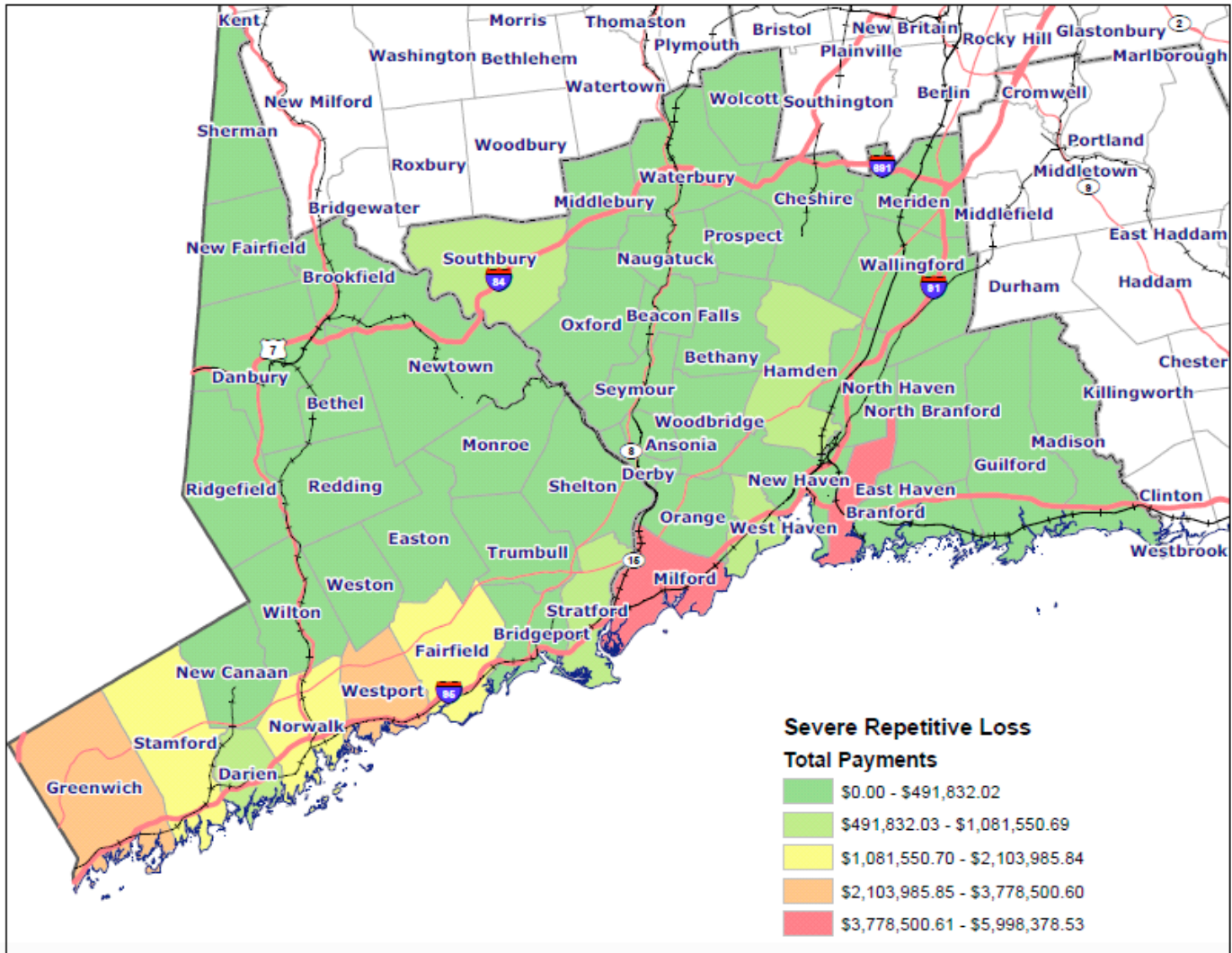


Figure 23: Communities impacted by both Irene and Sandy (measured by federal expenditure for IHP grants)

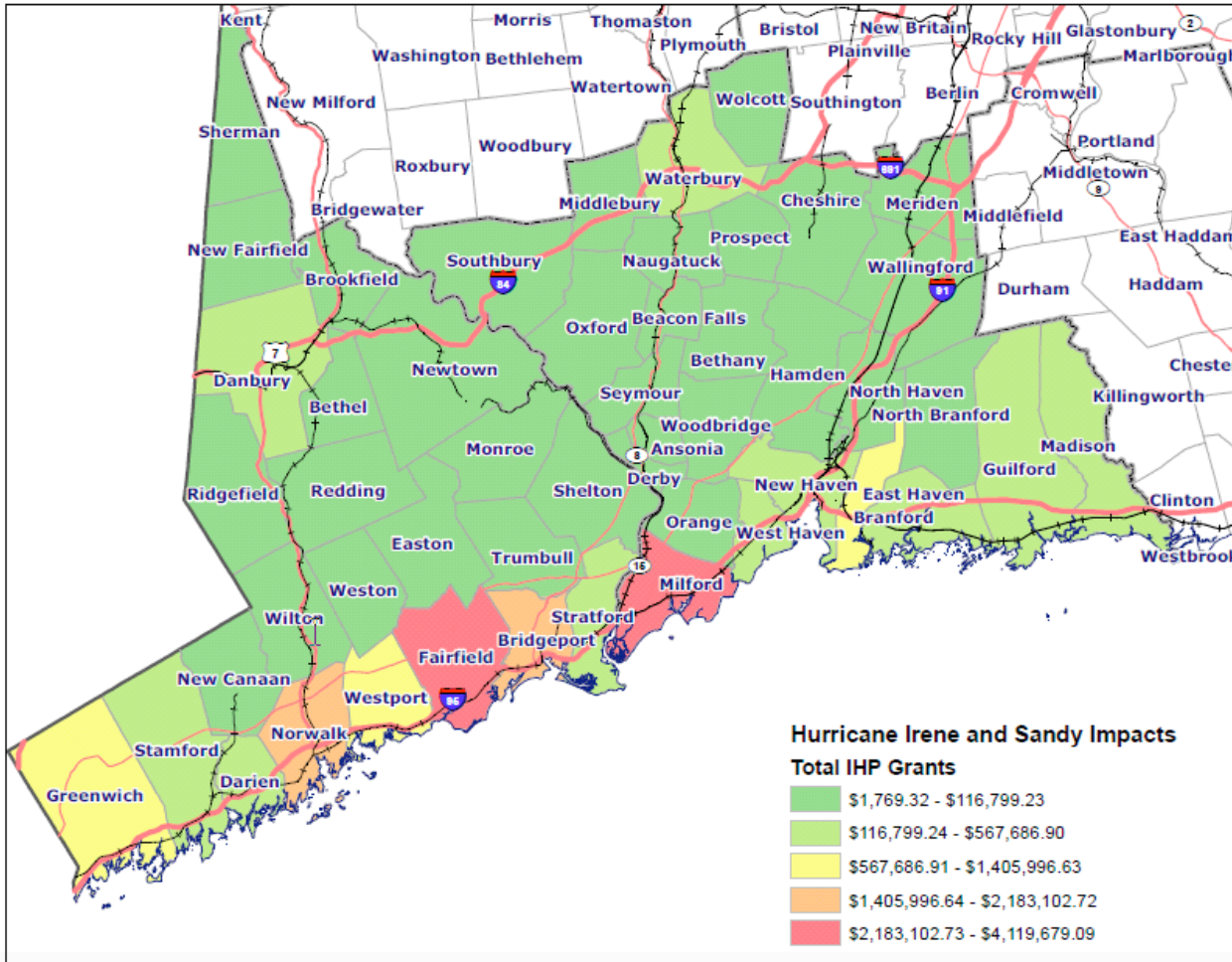


Figure 24: Areas inundated and properties damage by Hurricane Sandy in Fairfield County

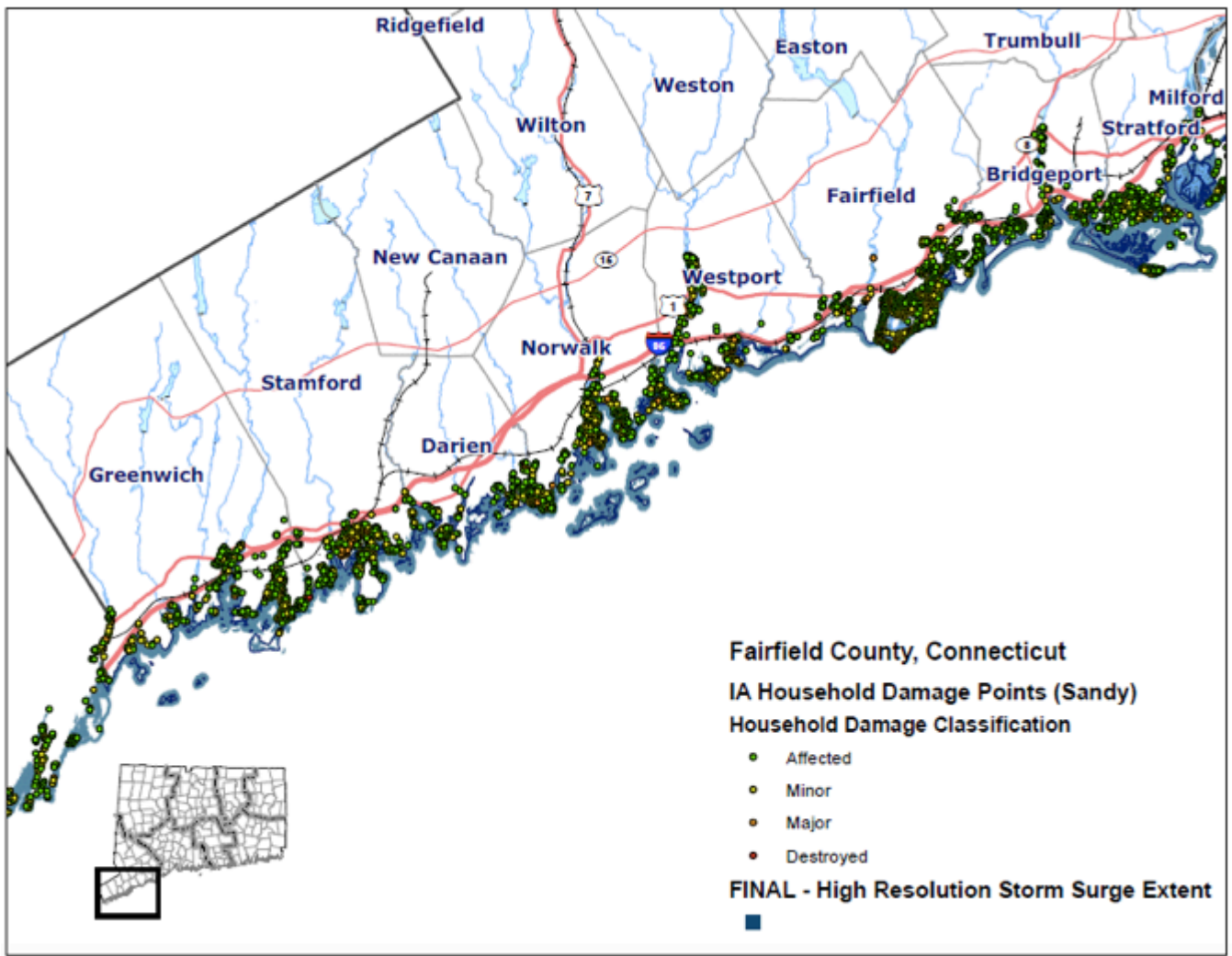


Figure 25: Areas inundated and properties damage by Hurricane Sandy in New Haven County

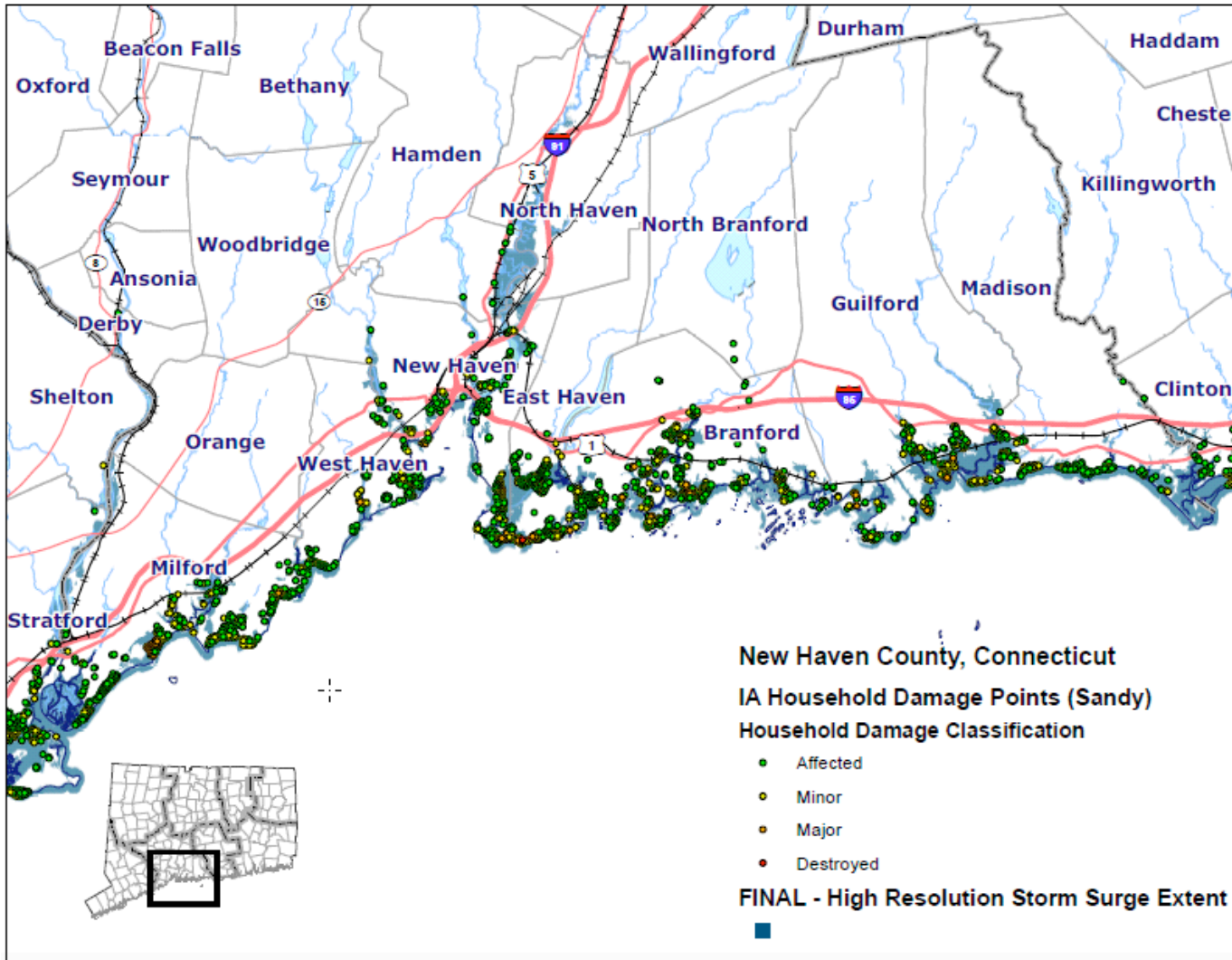


Figure 26: Social Vulnerability Index for Connecticut at the census tract level in Fairfield County (2010)

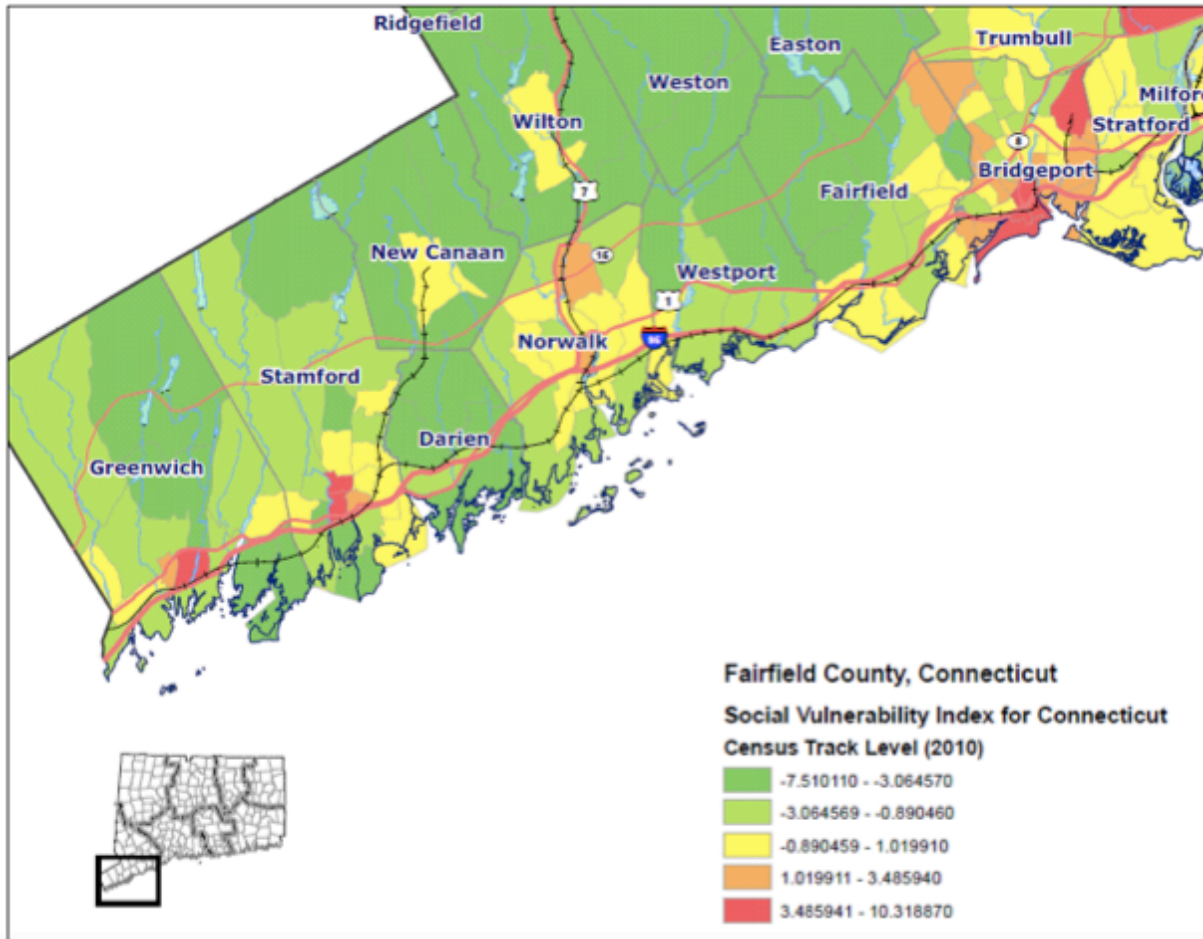


Figure 27: Social Vulnerability Index for Connecticut at the census tract level in New Haven County (2010)

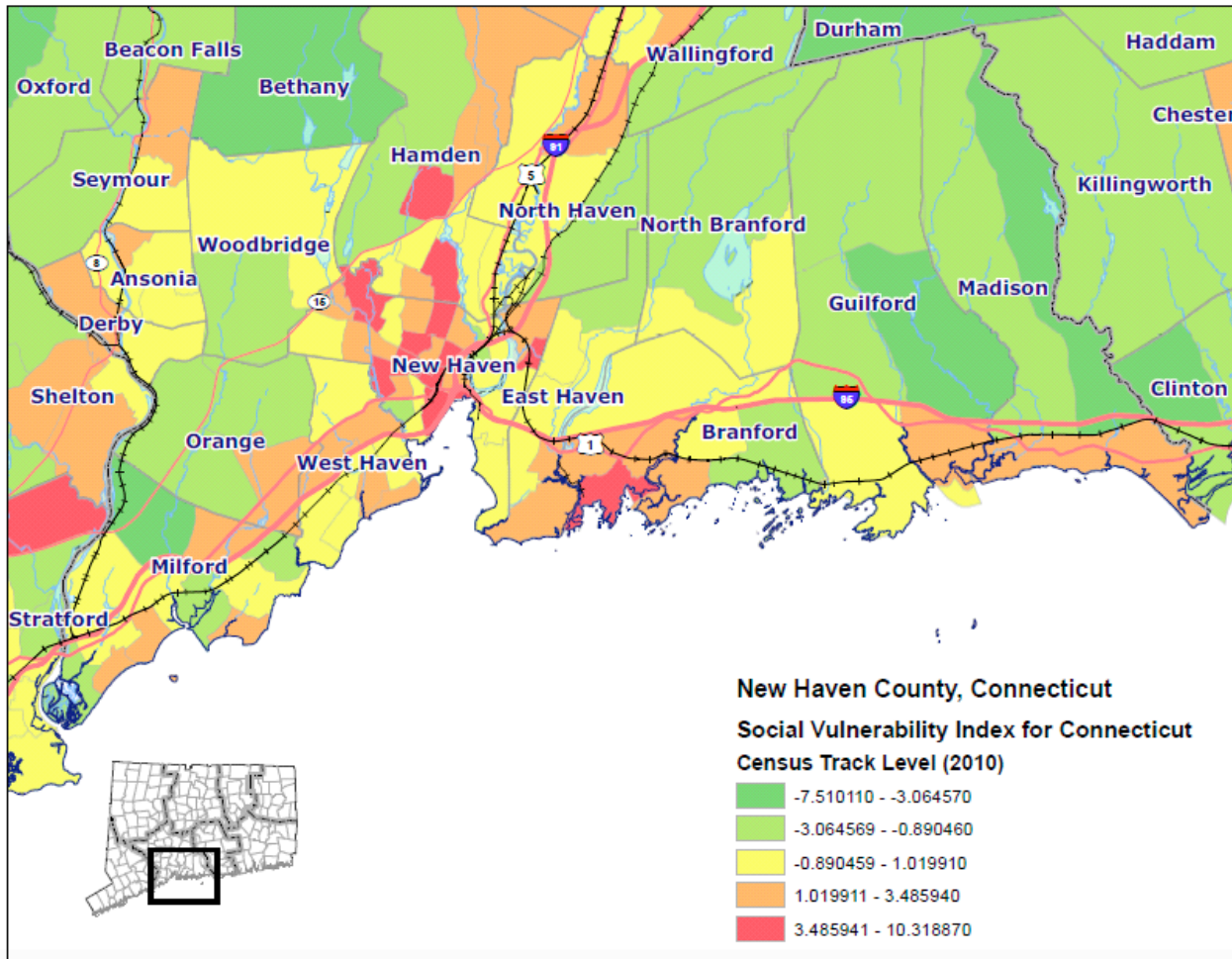


Figure 28: Percentage of persons with low or moderate income in Fairfield County

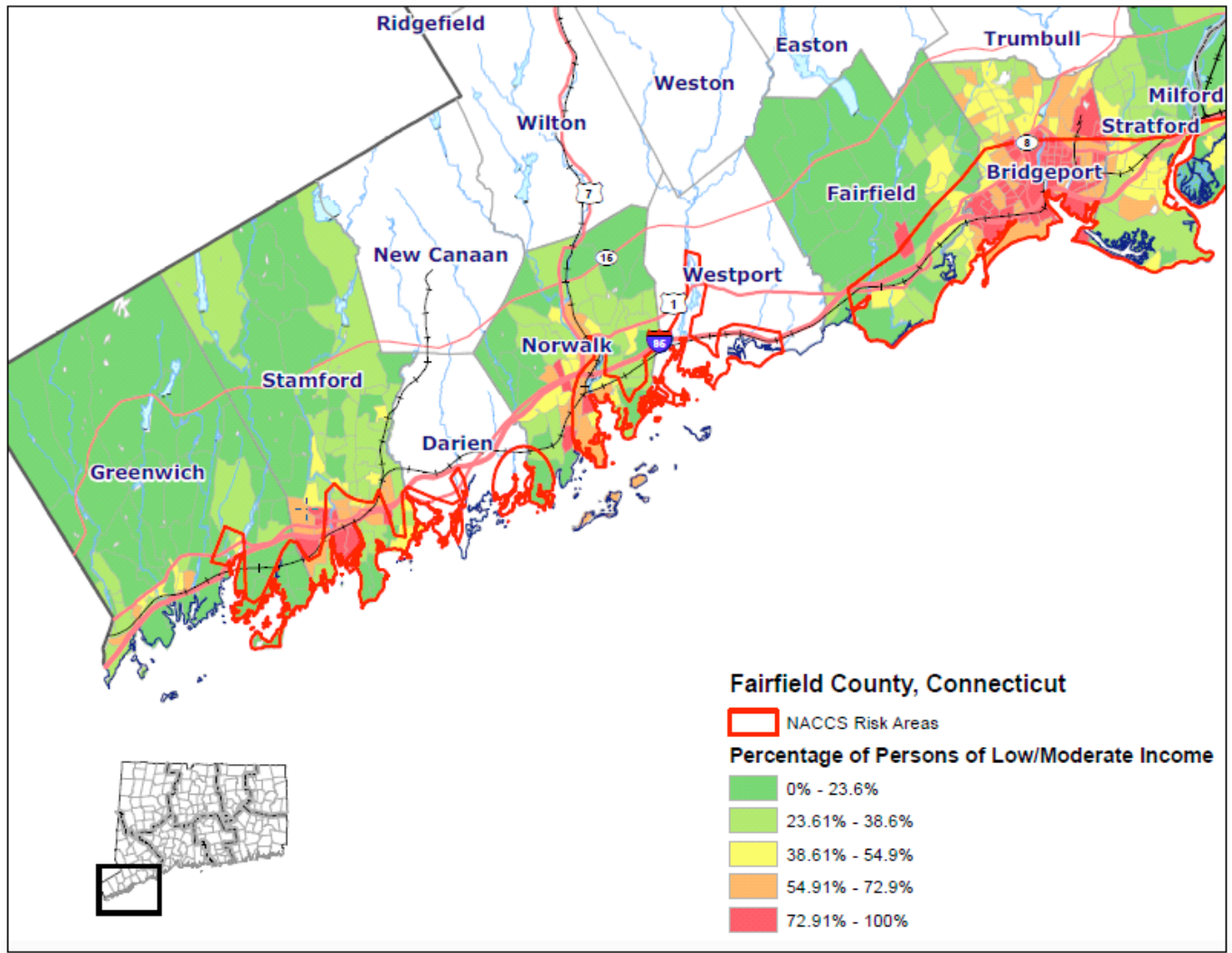


Figure 29: Percentage of persons with low or moderate income in New Haven County

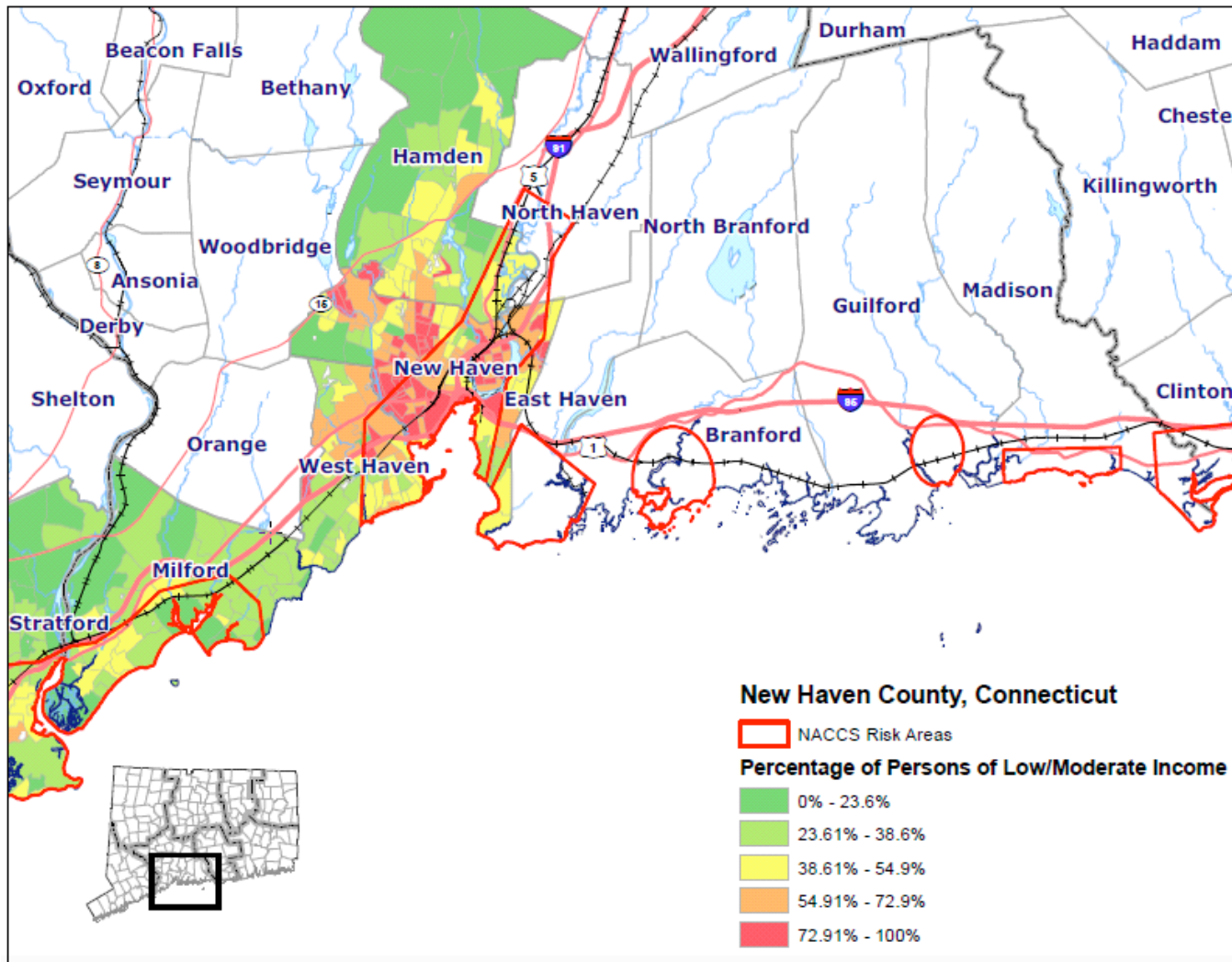
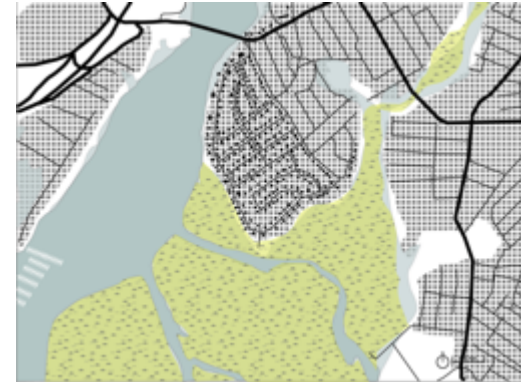
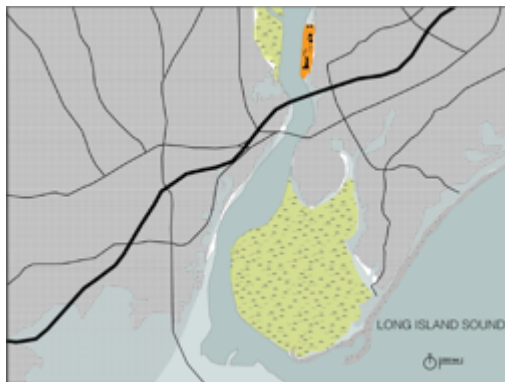


Figure 30: Vulnerable coastal typology along the coast: beaches backed by marsh



Figure 31: Vulnerable coastal typologies



TPOLOGY KEY











-  marsh
-  beach
-  open water
-  flood level
-  building footprint
-  high density housing
-  public open space
-  critical infrastructure
-  interstate highway
-  major road network

Figure 32. Average rent for coastal municipalities in the most impacted and distressed target areas (Zillow Rent Index, April 29, 2013).

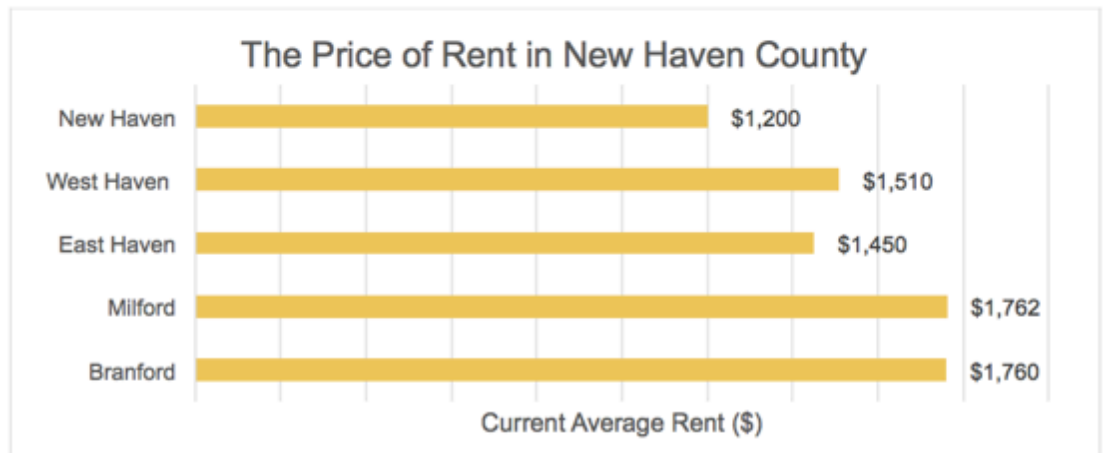
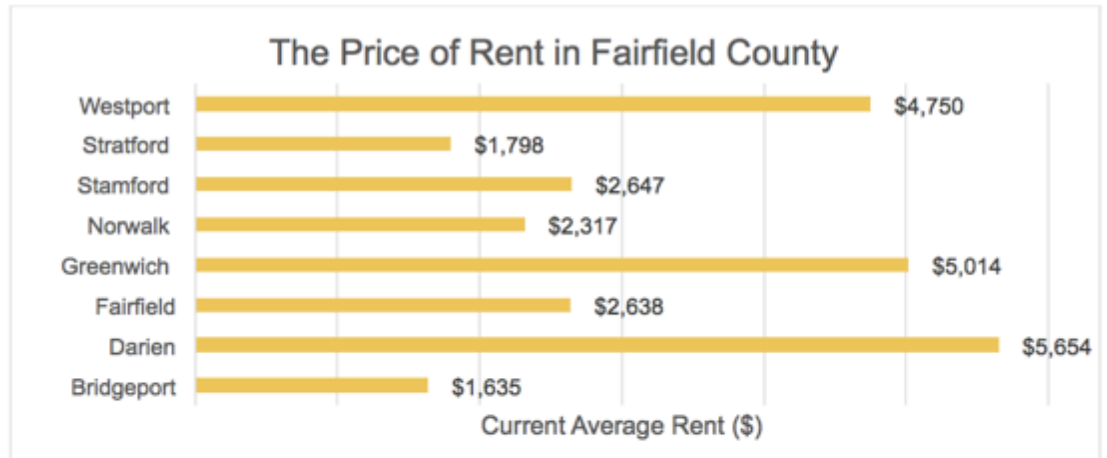


Figure 33. Number of homes damaged by Hurricane Sandy for coastal municipalities in the most impacted and distressed target areas (Analysis of Communities Impacted by Hurricane Sandy in Connecticut; HUD: PD&R; March 7, 2013).

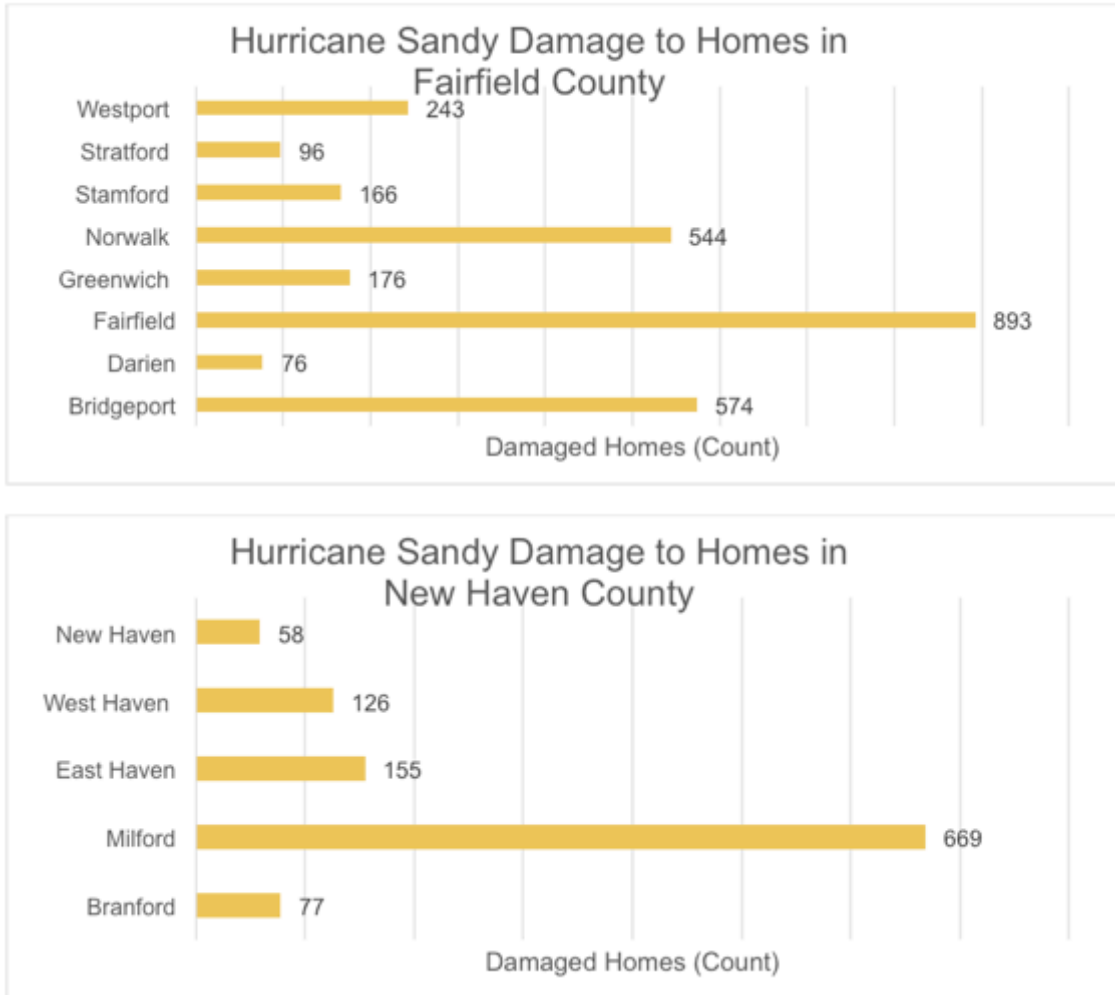


Figure 34. Population of coastal municipalities in the most impacted and distressed target areas (American Community Survey 2007-2011 Five Year Survey).

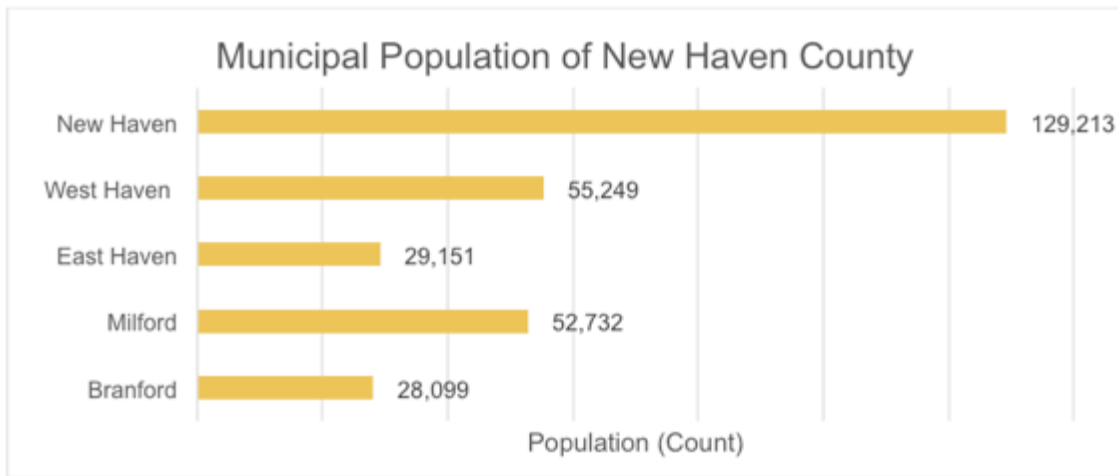
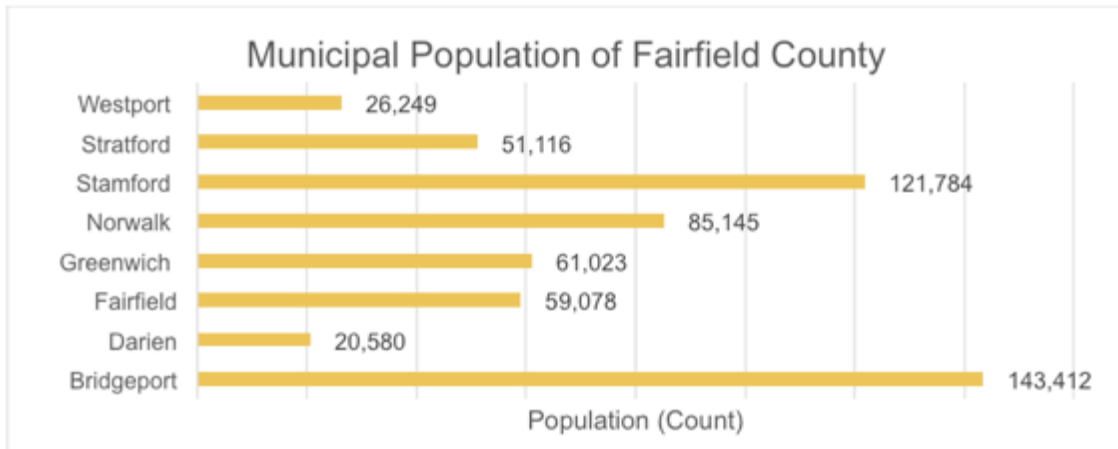


Figure 35. Current median home value and median income of residents in the most impacted and distressed target areas (Zillow Home Value Index, April 29, 2013; CT CDBG-DR Sandy Action Plan, June, 2013).

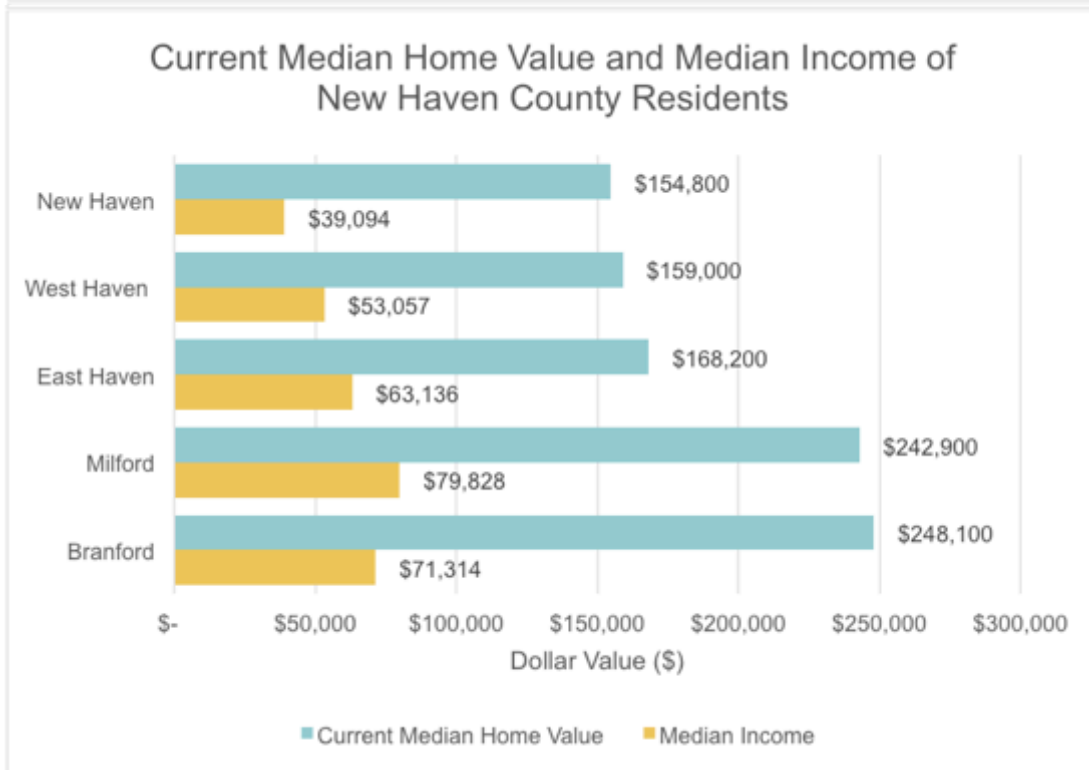
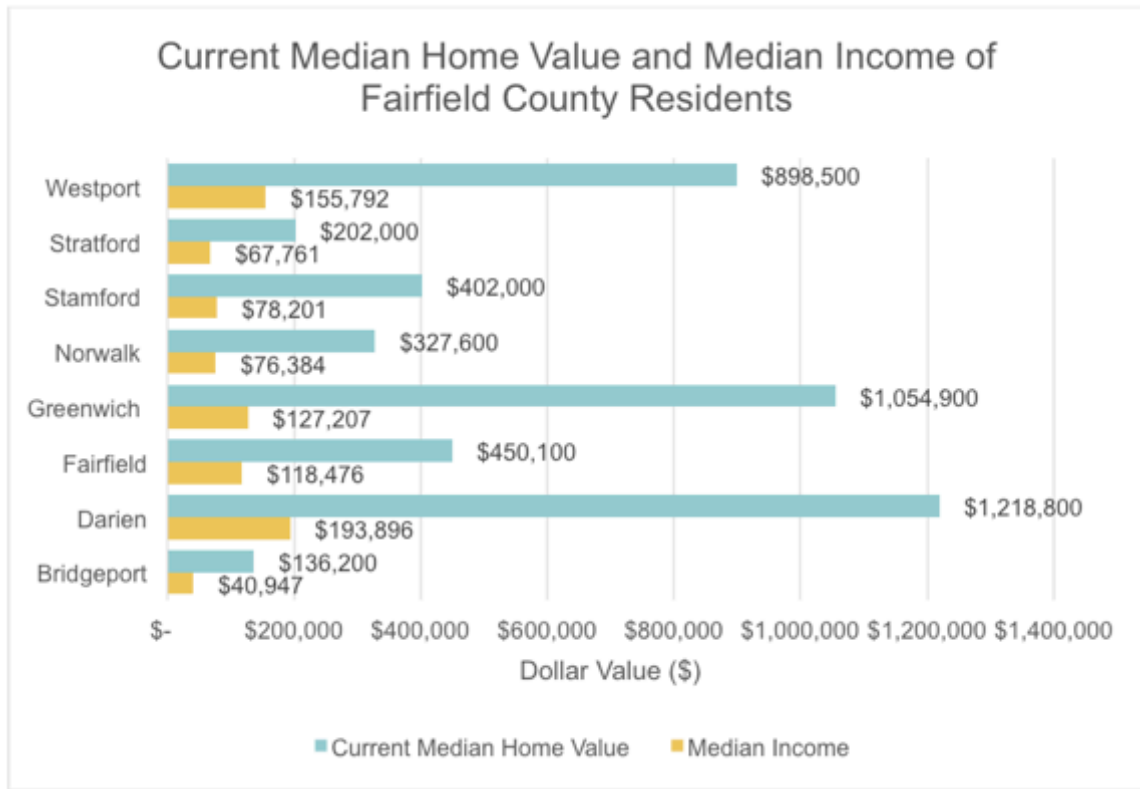


Figure 36. Percentage of the population that is a racial/ethnic minority and elderly and the poverty rate and home ownership rate for coastal municipalities in the most impacted and distressed target areas (American Community Survey 2007-2011 Five Year Survey; CT CDBG-DR Sandy Action Plan, June, 2013).

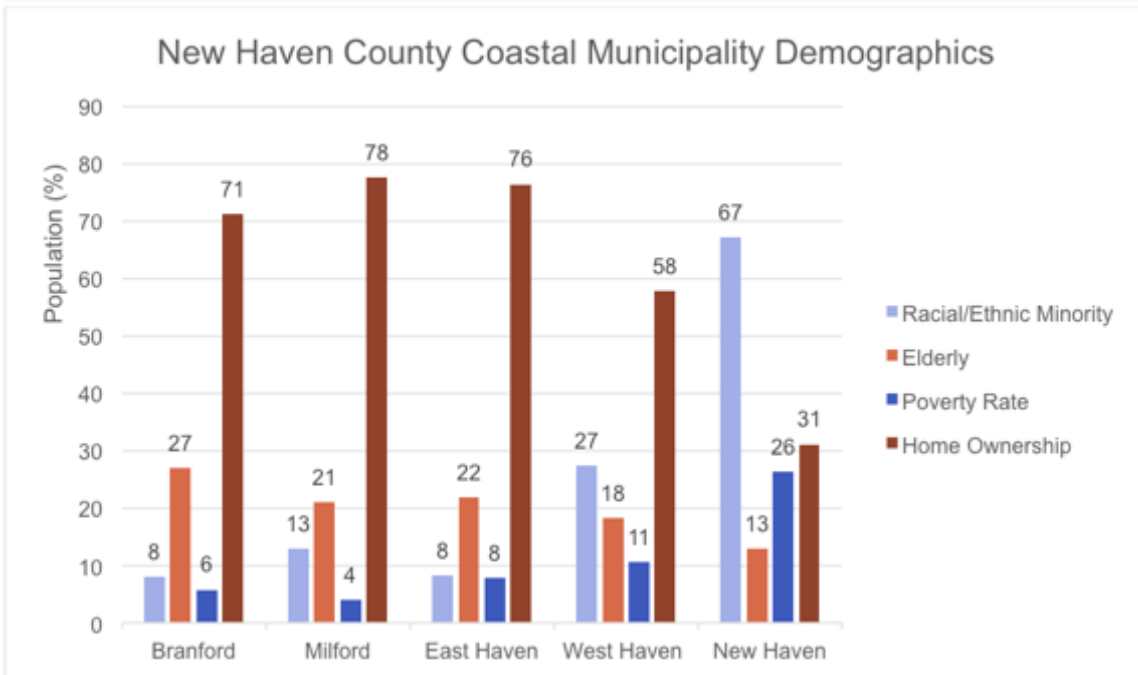
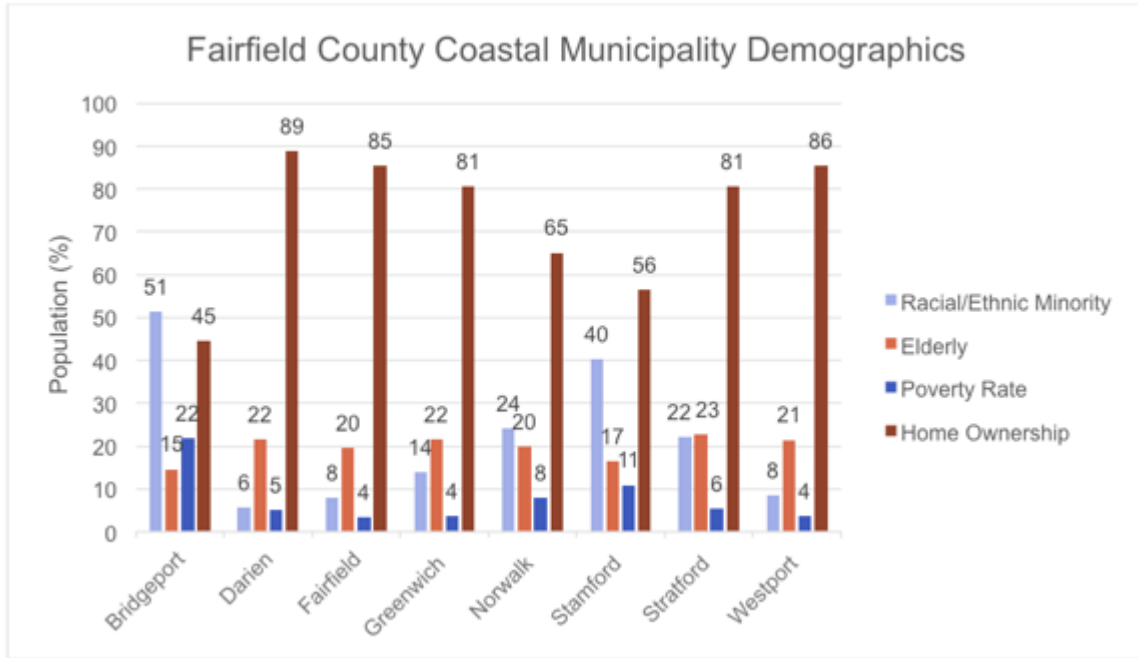


Figure 37. The most distressed 25 municipalities in the State of Connecticut as ranked by the Connecticut Department of Economic and Community Development based on high unemployment and poverty, aging housing stock and low or declining rates of growth in job creation, population, per capita income, percent of population with a high school degree and higher and per capita Adjusted Equalized Net Grand List (Connecticut Conference of Municipalities, Disproportionate Burdens: Major Challenges Facing Connecticut's Poorer Communities, November, 2014; © Copyright 2014 Connecticut Conference of Municipalities).

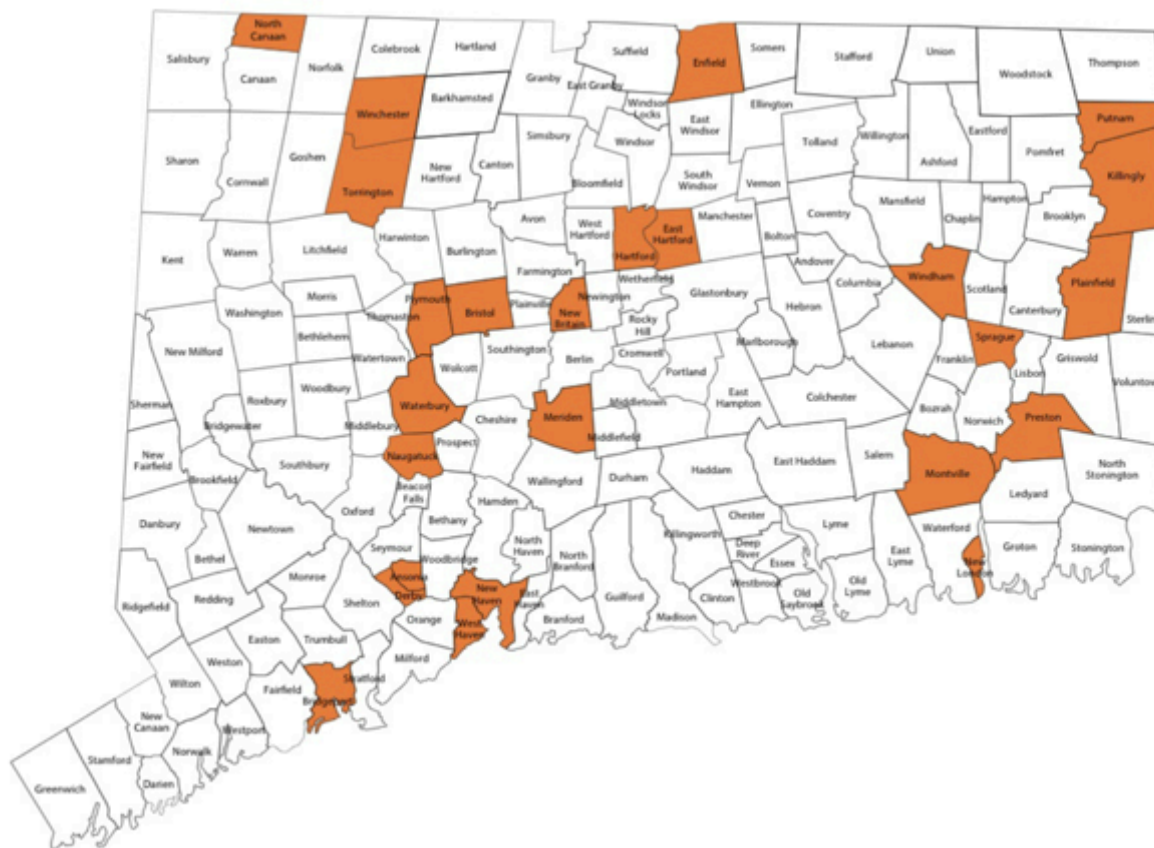
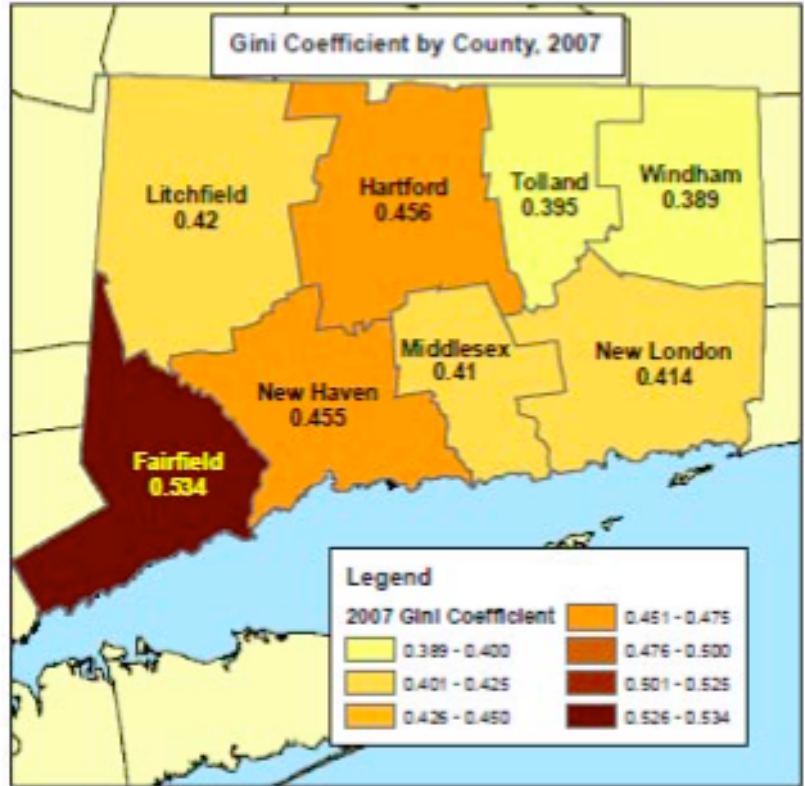


Figure 38: Gini coefficient (a measure of inequality) by county.

Figure 2: Connecticut's Gini Coefficient by County, 2007



Source: Connecticut Voices for Children

Figure 39: Low egresses – navigating under MetroNorth and often at the confluence of a waterway, create pinch points in the transportation infrastructure.



Figure 40: Geology and the physical environment create patches of risk along the coast. Development occurs in both low-lying flood zones and high ground creating patches or zones with different risks.

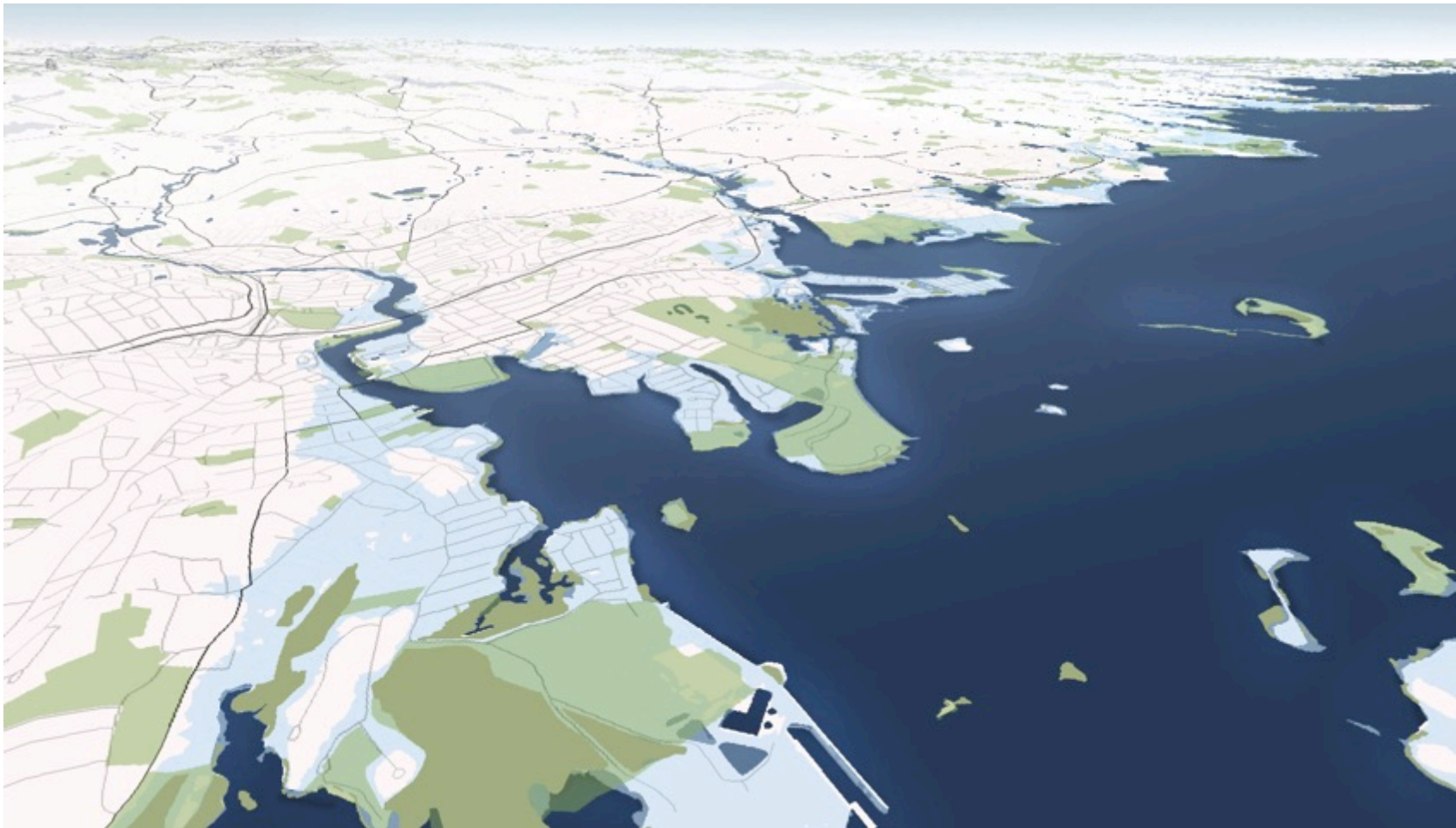


Figure 41: Areas with higher rates of poverty serviced by rail (Source CT Department of Transportation)

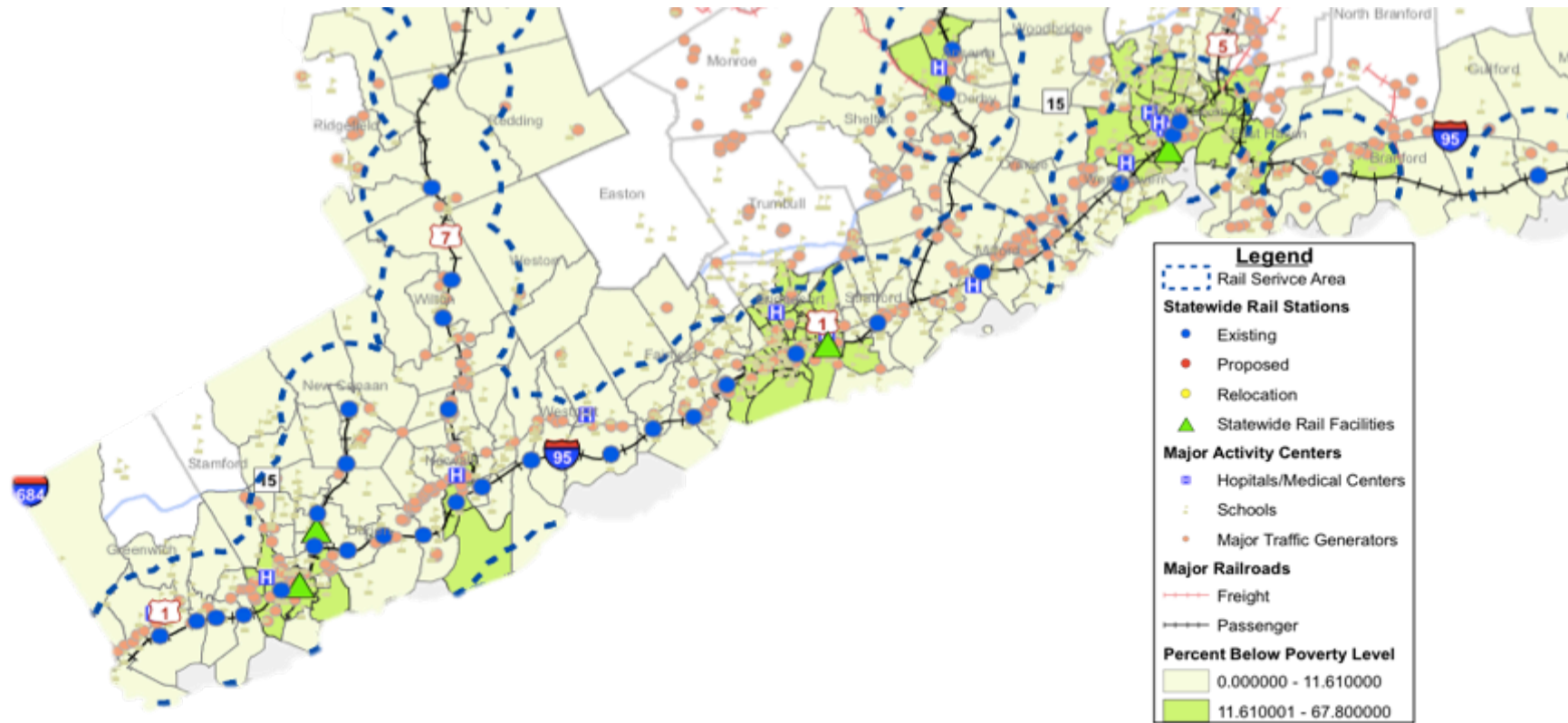


Figure 41b: Regional rail connections



Figure 42: Resilience networks. The evacuation corridors link vulnerable shorefront communities and critical facilities back to resilience centers. The physical environment and urbanization history shape emergency access routes.

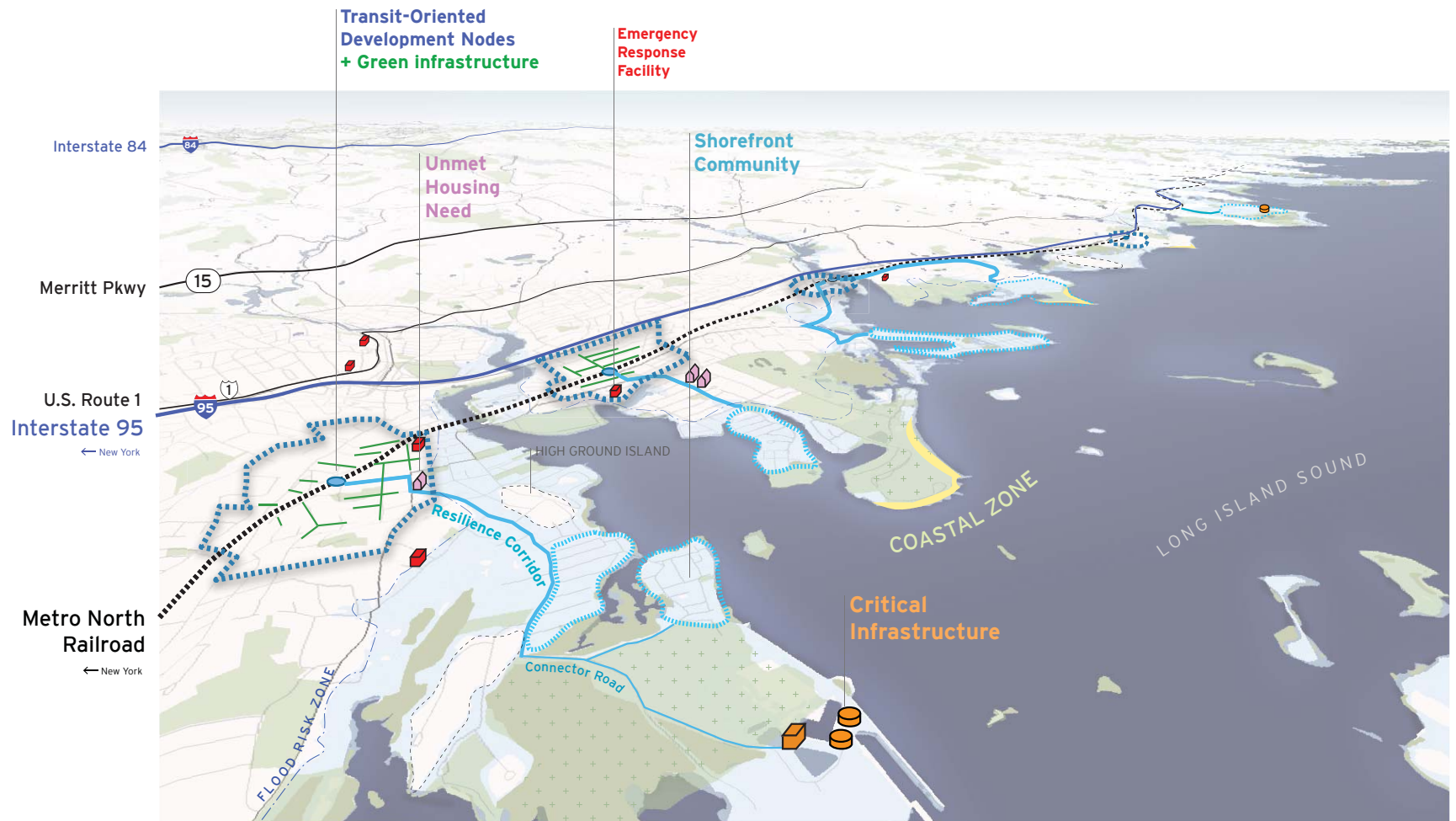


Figure 43: Resilience network connecting the coastal zone with the resilience corridor

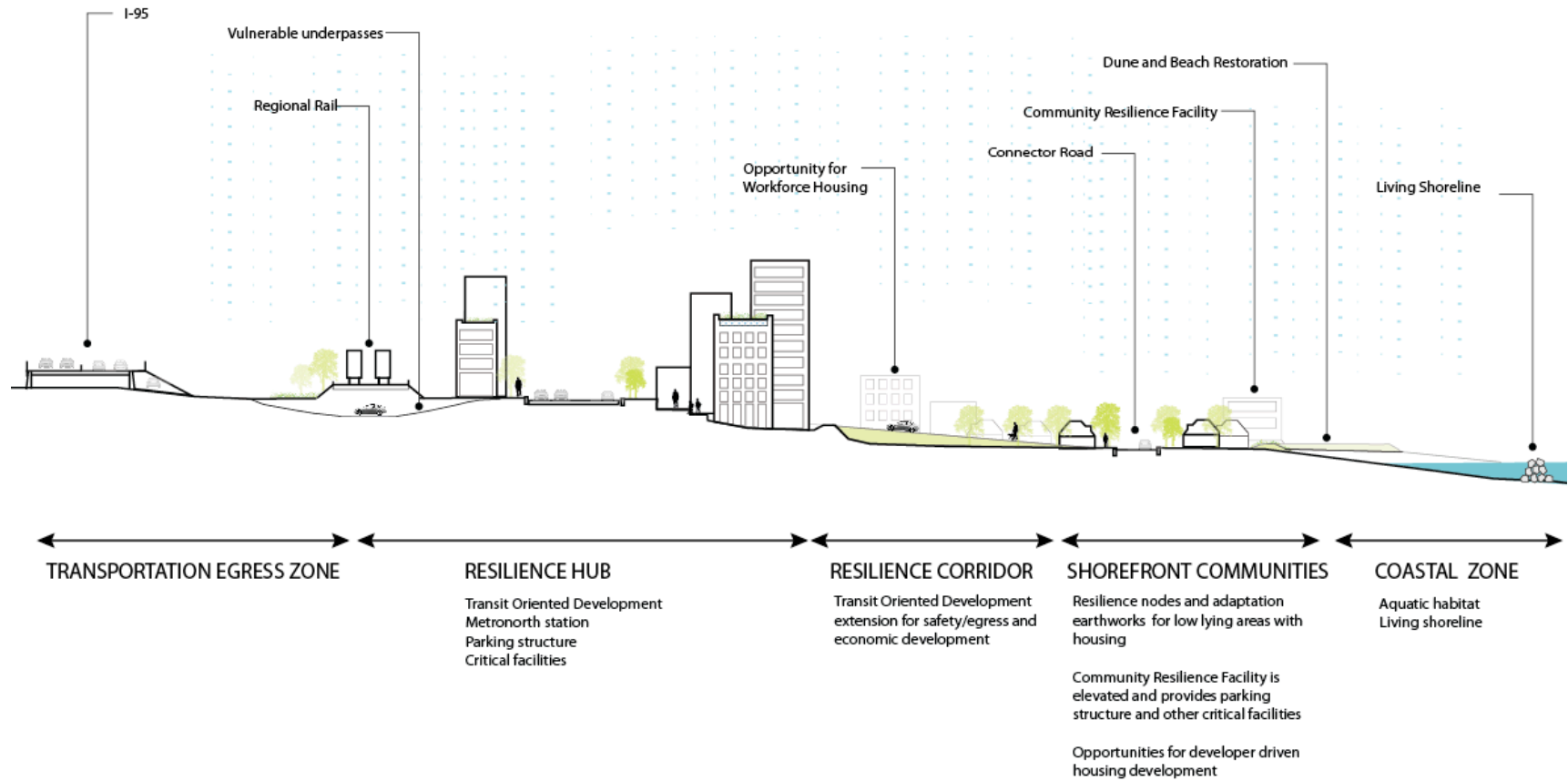


Figure 44: Resilience corridor providing refuge to shorefront communities

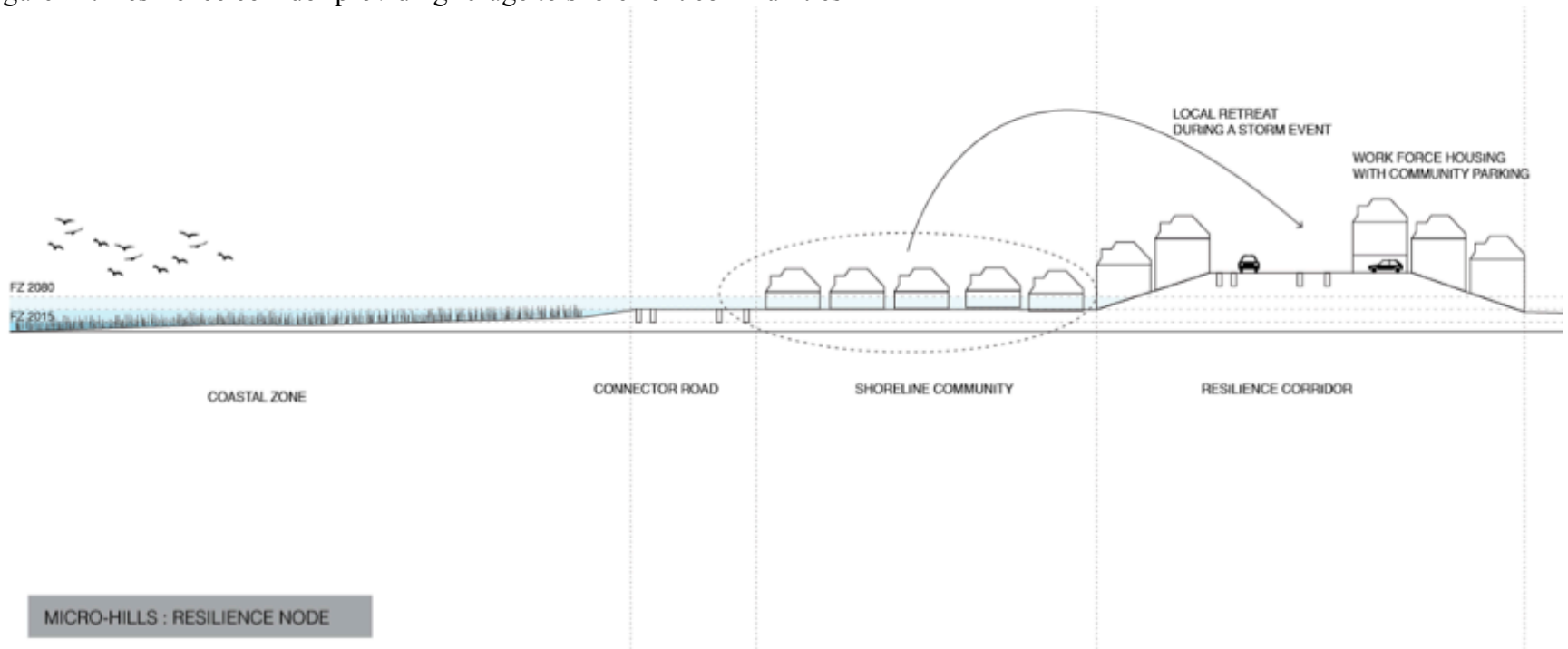


Figure 45: Local resilience corridors support regional transportation networks



Figure 46: Coastally adapted roadways – alternative approaches – option A



Figure 47: Coastally adapted roadways – alternative approaches – option B

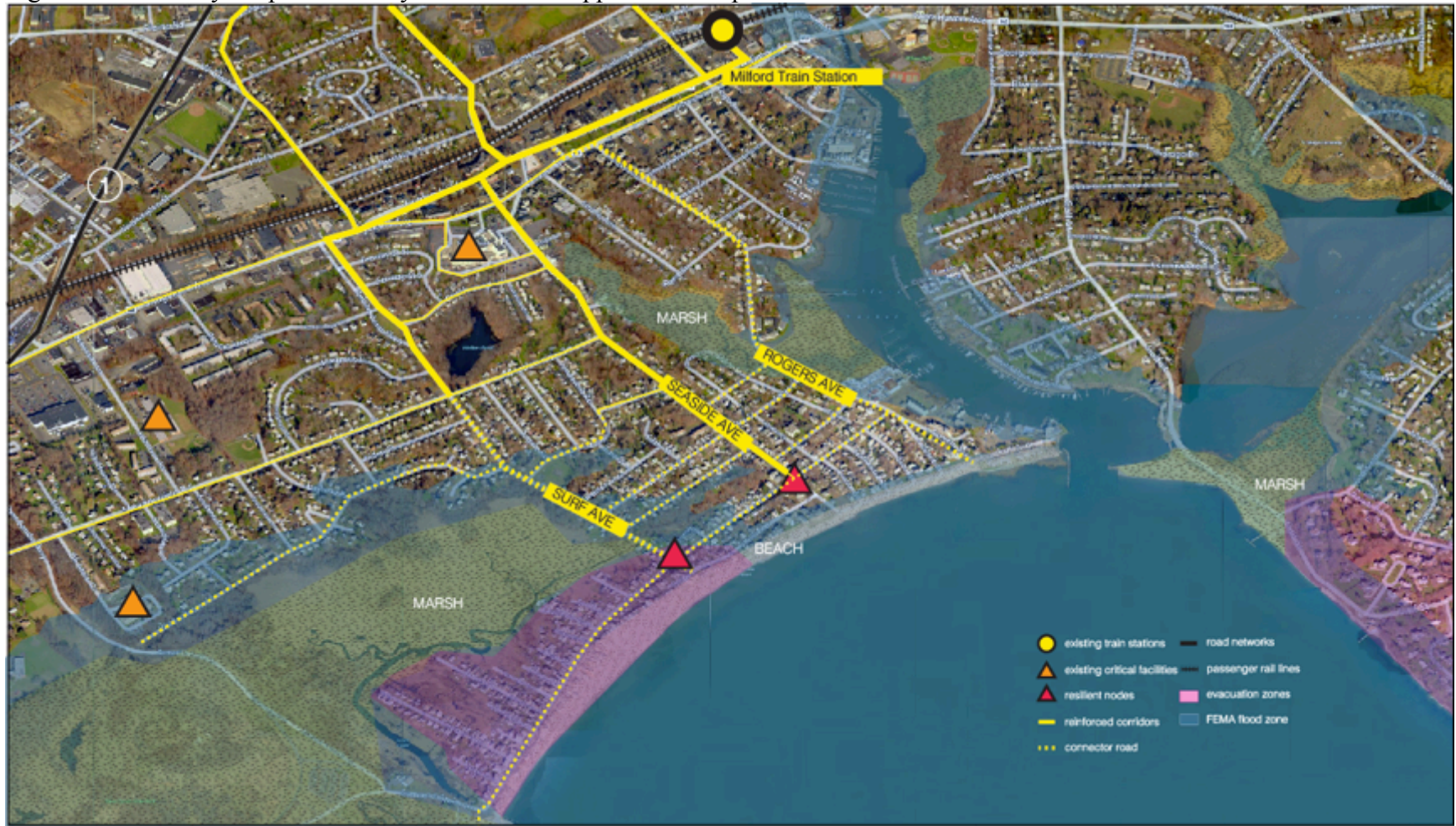


Figure 48: Stratford Typologies



Figure 49: Multiple lines of defense

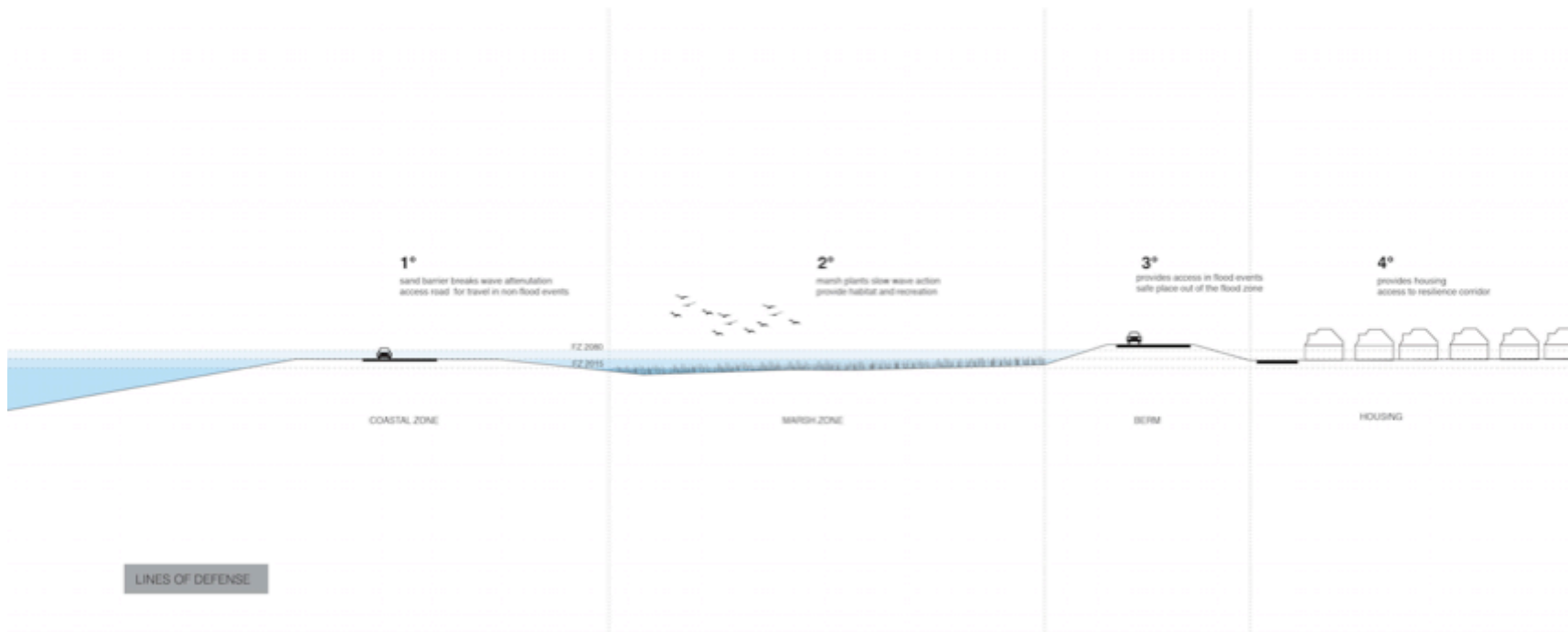


Figure 50: Flooded underpasses



Attachment F Benefit-Cost Analysis

There is no benefit-cost analysis for Phase 1 applications for the National Disaster Resilienc Competition.

NOTICE OF PUBLIC HEARINGS AND PUBLIC COMMENT PERIOD

The State of Connecticut, Department of Housing is seeking public comment and will be holding PUBLIC HEARINGS on the DRAFT CDBG-DR National Disaster Resilience Competition Phase I Application.

A fifteen (15) day comment period on the State of Connecticut's DRAFT Phase I application to the National Disaster Resilience Competition (NDRC) will begin on Tuesday, February 17th and end on Wednesday March 4th, 2015. In addition, PUBLIC HEARINGS will be held to discuss the State of Connecticut's DRAFT Phase I application to the National Disaster Resilience Competition (NDRC). This two-phase competition allows eligible jurisdictions to compete for Community Development Block Grant-Disaster Recovery (CDBG-DR) funds, as appropriated by the Disaster Relief Appropriations Act, 2013 (Public Law 113-2). Applicants successful in Phase I will be invited to compete in Phase II.

Beginning on February 17, 2015 the DRAFT application will be available for review at the Department of Housing website, www.ct.gov/doh , or may be viewed in person at the Department of Housing.

All State residents are invited to attend the multiple OPEN HOUSES and PUBLIC HEARINGS to comment on the State of Connecticut DRAFT Phase I application to the National Disaster Resilience Competition.

Hartford- Public Hearing

**10:00 a.m. to 12:00pm
February 17, 2015
Old Judiciary Room
Connecticut State Capitol
210 Capitol Avenue
Hartford, CT 06106**

Bridgeport- Open House & Public Hearing

**4:00 to 8:00 p.m.
February 17, 2015
Room BH 214
Housatonic Community College
900 Lafayette Boulevard
Bridgeport, CT 06604**

New Haven- Open House & Public Hearing

**4:00 to 8:00 p.m.
February 17, 2015
Kroon Hall, Yale University
195 Prospect Street
New Haven , CT 06511**

Written comments may be submitted via the Connecticut Department of Housing email address, CT.Housing.Plans@ct.gov, or in hard copy to NDRC Phase I Comments, Department of Housing, 505 Hudson Street, Hartford, CT 06106. All comments received on or before March 4th, 2015 will be considered and included in the final submission to HUD.

The Department of Housing programs are administered in a nondiscriminatory manner, consistent with equal employment opportunities, affirmative action, and fair housing requirements. Questions, concerns, complaints or requests for information in alternative formats must be directed to the ADA (504) Coordinator at 860-270-8261.

For Publication: Thursday, February 12, 2015

Substantial Amendment Criteria

The criteria for determining what changes in the Application constitute a substantial amendment requiring HUD prior approval are first, any change to the Application that would result in a change of more than 5 points in the score for capacity or soundness of approach or that would change the most impacted and distressed target area(s). Also, the following modifications will constitute a substantial amendment requiring HUD prior approval: a change in program benefit, beneficiaries, or eligibility criteria; the allocation or re-allocation of more than \$1 million; or the addition or deletion of an activity. Subsequent to award, a grantee may substantially amend the Application if it follows the same citizen participation requirements in this Notice for the preparation and submission of an Application, and HUD agrees in writing that the amended Application would still score in the fundable range for the competition.