Executive Summary

Natural Hazard Mitigation Plan

2016-2021 Update for the South Western Region

Prepared by the Western Connecticut Council of Governments (WCCOG)

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Natural Hazard Mitigation Plan 2016-2021

ES-1 Introduction

The South Western Region (SWR) is comprised of eight municipalities which form the southwestern panhandle of Connecticut. The region shares its western boundary with New York's Westchester County, is bounded by Long Island Sound (LIS) to the south, and extends inland approximately 13 miles. The Western Connecticut Council of Governments (WCCOG, formerly SWRPA) received Federal Emergency Management Agency (FEMA) funds through the Connecticut Division of Emergency Management and Homeland Security (DEMHS) to develop the 2016 Natural Hazard Mitigation Plan Update (HMP) for the following municipalities listed below:

Town of Darien	City of Stamford
Town of Greenwich	Town of Weston
Town of New Canaan	Town of Westport
City of Norwalk	Town of Wilton

The HMP was prepared in accordance with 44 CFR 201.6 of the Disaster Mitigation Act of 2000 (DMA; Public Law 106-390). The Disaster Mitigation Act of 2000 (DMA) established a national program for pre-disaster mitigation and helps expedite the administration of disaster relief to impacted areas. A key requirement of the DMA is the need for a FEMA-approved HMP, which keeps the region and its municipalities eligible for Hazard Mitigation Assistance (HMA) funding. Municipal adoptions of the regional plan can be found in Appendix A-0.

WCCOG worked intimately with municipal staff, as well as local and regional stakeholders to identify and incorporate critical project information. This HMP builds on previous iterations in 2005 and more recently in 2011, which currently serves as the existing HMP for the area. A key goal of this plan is to identify the natural hazards likely to affect the SWR, its eight municipalities, and the over 365,000 residents. The plan also identifies areas vulnerable to the aforementioned natural hazards, and incorporates appropriate strategies aimed towards mitigation. Consistent with FEMA and DEMHS goals, the HMP serves to reduce loss of life and property, economic disruptions, and the cost of post-disaster recovery for the region's communities.

Specific goals and objectives of the document include:

- Protecting public safety and preventing loss of life and injury;
- Reducing harm to existing and future development;
- Preventing damage to a community's unique economic, cultural, and environmental assets;
- Minimizing operational downtime and accelerating the recovery of government and business after disasters;
- Reducing the costs of disaster response and recovery, as well as the exposure to risk for first responders; and
- Helping accomplish other community objectives, such as leveraging capital improvements, infrastructure protection, open space preservation, and economic resiliency.

Project benefits include:

- Identifying cost effective actions for risk reduction;
- Directing resources to the greatest risks and vulnerabilities;
- Building partnerships by involving people, organizations, and businesses;
- Increasing education and awareness of hazards and associated risk;
- Aligning risk reduction with other community objectives; and
- Providing eligibility to receive federal hazard mitigation grant funding.

ES-2 Planning Process

Plan development was championed by WCCOG and the eight SWR munici-

palities. The planning process, including associated outreach and flow of communication, was conducted using a three-tiered format. The first tier consisted of municipal-appointed representatives who served as the HMP's Advisory Committee. The group consisted of staff with expertise in hazard mitigation planning and response, and the aggregation of key expertise served to help steer and provide critical input towards HMP development.

The second tier included key stakeholders, defined by FEMA as those that are affected by a mitigation action or policy. Consistent with this definition, key HMP stakeholders included additional municipal staff, state/local agencies, private organizations/institutions, businesses, and members of the general public. Adjacent regions and communities were also invited to participate as stakeholders. Unlike the Advisory Committee, stakeholders did not steer/guide plan development, but rather served to inform the planning team on a specific area of expertise and/or provide input from a different perspective within the community.

Lastly, the third tier consisted of the general public, who were often engaged throughout the planning process. Details regarding the methods and channels of outreach are briefly highlighted below, with additional information located in Chapter 2.

Hazard Mitigation Workshops

WCCOG partnered with The Nature Conservancy (TNC) to bring hazard mitigation workshops to the region. The four workshops covered all eight municipalities, providing critical opportunities to discuss hazard mitigation for a diverse and representative cross-section of each municipality. Participants included municipal staff, key stakeholders, and the general public alike. Such participation provided unique insight with respect to hazard mitigation, while also providing an active forum with which suggestions/feedback for each municipality could be aggregated and incorporated into the HMP in real time.

Greenwich Hazard Mitigation Workshop, December 18, 2014. Photo Credit: WCCOG

Natural Hazard Mitigation Survey

As part of the regions continued and diverse approach to public outreach, a Natural Hazard Mitigation Survey was created and released to the media, for distribution to the mass public. The survey sought to capture the public knowledge and perception of area natural hazards, including associated vulnerability and opportunities for mitigation at both municipal and regional levels. The survey provided an unprecedented opportunity for the SWR to reach an even larger public audience with respect to hazard mitigation input. Rather than solely relying on the public to visit WCCOG's website, the survey itself proactively sought to engage the general public. The results of the survey, by municipality, can be found in Table 2.2.2-2 of Chapter 2.

Media

Media outlets were utilized throughout the development of the HMP, serving as a conduit to the general public. Such outlets will also be utilized during the plan implementation and maintenance portions. Media releases, newspaper, video, and audio interviews were conducted to create an awareness of HMP development and project activities, while simultaneously conveying the importance of natural hazard mitigation. By utilizing the media, the region and its municipalities were able to tap into an existing communication network and better engage the mass public. The HMP utilized

the media at frequencies significantly higher than previous plan iterations. Such efforts, in conjunction with the unparalleled Natural Hazard Mitigation Survey, demonstrate the region's continued commitment to enhanced public involvement.

Municipal Public Information Sessions

A series of four municipal public information sessions were conducted in the SWR following the completion of the Draft HMP. The sessions occurred early in 2015 as part of a 30-day public comment period. The purpose of the meetings were to brief the communities with respect HMP components, area hazards, vulnerabilities, and hazard mitigation, including the connection to existing plans and documents. Presentations were made at the beginning of meetings, with the remaining time serving as an "open house" where residents could review the HMP, ask questions and receive personalized answers. The intimacy between technical experts and the public served as the driver for Public Information Sessions, as opposed to conducting HMP public participation in the form of a meeting agenda item.

ES-3 Natural Hazards

Extensive research and outreach revealed the following natural hazards with the potential to impact the region and its municipalities. An overview of area hazards by municipality can be found below in Table ES-3.1. More detailed information regarding hazard summaries in the region can be found in Chapter 3, including: history, geographic location, extent, probability, and overall significance of each hazard by municipality.

The SWR is vulnerable to a variety of natural hazards, as evidenced by the above table. Hazards with greatest frequency and potential for loss of life and/or property include: Flooding; Extreme Heat and Cold; Hurricane and Tropical Storms; Drought; Severe Wind; Severe Winter Weather; Severe Storms and Tornados. In addition, Storm Surge and Sea Level Rise were key hazards of concern for the five coastal municipalities. The aforementioned hazards are consistent with the most significant hazards identified as part of the State of Connecticut's 2014 Natural Hazard Mitigation Plan.

Hurricanes/Tropical Storms

The annual Atlantic hurricane season extends from June 1st through No-

Table ES-3.1 Hazards by Municipality

Municipality	Darien	Greenwich	New Canaan	Norwalk	Stamford	Weston	Westport	Wilton	Region
Avalanche									
Dam Failure	●	●	●	●	●	●	●	●	●
Drought	●	●	●	●	●	●	●	●	●
Earthquake		●	●	●	●	●	●	●	●
Erosion	●	●	●	●	●	●	●	●	●
Expansive Soils									
Extreme Cold	●	●	●	●	●	●	●	●	●
Extreme Heat	●	●	●	●	●	●	●	●	●
Flood	●	●	●	●	●	●	●	●	●
Hail	●	●	●					●	●
Hurricane	●	●	●	●	●	●	●	●	●
Landslide									
Lightning	●	●	●	●	●	●	●	●	●
Sea Level Rise	●	●		●	●		●		●
Severe Wind	●	●	●	●	●	●	●	●	●
Severe Winter Weather	●	●	●	●	●	●	●	●	●
Storm Surge	●	●		●	●		●		●
Subsidence									
Tornado	●	●	●	●	●	●	●	●	●
Tsunami	●								●
Wildfire	●	●			●	●		●	●
Severe Storm	●	●	●	●	●	●	●	●	●

vember 30th, although tropical cyclones can occur outside of this timeframe. Tropical cyclones can take form as either hurricanes, tropical storms, or tropical depressions, with hurricanes being the strongest form of cyclone. The National Weather Service's (NWS) National Hurricane Center is responsible for tracking and predicting tropical cyclones in the north Atlantic.

In August 2011 Hurricane Irene made its third landfall in New York City as a tropical storm. Irene brought sustained tropical storm winds, heavy rain, and destructive storm surge to Connecticut on August 28, 2011. Approximately 15,000 people evacuated due to storm surge along the shores of Long Island Sound, where a state voluntary evacuation was in effect. Preliminary damage cost estimates included $150-200 million for Individual Assistance covered by Insurance and $40-50 million for Public Assistance. The number of power outages statewide peaked to around 900,000, and around 3% of the state's trees along state roads were lost. The New Canaan branch of Metro North suffered extensive damage, and AT&T reported 2,000 downed poles, as well as additional damage to numerous cellphone towers.

Utilizing FEMA's HAZUS-MH modeling software, WCCOG estimated the extent of physical damage and economic losses to the SWR and its communities under the 500-year probabilistic Hurricane scenario. This scenario is similar to or slightly stronger than the 1938 Category 3 Hurricane that impacted the state. The model considered storm surge and wind data, predicting regional impacts totaling over $1.8 billion, with nearly 20,000 buildings receiving moderate or greater damage, 42 of which included critical facilities such as hospitals.

Flooding

With over 85 miles of coastline and more than 600 miles of waterways, the entire SWR is vulnerable to flooding, although the type varies by geography. The four main types of flooding are coastal, riverine, and shallow flooding. Coastal flooding typically results from coastal storms producing storm surges and erosion of coastal areas; riverine flooding occurs when water channels receive more rain, runoff and/or snowmelt from their watershed than normal, or if the channel is blocked by ice or debris; flash flooding occurs when an area experiences an unusually large amount of rain and/or high velocity of water flow within a very short period of time; lastly, shallow flooding tends to occur in flat areas with poor drainage, resulting in the pooling of water. The coastal municipalities experience all four major flood types, whereas the inland areas can experience riverine, flash, and shallow flooding.

The combination of dense development and highly valuable real estate in close proximity to water create the potential for substantial economic and/or property impacts from flooding. As a result, this hazard remained a significant concern for the region and its municipalities during the HMP development. Flooding can occur at any time of year, but the region experiences a greater risk during the spring as heavier precipitation events may correlate with melting snow and ice. The National Oceanic and Atmospheric Administration (NOAA) has also noted that late summer/early fall and early winter also create favorable conditions for flood events. Significant and widespread flood events have been observed in the region on an annual basis dating back to 2006.

The National Flood Insurance Program (NFIP) provides a means of financial protection for property owners from flooding. NFIP offers flood insurance to homeowners, renters, and businesses in participating municipalities. A December 2014 analysis of NFIP claims revealed 850 Repetitive Loss Properties (RLP) in the SWR, with claims totaling nearly $83.9 million. Not surprisingly and as depicted in Figure ES-3.2 below, claims are generally concentrated along waterways.

To better assess area flood risks, WCCOG modeling the impacts of flooding using FEMA's HAZUS-MH loss estimation program. The results indicate potential municipal damage as a result of a flood with a 1% (100-year flood) and 0.2% (500-year flood) probability of occurring in any given year, along with the impacted acreage. The analysis was conducted for both Coastal and Riverine Flooding, with the output also presented in Table ES-3.2 below.

Figure ES-3.1

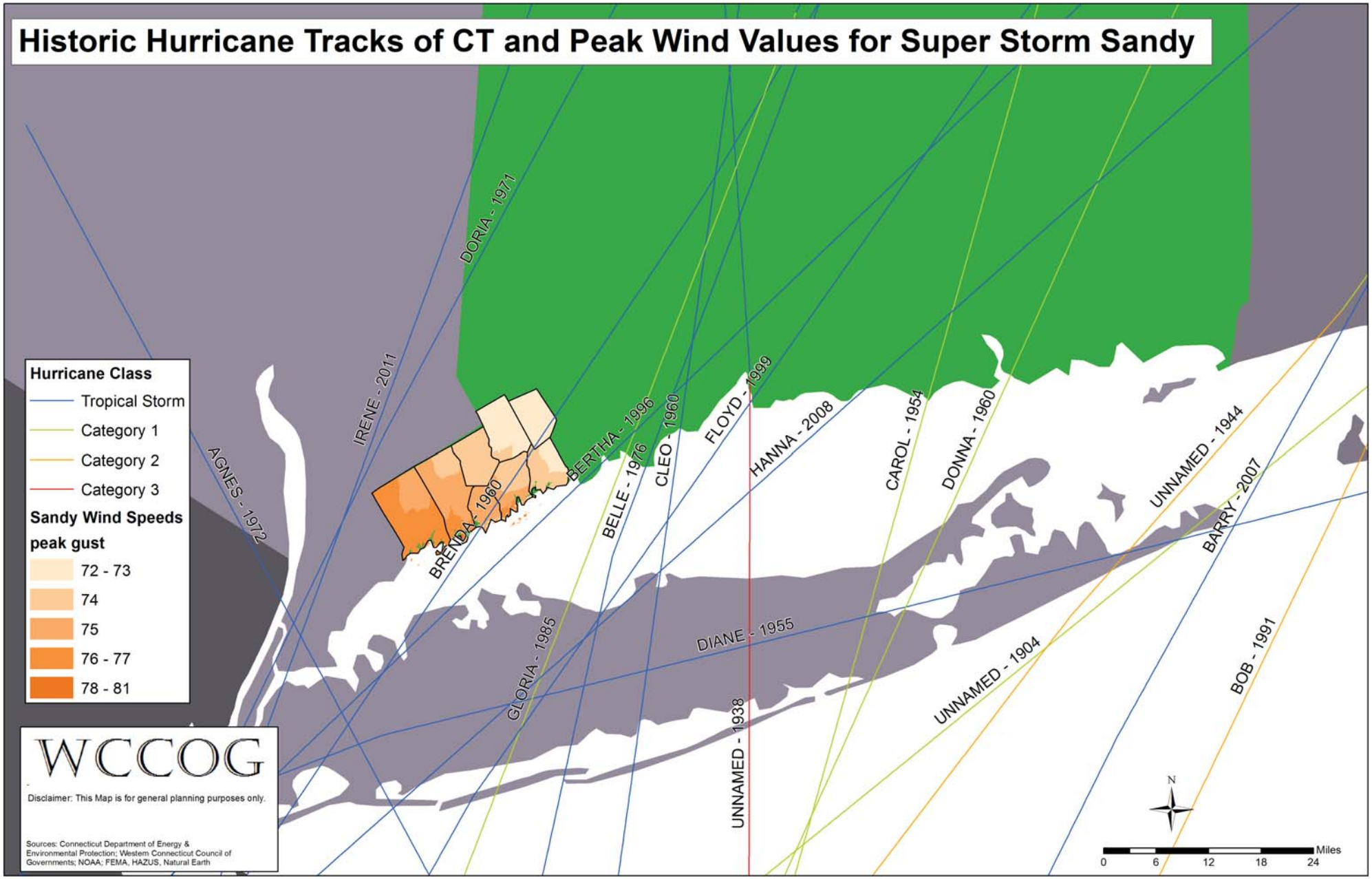

Historic Hurricane Tracks of CT and Peak Wind Values for Super Storm Sandy
Hurricane Class
Tropical Storm
Category 1
Category 2
Category 3
Sandy Wind Speeds
peak gust
72 - 73
74
75
76 - 77
78 - 81
WCCOG
Disclaimer: This Map is for general planning purposes only.
Sources: Connecticut Department of Energy & Environmental Protection; Western Connecticut Council of Governments; NOAA; FEMA, HAZUS, Natural Earth
DORIA - 1971
IRENE - 2011
AGNES - 1972
BRENDA - 1960
BERTHA - 1996
BELLE - 1976
CLEO - 1960
FLOYD - 1999
HANNA - 2008
CAROL - 1954
DONNA - 1960
UNNAMED - 1944
BARRY - 2007
GLORIA - 1985
DIANE - 1955
UNNAMED - 1904
BOB - 1991
UNNAMED - 1938
N
Miles
0
6
12
18
24

Figure ES-3.2

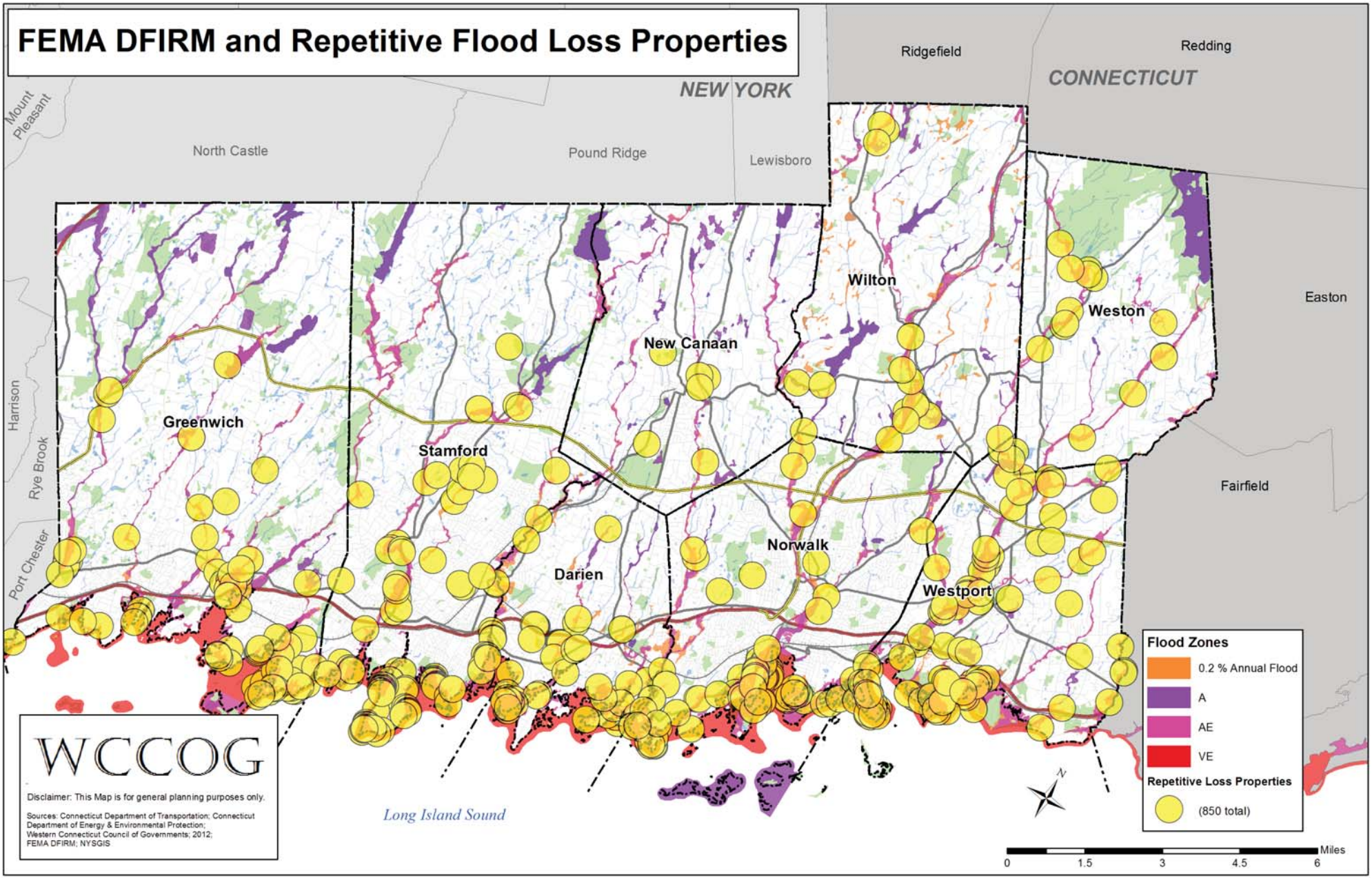

FEMA DFIRM and Repetitive Flood Loss Properties
NEW YORK
CONNECTICUT
Ridgefield
Redding
Mount Pleasant
North Castle
Pound Ridge
Lewisboro
Wilton
Weston
Easton
New Canaan
Greenwich
Stamford
Harrison
Rye Brook
Port Chester
Fairfield
Norwalk
Darien
Westport
Long Island Sound
WCCOG
Disclaimer: This Map is for general planning purposes only.
Sources: Connecticut Department of Transportation; Connecticut Department of Energy & Environmental Protection; Western Connecticut Council of Governments; 2012; FEMA DFIRM; NYSGIS
Flood Zones
0.2 % Annual Flood
A
AE
VE
Repetitive Loss Properties
(850 total)
N
0
1.5
3
4.5
6
Miles

Table ES-3.2: Flood Statistics by Municipality

	Riverine Flood Area (Acres)		Damage ($ 1000's)		Coastal Flood Area (Acres)		Damage ($ 1000's)	
Town	1% Flood	0.2% Flood	1% Flood	0.2% Flood	1% Flood	0.2% Flood	1% Flood	0.2% Flood
Darien	240.7	302.8	33231.0	50823.7	493.9	596.0	64023.0	92530.0
Greenwich	1368.9	1637.8	71481.0	109323.6	903.7	1152.6	193473.0	288006.0
New Canaan	533.6	618.0	19093.0	29201.0	--	--	--	--
Norwalk	516.5	597.4	107580.0	164533.6	1272.8	1461.8	249371.0	436406.0
Stamford	1421.2	1689.3	209421.0	320290.0	879.0	1070.2	413109.0	643095.0
Weston	1061.9	1167.8	29062.0	44447.6	--	--	--	--
Westport	507.5	1022.1	53293.0	81506.7	1017.2	1252.5	193279.0	352951.0
Wilton	939.9	1059.1	222010.0	339543.7	--	--	--	--
Region	6590.2	8094.3	745171.0	1139670.0	4566.7	5533.0	1113255.0	1812988.0

1. Damage statistics for 0.2% flood event for each municipality were derived from the regional 500yr flood event totals and the damage proportions observed in the 1% flood event. Source: FEMA HAZUS-MH, WCCOG

Drought

The potential for and impacts from drought have increasingly grown of concern in the region. Severe droughts have the potential to adversely impact the water supply and increase chances of wild fires. While the entire SWR is vulnerable to drought impacts, the severity increases towards inland areas of the region that rely on wells for drinking water, in addition to cisterns and/or fire ponds for firefighting.

As discussed above, drought has an equal chance of affecting all areas of the region, with a 12% annual chance of occurrence, according to NOAA's National Climatic Data Center (NCDC). The NCDC has recorded five drought events rated moderate or greater from 1901 to 2013. Most recently in October 2013, the SWR experienced moderate drought conditions according to United States Drought Monitor. Bridgeport, just east of the region, experienced a rainfall deficit of -6.76" during this period.

Severe Storms and Winter Weather

For purposes of this section, Severe Storms and Winter Weather include events such as: nor'easters; severe heat and cold events; blizzards, ice storms, and other intense precipitation events; severe winds; thunderstorms; and tornados.

According to the historic data collected from the NCDC during 2000-2014 the SWR can expect, on average, three severe winter storm events a year. All towns in the region are vulnerable to such impacts, which can cause icy and congested roads, power outages, school and work cancelations, as well as property damage. Heavy snow, ice, and high winds from nor'easters increase the potential for downed limbs and power lines. With much of the region's utility infrastructure situated aboveground, downed limbs and utility lines can wreak havoc to area residences, businesses, and emergency responders. Wind impacts from thunderstorms (downbursts) and/or tornados also create similar hazards to utility lines.

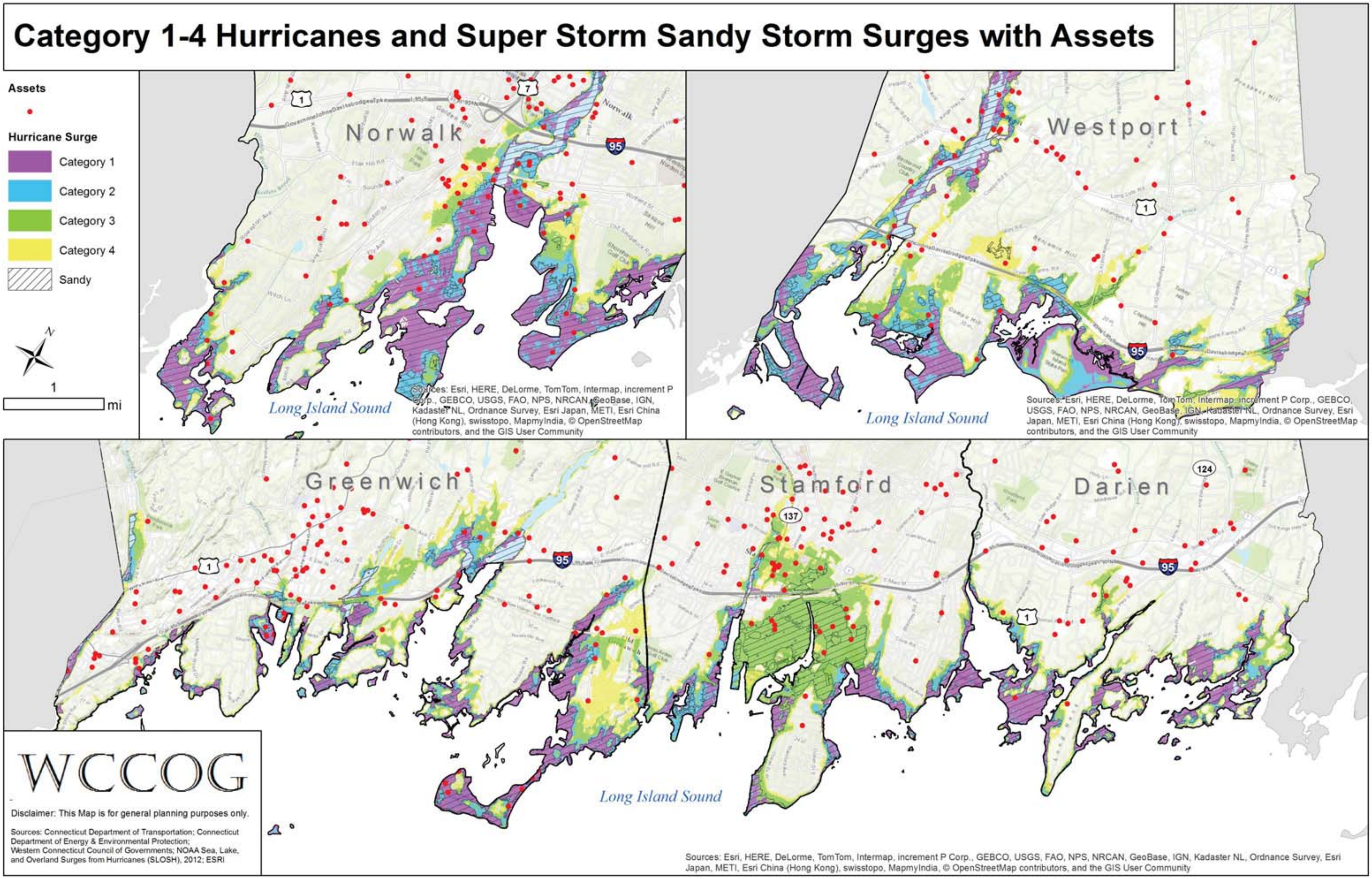
People living in the more rural areas of the SWR are even more vulnerable to potential power losses and property damage from severe storms. In addition, the elderly, poor and homeless populations are also very vulnerable to the impacts created by winter storms due to resource needs (heat/cooling, power loss, safe access to food stores, etc.). There is also an increased risk associated with transportation mobility as roads may become: blocked by downed trees/utilities; slick and treacherous in winter; and lower visibilities; all of which may increase traffic congestion along the area thoroughfares.

Storm Surge and Sea Level Rise

Storm surge is defined by NOAA as an abnormal rise of water generated by a storm, over and above the predicted astronomical tide. The end result is that sea water is pushed onto the coastline, resulting in flooding. The Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model is used to geographically evaluate the potential impact of storm surge, and is delineated by Hurricane Category (1-4 only). Recent storm surge events occurred in late

Figure ES-3.3

Category 1-4 Hurricanes and Super Storm Sandy Storm Surges with Assets



October 2012 during Superstorm Sandy, and on August 28, 2011 as part of the remnants of Hurricane Irene.

Sea level rise (SLR) creates the potential for the flooding of shoreline areas and coastal erosion, including saltwater intrusion from Long Island Sound. Increases in SLR could result in building damage, road and utility impacts, as well as loss of property. Impacts may be further exacerbated by the dense development along the coastline, with corresponding elevated property values. The municipalities of Greenwich, Darien, Norwalk, Stamford, and Westport are all potentially vulnerable to both SLR and Storm Surge.

Vulnerable Assets

WCCOG performed geospatial analyses using Geographic Information Systems (GIS) to identify critical assets (by type) potentially impacted by a variety of hazard scenarios. This was performed by overlaying the assets on top of GIS layers like Superstorm Sandy inundation areas; all assets which lie in the mapped hazard areas were flagged and added into a table. Unlike drought and tornados which have equal chances of occurring anywhere in the region, certain areas are more vulnerable to specific hazard types. For example, the coastal area is naturally more susceptible to sea level rise than its inland counterparts. The results of the geospatial analyses, including type of hazard and corresponding asset impacts, are presented in Tables ES-3.3 and ES-3.4.

Additional information regarding specific asset types by hazard vulnerability can be found in Section 3.21 of Chapter 3.

ES-4 Mitigation Strategies

The identification and development of activities which channel HMP goals of reducing loss of life, property and economic disruptions are paramount. The resulting mitigation strategies are the lynchpin in taking identified hazard risks and vulnerable areas from previous sections, and mitigating potential future impacts. Structurally, mitigation strategies are organized by the overall goal, refined further through objectives, and finally detailed action items. Figure ES-4.1 depicts the flow from goal to ob-

Table ES-3.3 Vulnerable Assets by Hazard Type

Hazard Category	Darien	Greenwich	New Canaan	Norwalk	Stamford	Weston	Westport	Wilton	Region
FEMA 1% Flood Zone (DFIRM)	1	22	0	17	14	0	19	2	75
FEMA 0.2% Flood Zone (DFIRM)	1	22	0	19	15	0	22	4	83
Hurricane Sandy Inundation Zone	1	18	0	17	6	0	12	0	54
Category 1 Hurricane (SLOSH)	0	15	0	9	0	0	5	0	29
Category 2 Hurricane (SLOSH)	1	21	0	22	0	0	12	0	56
Category 3 Hurricane (SLOSH)	1	27	0	34	24	0	16	0	102
Category 4 Hurricane (SLOSH)	3	30	0	42	28	0	22	0	125
Max Snow Depth greater than 24"	0	0	2	140	0	12	79	33	266
WildFire Urban Interface	0	16	12	2	21	0	7	11	69

Source: WCCOG, FEMA, NOAA, SLOSH, USGS, NCDC

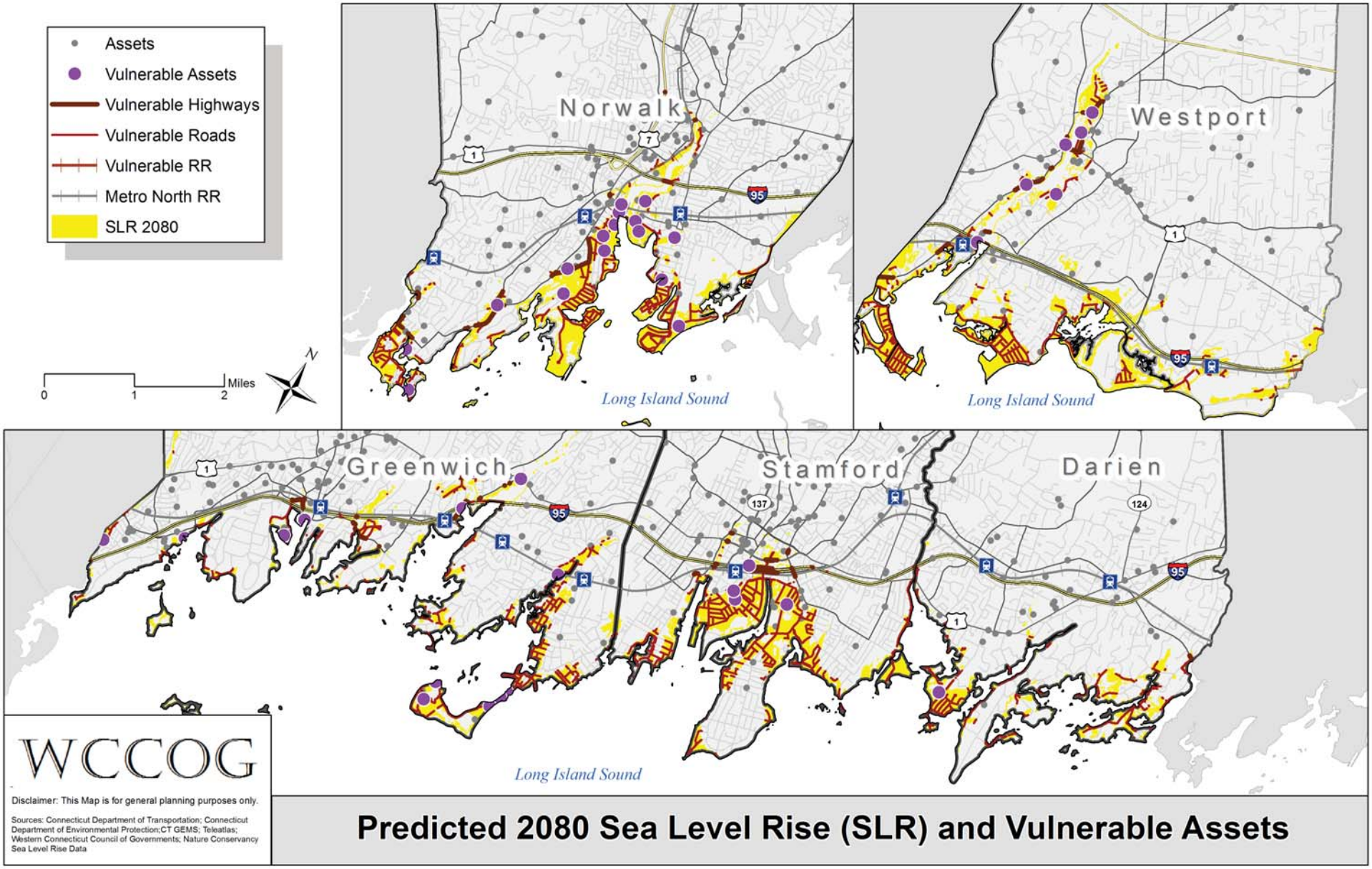
Table ES-3.4: Vulnerable Assets in Region from Sea Level Rise (SLR)

Impacts from SLR	Assets (count)	Railroads (# locations)	Vulnerable Roads (miles)	Vulnerable Arterial Roads / Highways (miles)	SLR Inundation Area (sqml)
2020 SLR	11	17	46.4	1.7	2.7
2050 SLR	20	17	49.2	2.6	3.3
2080 SLR	45	24	81.5	5.1	4.8

Source: WCCOG, CTDOT, TNC

Figure ES-4.1

*Image source: FEMA Location Mitigation Handbook, 2013



Predicted 2080 Sea Level Rise (SLR) and Vulnerable Assets

jective, including examples:

Previous mitigation strategies serve as an integral component to this HMP update. Such efforts are critical and aid in refining each municipality's mitigation strategies, particularly in light recent storm events and experiences gained since the 2011 plan. In addition, priorities can change over a five-year period, thus revisiting previous strategies provides municipal officials the opportunity to reflect on changes in priority. WCCOG met with each municipality and reviewed the 2011 mitigation strategies, revising accordingly. The revised strategies were then rated and prioritized using FEMA's STAPLEE method to determine feasibility and overall effectiveness. Additional and more detailed information on mitigation strategies can be found in Chapter 4.

Regional Mitigation Strategies

Due to the larger geographic impacts of certain hazards in conjunction with shared commonalities among municipalities, many mitigation strategies are better serviced at the regional level. The need for regional mitigation strategies is further bolstered by certain activities requiring coordination with the state and/or federal government, dealings with which WCCOG has expert experience in. Table ES-4.1 illustrates the 2016 South Western Region Hazard Mitigation Strategies.

Municipal Mitigation Strategies

As discussed at the beginning of this section, WCCOG worked intimately with each municipality to reassess their mitigation strategies, which consisted of goals, objectives, and actions. Strategies were revised to reflect current conditions, removing those completed and/or no longer applicable, and adding new strategies, particularly in light of recent event such as Hurricane Irene in 2011 and Superstorm Sandy in 2012. Consistent with federal guidelines, each municipality separately reviewed and revised their own specific mitigation strategies. The revised 2016 municipal strategies chart a course for which municipalities can follow in order to implement appropriate and feasible strategies that will attain the HMP goals and objectives. As with the regional strategies, the municipal counterparts were also rated and prioritized using FEMA's STAPLEE system.

While mitigation strategies vary by municipality and are based on a variety of factors, it is possible to categorize the strategies into more general groupings. Table ES-4.2 provides a snapshot of the strategy types, and the text below describes the types in more detail. Additional information on specific mitigation strategies and corresponding details can be found in Chapter 4.

Education and Outreach: Projects and actions in this category include measures to inform and educate residents, businesses, elected officials, state/regional/local agencies and institutions, as well as other key stakeholders. Specific types of outreach vary, and include mailings, website postings, public information sessions and workshops, newspaper postings, television/radio interviews, media releases and e-mail correspondence. Additional outreach measures include targeted outreach to specific populations that may be particularly vulnerable and/or at-risk, as well as key neighborhood and community groups. Lastly, actions were also developed to maintain and enhance municipal interdepartmental coordination, helping streamline communication, awareness, and emergency response efforts.

Emergency Preparedness and Response: include actions such as improving coordination with utility companies; maintaining and enhancing communication systems such as severe weather warnings; 911 centers; GIS and emergency mapping applications; trainings and exercises; new facilities and/or equipment such as backup generators, emergency operations center (EOC) improvements, or automated sand baggers.

Prevention: proactive measures conducted in advance of and aimed towards reducing hazard impacts. Prevention actions include regulations and ordinances such as requiring freeboard and other wet/dry flood proofing measures in flood zones; encouraging resiliency efforts such as elevating homes, implementing low impact development (LID) to control stormwater runoff and reduce impervious surface area.

Structural Projects: include activities to strengthen and harden facilities against natural hazards; acquiring property within the flood zone; maintenance activities such catch basin cleaning/dredging; in addition to constructing larger culverts and/or new drainage systems to help convey high flows or stormwater.

Table ES-4.1: Summary of 2016-2021 Mitigation Strategies by Type

	Education and Outreach			Emergency Preparedness and Response					Prevention				Structural and Other Physical Projects				Natural Resource Protection		
Mitigation Strategies	Informational Public Outreach	Targeted Public Outreach	Intra-municipal Coordination and Outreach	Improve Coordination and Working Relationships	Develop/Improve/Maintain Notification/Warning and Communication Systems	Integrate/Expand/Maintain Emergency Software and Mapping Capabilities	Trainings and Exercises	New/Upgraded Facilities/Equipment	Identfy/Assess Risks and Vulnerabilities	Identify/Assess/Protect Vulnerable Populations and Assets	Enhance/Strengthen Planning, Zoning, Building and Development Regulations	Encourage/Require Resiliency Techniques to Properties in Hazare Prone Areas	Property Acquisition/Relocation	Improve Drainage, Culverts, Roads, and Bridges (including Maintenance)	Protect/Improve Utility Infrastructure	Harden/Strengthen Critcial Assets	Encourage/Incorporate Best Management Practices to Reduce Hazard Impacts	Tree Management and Maintenance	Implement/Maintain Natural Mitigation Systems
Darien	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓		✓
Greenwich	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
New Canaan	✓	✓		✓	✓			✓	✓	✓			✓	✓	✓	✓		✓	
Norwalk	✓	✓		✓	✓		✓	✓	✓	✓				✓	✓	✓	✓	✓	
Stamford	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Weston	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Westport	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wilton	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Region	✓	✓	✓	✓	✓	✓	✓		✓	✓							✓	✓	

Table ES-4.2: Synopsis of 2016-2021 Regional Mitigation Strategies

Goal: Reduce the loss of life, property, and economic disruptions as a result of natural hazards.

Objective 1: Provide/Assist with education and outreach efforts to municipalities, stakeholders, and the public

Mitigation Actions:

1.1	Work with Municipalities, DEMHS, and the Red Cross to continue shared/regional sheltering locations.
1.2	Work with local municipalities to identify and coordinate desired training, exercise, and workshop programs that may be beneficial to the region and its municipalities.
1.3	Perform/assist with outreach and other project efforts for the public regarding hazards and emergency preparedness, including vulnerable populations.

Table ES-4.2

Objective 2: Provide Planning and Technical Assistance to the Region and its Municipalities	
Mitigation Actions:	
2.1	When opportunities arise, work with the State, Region, and local municipalities to enhance the Debris management plan to ensure its usefulness.
2.2	Work with municipalities and DEMHS to develop shelter-specific evacuation routes for a variety of storm scenarios. Document the results in a planning document. Encourage the state to evaluate large-scale evacuation scenarios for CT that includes a mass evacuation of New York.
2.3	Work with municipalities to maintain and implement the multi-jurisdictional HMP, conducting updates every five years.
2.4	Initiate Phase 2 of the DEMHS R1 Emergency Evacuation Planning and Needs Assessment. Explore the feasibility of evacuation routes and transportation modes in Region relative to natural hazards, potentially including identification of hazard-prone areas along key routes and associated access issues (i.e. transportation suitability analysis). Assess vulnerable assets from HMP and develop a short-list of feasible mitigation measures to explore for implementation.
2.5	Explore and develop a regional communications plan. Includes communications, sharing resources, identifying common strengths, weaknesses, and vulnerabilities. Identify opportunities to mitigate weaknesses and vulnerabilities.
2.6	Conduct a tree damage vulnerability analysis and assess susceptibility of critical assets and infrastructure.
2.7	Perform a watershed health analysis to scan region's watersheds, including area land use types and impervious area. Results will help determine vulnerable areas based on flow regime and storm runoff.
2.8	Support the development and maintenance of the ESF-7 Asset Inventory. Explore opportunities to sustain inventory, and the potential development of an associated plan.
2.9	Assist with projects and efforts that involve two or more participating municipalities, and other regional incentives, where desired. For example: a regional communications/dispatch center; a plan identifying interfaces with WebEOC, Veochi, GIS and other software applications.
2.10	Continue to identify and assess critical assets in the region. Work with municipalities and DEMHS to identify opportunities to mitigate critical assets and infrastructure against natural hazard impacts.

Objective 3: Support federal, state, and municipal efforts with respect to hazard mitigation	
Mitigation Actions:	
3.1	Continue the development and maintenance of a regional website with emergency management information (i.e. DEMHS site that can be linked to).
3.2	Participate in the development/update of the state emergency preparedness plans.
3.3	Continue to work to have an Army Corps of Engineers Reconnaissance Study conducted of the Region's rivers and streams.
3.4	Explore opportunities to secure technical assistance for Hazard Mitigation Grant Program (HMGP) applications (i.e. home elevation grants).
3.5	Create and maintain a regional stormwater clearinghouse to assist municipalities with stormwater BMPs, appropriate mitigation techniques, and regulatory compliance.

Natural Resource Protection: are noninvasive techniques to mitigate against natural hazards while concurrently retaining and restoring the areas natural functions. Examples include the installation of rain barrels and gardens to reduce flooding; encouraging and educating private property owners on proper stream channel clearing; as well as removing dead and diseased trees.

ES-5 Plan Maintenance

As a living document, the importance of keeping the plan current is crucial. Over time, changes to hazards, available information and data, as well as actions and priorities tend to occur, which may require plan adjustments. Such "real-time" adjustments help aid in keeping the HMP both current and relevant.

The HMP Advisory Committee will coordinate and convene annual plan reviews to assess overall implementation, difficulties/challenges, and any departures from what is currently captured in the HMP. As official HMP liaisons to their respective municipalities, municipal advisory committee members will also concurrently conduct annual outreach to their fellow staff, boards, and commissions; while also partaking in the regional discussion. Additional meetings will convene prior to and following an area natural hazard event, as appropriate.

With respect to actual details, the following elements from the plan will be carefully reviewed at the aforementioned meetings:

- Assess overall plan implementation progress;
- Evaluate specific sites and areas vulnerable to natural hazards:
  - Including all critical assets and infrastructure
  - Identify cost-effective mitigation measures to benefit these areas;
- Summarize mitigation strategies that have taken place;
- Monitor plan and effectiveness of remaining mitigation strategies;
- Review and adjust overall goals and mitigation strategies (where applicable)

Table ES-5.1 highlights the proposed schedule from 2016 to 2021.

Additional information on the HMP and natural hazard mitigation planning can be found at: http://www.westcog.org/hazard-mitigations/

Table ES-5.1: Schedule for 2016-2021 HMP Update

	2016				2017				2018				2019				2020			
2016-2021 Plan Approval and Adoption																				
FEMA Review & Approval	●	●	●																	
Local & Regional Adoption			●	●	●															
Plan Distribution			●	●	●															
Plan Monitoring and Implementation																				
Annual Reviews & Updates						●				●				●				●		
Public Involvement						●				●				●				●		
HMP Update Process																				
Apply for Grant Funding							●													
Regional Board Approval							●													
Municipal Approval(s)							●													
HMP Development																				
Critical Assets & Infrastructure Update									●	●										
Risk Assessment Update										●	●	●	●	●	●					
Mitigation Strategies Update												●	●	●	●	●	●			
Document Preparation & Revisions														●	●	●	●	●	●	●
Public Involvement										●			●		●	●	●	●	●	●

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