







City of Stamford Hazards and Community Resilience Workshop

Summary of Findings

City of Stamford

Hazards and Community Resilience Workshop Summary of Findings

Overview

The need for municipalities, regional planning organizations, states and federal agencies to increase resilience and adapt to extreme weather events and mounting natural hazards is strikingly evident along the coast of Connecticut. Recent events such as Tropical Storm Irene, the Halloween Snow Storm, Hurricane Sandy, and most recently Blizzard Juno have reinforced this urgency and compelled leading communities like the City of Stamford to proactively plan and mitigate risks. Ultimately, this type of leadership is to be commended because it will reduce the exposure and vulnerability of Stamford's citizens, infrastructure and ecosystems and serve as a model for communities across Connecticut, the Atlantic Seaboard, and the Nation.

In the fall of 2013, a partnership formed between the City of Stamford, Western Connecticut Council of Governments, and The Nature Conservancy. This partnership focused on increasing awareness of risks from natural and climate-related hazards and to assess the vulnerabilities, and strengths within the City of Stamford. This was actualized through a series of presentations, meetings, and outreach to build stakeholder willingness and engagement followed by a Hazards and Community Resilience Workshop in December of 2014. The core directive of the Workshop was the engagement with and between community stakeholders in order to facilitate the education, planning and ultimately implementation of priority adaptation action. The Workshop's central objectives were to:

- Define extreme weather and local natural and climate-related hazards;
- Identify existing and future vulnerabilities and strengths;
- Develop and prioritize actions for the City and broader stakeholder networks;
- Identify opportunities for the community to advance actions to reduce risk and increase resilience comprehensively.

The City of Stamford's Hazards and Community Resilience Workshop employed a community-driven process developed by The Nature Conservancy as part of their Coastal Resilience Program. Elements of the "Roadmap for Adapting to Coastal Risk" (NOAA) were used to frame portions of the workshop (i.e., "profiles"). The Conservancy's Risk Matrix and Coastal Resilience Tool (www.coastalresilience.org) where integrated into the workshop process to provide both decision-support and risk visualization for the City of Stamford. Using this workshop process, rich with information, experience, and dialogue, the participants produced findings which are outlined in this summary report. The following report provides an overview of the top hazards, current concerns and challenges, current strengths and vulnerabilities, and prioritized recommendations to improve the City of Stamford's resilience to natural and climate-related hazards today and in the future.

The summary of finding transcribed in this report, like any that concern the evolving nature of risk assessment and associated action, are proffered for comments, corrections and updates from workshop attendees and additional stakeholders alike. The City of Stamford's leadership on hazards and community resilience will benefit from the continuous and expanding participation of all those concerned.

Summary of Findings

Top Hazards and Vulnerable Areas for City of Stamford

During the Hazards and Community Resilience Workshop (December 2014), participants from the community were asked to identify the top natural hazards for the City of Stamford. Coastal and inland flooding from intense storms and resulting storm surge and riverine flooding were identified as the hazard of greatest concern by most participants. Extreme winter storms with snow, ice, and wind were also listed as priority hazards by workshop attendees. These events have direct and severe impacts on City assets such as its residential neighborhoods, natural areas (beaches, wetlands, rivers, parks), roads, and critical infrastructure. In addition, the participants determined that environmental shifts associated with climate change, such as sea level rise, extreme precipitation events, and lengthening periods of drought will elevate the damaging impact of natural hazards in Stamford. Severe heat waves were also flagged as a growing concern particularly in the downtown area.

Top Hazards and Vulnerable Areas - City of Stamford

Top Hazards

- Coastal Flooding and Storm Surge
- Inland Flooding
- Ice and Snow Storms
- High Wind Events

Other Hazards: Severe Droughts and Heat Waves, Sea Level Rise

Vulnerable Areas and Attributes

Neighborhoods: Neighborhood along Weed Avenue and Dolphin Cove.

Ecosystems: Salt Marsh areas across coast, Mill River, Cove Island Park, Cummings Park Beach, Noroton River, Rippawan River, Mianus River Park, floodplains along rivers, bird sanctuary.

Transportation: Weed Avenue, all roads in FEMA's A Zone (south of I-95), Saddle Rock Road, Dolphin Cove, Portions of I-95 and Metro North (intersection with Rt. 104), Elm Street, Atlantic Street, Canal Street, and Washington Street at underpass, North Street to Main Street, Kenilworth Road, Wire Mill Road, High Ridge Road, East Main Street, Sea Beach Drive, Mitchell Street/Downs Avenue, Saddle Rock Road, Davenport Drive.

Infrastructure: Schofield Shelter/Smith House, overall shelter systems capacity, marinas, beach pavilions, Wastewater Treatment Plant, 8-10 vulnerable pump stations (Holly Pond, Cummings, Cove), dike system along Cummings Road, Woodside Fire Station #2 and Station #5, downtown Fire Headquarters, Holly Pond and Cove Dams (4 flood gates – 2 in Stamford, 2 in Darien), Harbor sedimentation, Hurricane Barrier, elderly housing (Shippan Place (511/521), inland culverts, east side of Mill River Street, south of North Street), power substations, power lines in north Stamford, East Main Street, breakwater system, CT Transit – Stamford Division, West Bridge, Stamford School System, various sections of sewer lines.





<u>Current Concerns and Challenges Presented by Hazards</u>

The City of Stamford has several concerns and faces multiple challenges related to the impacts from natural hazards. In recent years, Stamford has experienced a series of highly disruptive and damaging weather events including Tropical Storm Irene (August 2011), Hurricane Sandy, (October 2012), and winter Nor'easter Nemo (February 2013). Impacts from Irene included coastal flooding, heavy-rain induced inland flooding, and wind damage. Sandy caused coastal flooding and extensive power outages across large portions of the City. Nemo dropped nearly three feet of snow on Stamford knocking out power and isolating residents and neighborhoods. The magnitude and intensity of these events across Connecticut over the course of just 18 months increased awareness of natural hazards and motivated communities like Stamford to comprehensively improve resilience at municipal and regional levels.

This series of extreme weather events highlighted for Stamford that impacts from hazards are felt differently across the City from the low-lying coastal area to highly urbanized downtown to the less developed and more suburban neighborhoods in the northern sections of the municipality. The southern part of City borders Long Island Sound and is exposed to damage from coastal flooding and surge during storms. The downtown area experiences localized flooded due to heavy precipitation events. The less densely settled northern uplands experience the effects of tree damage from wind, snow, and ice as well as damage from inland flooding during precipitation events. This presents a challenge to preparedness, response, and mitigation priorities and requires comprehensive yet tailored actions for particular areas of City.

The workshop participants were generally in agreement that the City of Stamford is experiencing more intense and frequent storms events. The impacts, particularly during Tropical Storm Irene and Nor'easter Nemo, affected the daily activities of every resident and many businesses. Coastal areas are experiencing greater impact from major storms and increases in average tidal ranges are resulting in routine flooding events in certain low lying places. There was the recognition that many more residents are witnessing more routine flooding and generally elevated ground water levels. Additionally, there was a general concern about the need and challenges of being prepared with contingency plans for worst case scenarios during different times of the year (i.e., major hurricanes (Cat-3 or above)) particularly in the late fall/winter versus summer which result in more intense winter Nor'easters.

Specific Categories of Concerns and Challenges

Vulnerability of Road Network

One of the primary concerns expressed by participants was the vulnerability of Stamford's road network (state, town, private ownership) during and after routine and extreme events. Road blockage prevents emergency management services from reaching stricken areas, reduces public access to evacuation routes and critical facilities like gas stations, grocery stores, and pharmacies. In addition, impassable roads can limit access to sheltering facilities in the City (i.e., Schofield Shelter/Smith House). One of the principal concerns revolved around the adequacy of the existing evacuation plan (i.e., routes, bottlenecks, staging areas, buses, etc.) as it relates to access and egress on the road network under various disaster scenarios. This concern includes the issues around the "Emergency Snow Routes" designations that can get compromised by parked and abandoned vehicles.

Issues were surfaced by workshop participants regarding flooding along I-95 and Metro North. Certain intersections such as with Route 104 were called out as well as routine and heavy flooding of underpasses at Elm, Atlantic, Canal, and Washington Street. These major underpasses, once flooded, result in the reduction of access and egress to the south end causing isolated populations and impacts on commerce in the recovery phase of a disaster. Additional vulnerabilities in the road network include much of the areas south of I-95 in the FEMA's A Zone, select neighborhoods such as Dolphin Cove as well as secondary roads cutoff by downed trees and/or power lines north of downtown. Loss of access during the winter storms can be a larger issue for emergency responders due to the extended length of power loss and the colder temperatures for isolated residents; particularly elderly and other vulnerable populations.



Additional concerns related to roads includes the recognition by the City that many of Stamford's culverts are too small to effectively convey floodwaters downstream resulting in back-ups and increased flooding of critical intersections, roadways, and adjoining properties/right-of-ways.

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Wastewater Treatment System

The Stamford Wastewater Treatment (WWT) Plant was identified as being vulnerable to flooding from heavy rains and breaching of prevention devices. It was mentioned that despite being behind Stamford's Hurricane Barrier the WWT Plant is flood prone. Approximately 8 out of the 10 pump stations that serve the WWT Plant – particularly the Holly Pond, Cummings, and Cove stations – are currently vulnerable to flooding. Furthermore, flash floods due to heavy precipitation events and high tides currently impact existing sewer lines. Recent discharges of effluent into adjoining water bodies and after routine storms suggests further need to explore vulnerabilities to the overall sewer system and stormwater management approaches related to capacity shortfalls during heavy rain and storm events. It is important to note that the sewer system in not a combined system in Stamford although storm runoff enters the system via various means (i.e., manhole covers, etc.). Illegal hookups to the system and discharges were called out as an issue that increases the ramifications of hazard events on the efficiency of the WWT system in Stamford. Furthermore, there were concerns expressed around coordination between the Stormwater Management Team and the WPCA regarding the overflows of the WWT plant during high rain events.

Critical Infrastructure and Facilities

The Stamford Hurricane Barrier (Army Corps of Engineers project) was identified as a community asset with some qualifiers. The participants noted that the Barrier is designed to protect the south end and not the downtown area. In addition, there was concern that the Barrier was designed for a hurricane scenario that may be exceeded given the projections for more intense and frequency natural disasters – particularly with ongoing sea level rise in Long Island Sound. Longer term maintenance, cost, and sustainability of the Barrier were also cited as a concern. One reason stimulating this concern is that a large and growing percentage of Stamford's tax base is currently protected by the Barrier. The prospects of rising flood insurance rates that reflect the true cost of risk elsewhere across the flood prone areas of the City were cited as having a potential impact on property values and potential reduction in tax base.

Several critically important facilities were called out as vulnerable including the Woodside Fire Station, Station #2 (if Barrier goes - possible under Cat-3 hurricane scenario), and Station #5 due to river flooding. The river becomes very constricted and the pedestrian bridge serves to aggregate large woody debris and other potentially hazardous objects. The downtown Stamford Fire Headquarters is also projected to

be susceptible to flooding from a Category-3 hurricane. Other facilities such as the CT Transit Stamford Division need to improve their resilience to hazard impacts.

Functional Needs/Vulnerable Populations

Currently, the list of vulnerable individuals or those in need of special assistance exist only on computers which renders the information useless during power lose. The Utility does maintain a list and provides that to the Emergency Operations Center team during emergencies. Unfortunately, the list is often incomplete because some residents do not want to self-identify themselves as "disabled". This becomes particularly problematic for the homeless population in Stamford during disasters. Further education and outreach programs are needed to teach residents to help themselves via preparedness training (72-hours worth of resources). In the advent of voluntary and mandatory evacuation there is often a need to provide transportation to sheltering facilities and to ensure that the current facilities are able to provide specialized

levels of care (i.e., oxygen tanks) via medical doctor's approval. The need to provide electricity at shelters was cited as crucial to ensure people don't feel isolated and become desperate (i.e., cable, internet, phone lines at shelters). The ability of the sheltering system to handle 1% of Stamford's population or 1,200 people is currently beyond facility capacity.



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As voiced by participants, an overarching concern is that there has not been a comprehensive assessment of vulnerable populations and the existing system of support and sheltering networks (i.e., senior centers, schools, churches, etc.) during and after emergencies. This would include "cross-walks" between private facilities with their own individual contingency/emergency plans with other facilities and Stamford's overall emergency structure. The lack of a comprehensive evacuation plan for residents and vulnerable populations was also mentioned.

Natural Resources - River and Coastal Wetlands

One of the key challenges raised during the Workshop is the lack of awareness amongst residents of the benefits and critical services (including flood storage and protection) provided by the wetlands as well as the lack of knowledge regarding regulations in place for wetland protection. The larger concern is that the wetlands and riparian areas are not being valued and incorporated as natural infrastructure that can help reduce risk and improve resilience.

Current Strengths and Assets in Stamford

As a result of Stamford's recent experiences with extreme weather, the City is well acquainted with the existing strengths within the community. In addition, the long term presence of the Hurricane Barrier and the Mill River dam removal stand as affirmative examples of proactive approaches to risk reduction in the City. Reinforcing and expanding these supportive practices and assets will generate greater benefits to the community through increased resiliency against future storms, with greater frequencies and intensities, as well as long term impacts from the ongoing increases in air temperature, precipitation, and sea level.

- Clearly, the responsive and committed leadership by the elected officials and department leads is a very much appreciated strength in Stamford. Regional cooperative agreements with adjoining municipalities and state entities were cited as critical and potentially cost-saving outcomes of this leadership and staff dedication.
- Stamford's first responders are a major asset during emergency events due to their long-term knowledge and experience with a diverse array of situations. The overarching coordination amongst various departments including Police, Fire, EMS, and others was cited as ongoing community strengths.
- Ongoing enrollment of City in FEMA's Community Rating System (i.e., Class 7).
- Supportive social services such as the activities and transportation systems for seniors, youth and families, as well as faith-based organizations were highlighted as important community assets.
- The marshes, beaches, coves, floodplains and open space along Stamford's coast
 and waterways offer increased defense against storms through surge attenuation,
 inland flooding storage, and capture for surface runoff infiltration. Forested areas,
 wetlands, and other park land provide public amenities and serve to maintain water quality and quantity for well-dependent residents. Without these natural resources in place, Stamford's coastal and inland infrastructure and homes would
 suffer greater damage and higher ongoing and reoccurring costs to rebuild or relocate.

Recent Improvements

Workshop participants highlighted a variety of positive actions taken by the City and others in the wake of recent storm. Participants described the existing communications system in Stamford as robust and "storm-tested" with a network of four communications towers, a computerized operator, and a Reverse 911 – Code Red system. The outreach effort clearly goes beyond reverse 911 and includes notification via



websites, cable, radio, and door-to-door efforts in the event of an evacuation. Despite some current short falls in capacity the City's Shelter Management Plan – in continuity with the Red Cross – was highlighted as a community asset. Additional improvement have occurred in the pre-event notification by City staff of senior housing facilities including municipally and pri-

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vately owned. The participants also noted that the City of Stamford has a tree and vegetation management plan (with contracts in place) which is being implemented in coordination between the contractor, City, and utility crews. Another asset mentioned is the local land trusts and land use planning bureau that have proactively secured easements, donations, and/or acquisition of parcels with high levels of exposure to hazards along the coast and waterways. This type of action helps to prevent additional development in high risk locations and avoids future costs to the City.

Workshop's Highest Priority Recommendations for Stamford

The following are recommendations for the City of Stamford generated by the Workshop participants organized from highest to lowest priority.

Highest Priority

- Assess strengths and weaknesses of existing coastal zoning policy across the City against various hazard scenarios (Hurricanes and/or sea level rise). Build on existing building code modifications (new homes elevated 1' above BFE; renovations <50% over 5 years or update entire structure) to increase resiliency of the housing stock.
- Determine vulnerabilities of wastewater treatment plant and all pump stations under various flooding scenarios (i.e., stress test system).

Highest Priority

- Consider conducting a feasibility study to relocate Woodside Firehouse to reduce risk longer term.
- Assessment needed that identifies opportunities to improve resiliency of coastal neighborhoods and critical infrastructures to various surge and sea level rise scenarios.
- Seek to increase the amount of open space to further limit ongoing risk to properties and infrastructure particularly in the Rippowan floodplain among other areas with ongoing and increasing flood exposure.
- Assess vulnerabilities to senior housing and City education facilities under various scenarios.
- Conduct tree inventory with GPS for ROW to help protect electric grid. Seek to require buried/hardened lines for new developments or redevelopment projects.
 Require developers to help trim trees as part of their applications. Emphasis on longer term maintenance of healthy urban tree canopy.
- Need to rectify the aging utility poles across City by prioritizing replacement along with consideration of alternatives (i.e., concrete poles).
- Seek to increase regional restoration plans that elevate the level of cooperation between municipalities, utilities, and residents (i.e., Make Safe programs).
- Need to conduct inter-city and regional tabletop exercises to maximize readiness to major disaster events. Foster regional planning and communication plan to clarify vulnerabilities, share ideas, resources, etc. Work to increase coordination of evacuation and preparedness plan that considers the use of color coded evacuation signage in select neighborhoods and along main egress routes. Revisit emergency snow routes and focus on areas with parked cars and abandoned vehicles.

Highest Priority

Look to assess the longer term maintenance needs and enhancements for Hurricane Barrier.

Acquire (solar) generators for City shelters to supplement sustainability and longevity of supply (i.e., lights, power, cable, phone lines).

Need to improve database of vulnerable populations to ensure high level respons-es and safety in advance of and during disasters.

Increase and improve emergency responder outreach to vulnerable communities to increase awareness and individual preparedness. This is particularly important amongst neighborhoods in low lying and exposed areas of the City (coast and along waterways). Increase training opportunities for residents to prepare "disaster kits" and information about sheltering-in-place (72-hour plan) if no mandatory evacuations.

Need comprehensive "Evacuation Plan" for South End neighborhoods due to high level of flood exposure.

Assess impacts to coastal natural resources under various storm and sea level rise scenarios. Utilize TNC's Salt Marsh Advancement Zone Assessment Report for Stamford to identify and prioritize protection and management opportunities.

Generate flood reduction solutions that incorporate living shorelines and green infrastructure projects (i.e., street planting, green roofs, rainwater harvesting, porous pavement, and other bioengineering techniques). Work with TNC to install bioswale(s) to control localized flooding in the Stamford Downtown.

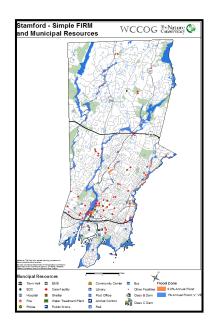
Enhance and accelerate water quality monitoring and stormwater and sewer connections and investigate illicit connections and discharges. Ensure pending zoning regulations for zero net runoff from all new constructions are passed and implemented.

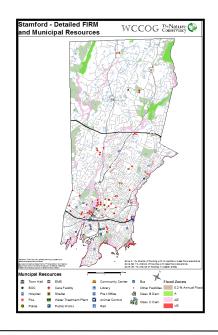
Highest Priority

- Conduct shoreline/waterway assessment to identify and prioritize natural infrastructrue and ecosystem services provided in Stamford that is and will maximize risk reduction for adjoining and downstream property and infrastructure assets. Work to ensure these locations are protected and enhanced across City. Consider replacing hard engineering structures with more natural infrastructure alternatives if feasible and appropriate.
- Include land protection needs to help reduce risk from flooding in Stamford's Plan of Conservation and Development.

Moderate Priority

- Move generators at senior housing facilities to higher floors to help minimize potential of flooding.
- Conduct study to determine feasibility and effectiveness of alternative to elevate risks to substations at underpasses in several locations.
- Assess vulnerability under various scenarios of pump stations and design flood prevention alternatives and/or explore relocation options longer term.





Moderate Priority

- Identify potential solutions to minimize issues at Holly Pond Dam and Gates. Establish cooperative agreement between Stamford and Town of Darien.
- Secure funding to elevate above flood height critical infrastructure related to power distribution and supply infrastructure.
- City-wide look to increase the resiliency of road networks by focusing on improvement to infrastructure such as bridges and culverts via a robust prioritization process. Look to install backflow preventers on select infrastructure in certain locations to reduce flooding.
- Assessments and improvements along Wire Mill Road and High Ridge Road.
- Extreme weather flyers and communications (multi-lingual) about available services for Stamford's homeless population.
- For neighborhoods and populations at-risk, identify level and location of vulnerable housing units and develop longer term plan to reduce exposure across the City.
- Coordinate with faith-based organizations to augment existing capacity to provide shelter during emergencies.
- Assess the source of sedimentation to the harbor and seek management approaches and outreach needs.
- Increase dam safety and awareness of responsibility by assessing the risks of catastrophic failure to downstream private and public assets. Concurrently, improve database (i.e., condition, ownership, etc.) for the 207 dams within the City.
- Identify opportunities to improve risk reduction at Pilgrim Towers.

Moderate Priority

- Enhance and restore natural infrastructure features (i.e., dune enhancement, wetland restoration) within coastal parks (example Cove Park).
- Improve risk reduction characteristics of waterway through natural infrastructure & riparian buffer enhancements – Mill River, Rippowan River. Conduct riparian buffer improvement analysis and project prioritization.
- Develop integrated sediment management plan for entire coastline of City. Seek to coordinate with adjoining municipalities and larger region and perhaps tie to beach resiliency planning efforts.



Lower Priority

- Assess vulnerability and identify solutions for beach pavilions.
- Seek opportunities to increase piling heights at marine(s) to accommodate increasingly higher tides.
- Identify ways to increase the resilience of the Connecticut Transit Stamford Division facility.
- Need to augment existing generator supply for businesses to include additional locations across the City.

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Workshop Participants: Departments, Organizations and Other Entities

Aquarion - Water Operations*

Army Corps of Engineers - Levee Safety*

University of Connecticut/Department of Energy and Environmental Protection

City of Stamford - Downtown Special Service District

City of Stamford Engineering Department

City of Stamford Economic Development

City of Stamford Fire Departments

City of Stanford Grants Office

City of Stamford Land Use Bureau

City of Stamford Legal Affairs

City of Stamford Office of Administration

City of Stamford Office of the Mayor

City of Stamford Office of Operations—Traffic and Road Maintenance

City of Stamford Parks and Recreation Department

City of Stamford Police Department

City of Stamford Public Safety, Health and Welfare

Connecticut Department of Emergency Services and Public Protection

Connecticut Department of Transportation - Bureau of Public Transportation - Rail Operations*

Connecticut Fund for the Environment

Cove Neighborhood Association

Dolphin Cove Neighborhood Association

East Side Partnership*

Glenbrook Neighborhood Association

Harbor Point Development

Hubbard Heights Association*

Mill River Park Collaborative

Northeast Utilities

North Stamford Association*

Regional Plan Association*

Scofieldtown Neighborhood Association

State Senate District 27 & 36

State House Districts 144, 145, 146, 147, 148, 149*

Shippan Point Association*

Soundwaters*

South End Neighborhood Revitalization

Springdale Neighborhood Association

Stamford CERT

Stamford Chamber of Commerce

Stamford Environmental Protection Board

Stamford Harbor Management Commission

Stamford Hospital - Public Affairs

Stamford Planning Board

Stamford Parks and Recreation Commission

Stamford Partnership

Stamford Zoning Board

Stamford Zoning Board of Appeals

Stamford 2030 District

The Business Council of Fairfield County

Waterside Coalition*

^{*}invited but unable to attend.



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Appendix Maps of Stamford Used During Workshop







