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Madison during Storm Sandy—October 2012

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Town of Madison

Hazards and Community Resilience

Workshops

Summary of Findings

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Hazards and Community Resilience Workshops

Summary of Findings

Overview

The need for municipalities, regional planning organizations, the state 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, and Storm Sandy have reinforced this urgency and compelled leading communities like the Town of Madison to proactively plan and mitigate potential risks through a community-driven process. Ultimately, this type of leadership is to be commended because it will reduce the exposure of Madison'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 Town of Madison and The Nature Conservancy. The partnership's focus was on increasing awareness of risks associated with extreme weather and natural and climate-related hazards and to assess the risks, strengths and vulnerabilities within the Town of Madison. This focus was actualized through a series of initial presentations, individual interviews and outreach to build stakeholder willingness and engagement followed by a series of Hazards and Community Resilience Workshops in May of 2014. The core directive of this effort was the engagement with and between community stakeholders in order to facilitate the education, planning and ultimately implementation of priority adaptations actions. 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 Town and broader stakeholder network;
- Identify opportunities for the community to advance actions to reduce risk and increase resilience.



The Town of Madison's Hazards and Community Resilience Workshops utilized general aspects of the National Oceanic and Atmospheric Administration Coastal Services Center's "Roadmap for Adapting to Coastal Risk" coupled with decision-support and risk visualization workshop process developed by The Nature Conservancy the includes TNC's Risk Matrix and Coastal Resilience Tool (www.coastalresilience.org). Through 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 assets, and recommendations to improve the Town of Madison's resilience to natural and climate-related hazards today and in the future.

The summary of findings 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 participants and additional stakeholders alike. The Town of Madison's exemplary 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 Town of Madison

During the Hazards and Community Resilience Workshops (May 2014), participants from the community were asked to identify the top natural hazards for the Town of Madison. Coastal and inland flooding from intense storms and resulting storm surge and riverine flooding were identified as the greatest hazards by most participants. Extreme snow, ice, and wind were also listed as priority hazards by workshop attendees. These events have direct and severe impacts on Town resources such as its residential neighborhoods, natural areas (beaches, wetlands, rivers, and parks), roads, and critical infrastructure. In addition, the participants determined that environmental changes associated with climate change, such as sea level rise, extreme precipitation events, and growing periods of drought are exacerbating the damaging impact of natural hazards in Madison.



Top Hazards and Vulnerable Areas For Town of Madison

Top Hazards

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

Other Hazards: Severe Drought (and related fires in North Madison), Extreme Temperatures, Sea Level Rise

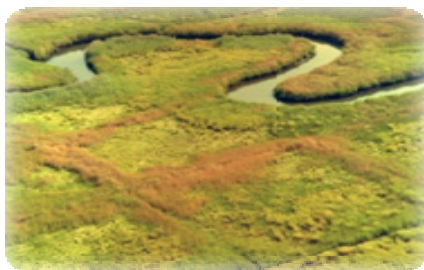
Vulnerable Areas

Neighborhoods: Neck Road, Garnet Park, Circle Beach, Middle Beach, Heatherwood

Ecosystems: Fence Creek, East and Neck River Marsh, East and West Wharf, Salt Meadow Park, Neck River, Hammonasset State Park, Tuxis Pond, Surf Club Beaches.

Transportation: State Routes 1 (multiple locations including Guilford/Madison Town line – Fence Creek), 79 and 80, Circle Beach Road, Garnet Park Road, Neck Road, Middle Beach Road, Parker Avenue, shoreline roads in general, Railroad tracks and bridges.

Infrastructure: Town Campus (EOC), Madison Hose Company No. 1, Lake Hammonasset Dam, other smaller dams, Route 1 commercial district (i.e., gas, pharmacy, restaurants, groceries, etc...), East Wharf, West Wharf, Strong Field facilities, Surf Club Building, North Madison commercial/rural shopping zone, nursing/assisted care homes and affordable housing (Neck Road, Madison House, The Hearth at Tuxis Pond, Mercy Center, Concord Meadows, Watrous, Legend Hill), urgent care and skilled nursing facilities, tide gate (Neck Road area), Heatherwood subdivision, electric power distribution system and substations (Green Hill Road, Bradley Road, Garnet Park), telephone land lines.



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NWS



Current Concerns and Challenges Presented by Hazards:

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

This series of extreme weather events highlighted for Madison that impacts from hazards are felt differently across the Town. Participants noted that there are two primary regions in Town with regards to natural hazards: the low-lying coastal area and the forested uplands of northern Madison. The southern part of town borders Long Island Sound and is exposed to damage from coastal flooding and wave surge during storms. The heavily forested northern uplands experience the effects of tree damage from wind, snow, and ice as well as damage from inland flooding during heavy precipitation events. This presents a challenge to preparedness, response, and mitigation priorities and requires comprehensive yet tailored actions for particular locations and/or areas of Town.

The workshop participants were generally in agreement that the Town of Madison is experiencing more intense and frequent storm events. The impacts, particularly during Tropical Storm Irene, affected the daily activities of every resident. 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 experiencing basement flooding after rain storms and witnessing generally elevated ground water levels. Several coastal areas were reported to have permanently lost beach area along with multiple alterations to homes; the Circle Beach neighborhood was cited as an example. Strong concerns were raised about the loss and degradation of coastal wetlands and other



natural infrastructure and the resulting increase in exposure of homes and people to storm surge and flooding. The importance of intact forested watersheds in Madison was also cited as critical for long-term drinking water supply as drought becomes more pervasive. 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 with 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 Madison's road network during and after extreme and routine events. Road blockage prevents emergency services from reaching stricken areas and 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. There are multiple factors contributing to travel interruptions ranging from flooding due to coastal storm surge, inadequate drainage systems for current precipitation events, snow deposition, and downed trees and power lines due to wind, ice, and/or snow.

Coastal roads such as those off of Neck Road and Middle Beach Road among others flood due to storm surge, as well as routine high tides in some locations. The extent and duration of flooding is caused by inadequate drainage systems including under-sized culverts (Old Farms Road along Bailey's Creek) and antiquated tide gates that restrict water conveyance and cause water to "back up". In several locations the storm water drainage infrastructure is incomplete and stressed by higher magnitude and intensity precipitation events. Choke points susceptible to flooding such as the railroad underpass along Route 1 (Mungertown Road was cited) can render the roadway impassable; effectively severing critical links between the shore communities and northern parts of Town. The vulnerability of town-owned bridges over flood-prone rivers was highlighted. The inability of Town equipment to adequately move the snow during extreme, early winter storms (wet and deep) were cited as an accessibility concern particularly for smaller roads back off of Routes 1 and 79. In several cases, town crews were forced to wait for state crews to plow off critical routes in order to access secondary roads.



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Dams

The Lake Hammonasset Dam, owned by the Regional Water Authority, is classified as a high hazard dam by CT Department of Energy and Environmental Protection. The participants had serious concerns about the safety of this Dam during and after high precipitation events. Impacts from catastrophic failure would include floodwaters reaching I-95 as well as the Town Campus which would threaten the center of Town Government operations, especially emergency management and shelters (gym is lowest lying building on campus), as well as potentially compromising several bridges. Other smaller dams across Town may also be of concern given their age and increased rainfall projections in the future.

Railroad

Like the rest of Connecticut's coastal municipalities, the railroad tracks bisect (east-west) the communities often in low lying areas making tracks and stations vulnerable to coastal flooding. In addition, rail infrastructure is aging, particularly the bridges (5 bridges in Madison were cited). The participants noted that in several locations the rail line is vulnerable to flooding as well as a concern for multiple bridges in very low lying areas (i.e., over Neck River in particular).

Electrical Distribution Systems

Electric service outages are a concern in Madison and can be caused by all types of natural hazards. The power distribution system was cited as the most critical infrastructure in Town and can impact all residents regardless of where they live. Mature trees and limbs along roadways and other transportation corridors are a primary culprit because they can bring down power lines. Power interruptions due to winter storms cause heat loss in homes which is of particular concern for elderly and less mobile residents.

Of principal concern during the last large scale power outage was the demonstrated lack of communication and coordination between the electrical utility companies and the Town. The lack of coordination and timely response had impacts on the pace of power restoration to residents and businesses. Remarkably, there were many reports of blocked roads being cleared of downed trees by volunteer firefighters (without power company crews) not fully trained or authorized to deal with power lines. Flooding of substations on Green Hill Road, Bradley Road, and Route 1 were called out as concerns to the overall power distribution system.



Another concern is the provision of interim power for facilities that provide critical goods and services to Madison residents during an emergency. Currently, there is only one gas station in Town equipped with a localized power supply. Need for power and supply stockpiles at urgent care facilities after major events were also noted as a concern. North Madison's small commercial zone including Robert's Food Center, lost power during Irene.

Coastal Flood Damage

Coastal flooding (static flooding, storm surge, resulting erosion) presents a major threat to the town's infrastructure, facilities, neighborhoods, and individual homes and property. Recent events suggested to the participants that the financial impact of significant coastal flooding could be considerable in the future and may lead some residents and businesses to reevaluate the costs of rebuilding versus relocations to less vulnerable areas. Of particular concern is that coastal flooding has and will continue to surround particular neighborhoods and cut them off from the rest of Town making it difficult for first responders and other services to access during emergencies. In addition, several individuals highlighted that household items such as unsecured propane tanks were redistributed by flood waters creating potential explosion hazards along with other household chemicals and contaminants.



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Madison's main commercial zone along Route 1 was called out as vulnerable to severe flooding that would impact resident's access to gas, groceries, and the pharmacy. There are also residents that live above commercial properties within the flood zone. Another smaller commercial area on Route 1 near the town border with Guilford currently reports frequent flooding issues.

Other locations in town including the Town Campus, the fire station on Route 1, the town center, and all coastal neighborhoods are at risk. Town Campus includes municipal government buildings, an emergency shelter, police station, and the Emergency Operations Center - where emergency response is managed. The fire station on Route 1 is also located in a floodplain, reducing the capabilities of a critical local asset during severe coastal flooding events. Participants highlighted that the historic value of the stone wharfs (200 years old) were lost after Irene.



Drinking Water Supply and Access

Another major concern expressed during the Workshops was the availability of drinking water during and after emergencies. Businesses and residents south of Interstate 95 are served by the public water well field near Town Campus. Participants highlighted the need for a forward looking contingency plan to account for vulnerabilities to the quality and quantity of this resource, which supplies 30-40% of the water for the Town. Residents elsewhere in Town are served by private wells. For both constituents, access to drinking water is compromised during power outages. Many residents in North Madison lost power for weeks which caused major reductions in water provisioning from private wells and required the instituting of water conservation measures. The potential of longer periods of drought were raised as a concern for the private drinking water supply north of I-95, which may result in the need for drilling deeper wells.

Participants mentioned that a tanker with free potable water was provided at the North Madison Fire Station after Sandy. There was a general sense that additional water supply resources need to be identified and provided during major events for residents in North Madison to mitigate in the short term against power outage impacts on private water supply.

Wastewater

The entire Town of Madison uses septic systems to treat wastewater. Flooding and storm surge during recent major events exposed 18 and 3 septic systems in Irene and Sandy, respectively. The lack of adequate locations outside of expanding flood zones for septic system installation in coastal neighborhoods was cited as a concern. Many participants were also concerned that there is a lack of information regarding how much of an impact pollution from septic systems are having on Madison's coastal ecosystem.

Neighborhood Isolation and At-Risk Populations

Of greatest social concern was neighborhood isolation during flooding events and loss of power during winter storms. An additional concern included public health and safety impacts due to heat waves (30+ days over 90° per year, currently) on an aging population. There are several neighborhoods at risk of being cut off from the rest of the Town due to flooding or downed trees over critical roads. This is particularly dangerous for the elderly and medically vulnerable residents who live in these areas.



Concord Meadows was singled out as an affordable housing complex with residents that require medical assistance and is entirely dependent on electrical supply. Legend Hill was also identified as an example of a 55 and over condo complex positioned on a steep hill that is difficult to access during winter storms. Several other nursing homes, rehabilitation facilities, and senior/assisted living housing were noted as susceptible to impacts from natural hazards. In addition, medical evacuation was identified as a significant challenge given the limited ambulance capacity. Neighborhoods singled out as particularly vulnerable to impacts include Neck Road, Garnet Park, Circle Beach, and Middle Beach. Participants highlighted that approximately 25% of the current population is over 65 years old with anticipation of increasing percentages in the future.



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Town Campus

Madison's Town Campus is located within the Hammonasset River floodplain and is vulnerable to both inland and coastal flooding. This is a concern because the Town Campus serves important functions during emergencies such as housing the municipal Emergency Operations Center. The Town Campus also serves as an emergency sheltering location, site of the Town Police Department, and the primary seat of Madison's government. This facility and its current essential functions are in jeopardy from several flooding scenarios as explored during the Workshops. Currently, there are two generators – one for the police station and the second to service the rest of Town Campus.

Communications

Madison is the longest town running north-south in the state and has several antennas along that length. Between the Dispatch Center and the Town's antennas, the communications network is vulnerable to interruption of service and currently provides inadequate coverage during storm events. There is dependence by the emergency response dispatch on landlines which become particularly vulnerable with ice, wind, and snow events. This has been recognized by the Town with the mention of an engineering study underway to improve communications via microwave transmission between towers. Commercial cellular phone coverage is weak in several areas in Town but that is a universal predicament along the coast due to an inadequate network maintained by the major carriers (i.e., ATT, Verizon).



The participants highlighted an additional critical communications shortfall. In advance of Irene as well as during Sandy there was a great deal of untimely and/or incomplete information which lead to confusion and anxiety amongst Madison residents. This is such a critical communications gap because the reality is that most residents depend primarily on local governments before, during, and after major hazard events.

Emergency Management/Evacuation Procedure

One of the areas identified as a concern was lack of adequate education of and communications with residents regarding emergency management and evacuation procedures. Participants were unsure whether Madison has predetermined evacuation routes and what is expected of residents in advance of major events. Consequently, residents did not take the mandatory evacuation notices from the emergency management professionals seriously during Irene and Sandy. This presents challenges for town officials and places the fire department in unnecessarily dangerous situations that can be life threatening and damaging to town vehicles and equipment. For example, EMS volunteers responded during Irene to remove an individual on oxygen from a home that was flooded near the Circle Beach neighborhood. Post-storm security and access control surfaced as an issue with multiple accounts of looting of private homes in the Middle Beach neighborhood evacuated during Irene. During Sandy, the Town was able to shut down and control access to evacuated areas via police checkpoints. In addition, it was noted that several critical facilities are subject to flooding such as the fire station on Route 1 from Tuxis Pond.

The overall cost to the Town of Madison to effectively respond and recover from the list of major events was highlighted as a significant and growing challenge. Most of



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the additional costs involved overtime pay for services (i.e., police and highway). In addition, the safety of emergency workers due to health hazards from storm damage was raised. The typical reimbursement from FEMA of 75% presents a shortfall that must be paid by the Town and can have implications on approved and budgeted capital expenditures.



Current Strengths and Assets in Madison

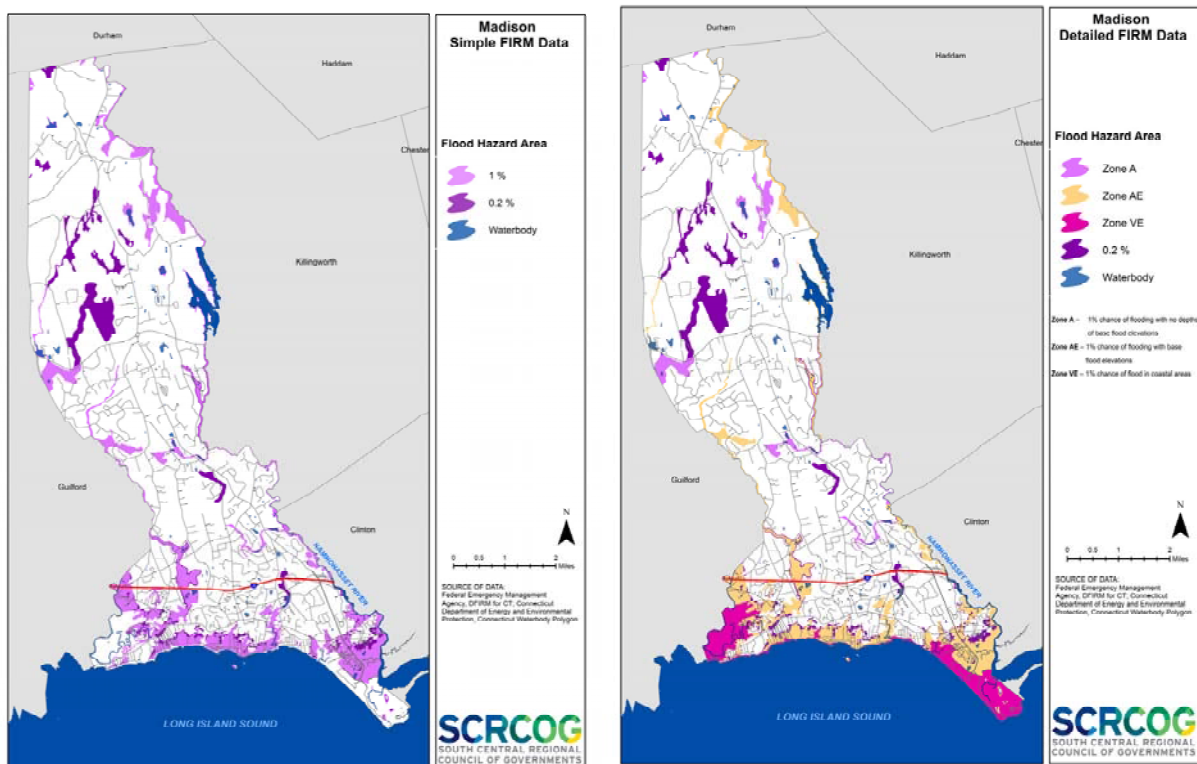
As a result of Madison's recent experiences with extreme weather, the town is well acquainted with the existing strengths within the community. Reinforcing and expanding these supportive practices and assets will generate greater benefits to the community through increased resiliency against future storms, with greater frequencies and intensities, as well as long term impacts from the ongoing increases in air temperature, precipitation, and sea level.

- Madison's residents have proven to be a key asset during recent natural hazards. On a neighborhood level, residents face common challenges and have demonstrated a desire to help one another recover quickly. In the aftermath of Irene, residents witnessed a heightened sense of neighborhood or community which only increased during and after Storm Sandy. Many residents had installed generators after Irene and were able to share connectivity (wi-fi) and other resources with those that did not.
- The increase in neighborhood awareness and resiliency has helped to augment the overarching emergency management and social service provided by the Town during and after recent storm events.
- Supportive social services such as the Senior Center activities, Senior Consortium, transportation systems for seniors, youth and family services, as well as faith-based organizations were highlighted as important community assets.
- Clearly, the responsive and committed leadership by the elected officials is a very much appreciated strength in Madison. In association, regional cooperative agreements with adjoining municipalities and state entities were cited as critical and potentially cost-saving outcomes of this dedicated and ongoing leadership.
- Madison's first responders are a major asset during emergency events due to their experience and knowledge with a diverse array of situations. The overarching coordination amongst various departments including Police, Fire, and EMS was cited as ongoing community strengths. Improvement to critical equipment and facilities such as the Ambulance Garage and dedicated power generation at the Town Campus's Emergency Operation Center helps to reinforce this highly important asset in Madison.



Current Strengths and Assets in Madison cont...

- The marshes, beaches, and open space (including Madison Country Club) along Madison's coast offer increased defense against storms through storm surge attenuation and capture for storm runoff infiltration. Intact forested watersheds, reservoirs, and other park land provide public amenities and serve to maintain water quality and quantity for private, well-dependent residents. Without these natural resources in place, Madison's coastal and inland infrastructure and homes would suffer greater damage and higher ongoing costs to rebuild or relocate. The recent acquisition of Salt Meadow Park adds to overall benefits of natural infrastructure for residents. Also, Madison has large tracts of undeveloped upland forests which protect local water quality and also provide water storage services that replenish the local aquifers. The ability to lower reservoir levels (Lake Hammonasset Dam) in advance of major precipitation events to effectively increase upstream storage capacity was seen as an asset.



Top Recommendations to Improve Madison's Resilience to Hazards

Best Practices during Recent Storms

Workshop participants highlighted a variety of positive actions taken by the Town and residents in the wake of recent storms in Madison. These included upgrades to the central communications systems (i.e., portable radio console and laptop), consistent outreach via Town's robo-calls and flyers during Sandy, purchase of a new ambulance, alternative water provisioning (water truck at North Madison Fire Station) and meal distribution, and increased access to charging stations for phones. In addition, the Town has gained a greater insight into the challenges presented by natural hazards, which translates into a more meaningful Natural Hazard Mitigation Plan and Plan of Conservation and Development. With partners, the Town successfully pursued funding opportunities such as the post-Sandy proposal designed to advance resiliency in Madison. Finally, the participants noted an increase in neighbors helping neighbors with clean-up and recovery activities like clearing tree limbs and pumping out basements.

In addition to these best practices a common thread throughout the workshop discussions was the recognition that the Town and residents need to be better prepared through longer term contingency planning across key areas of concern. The core highlights are addressed below.

Access to Critical Resources

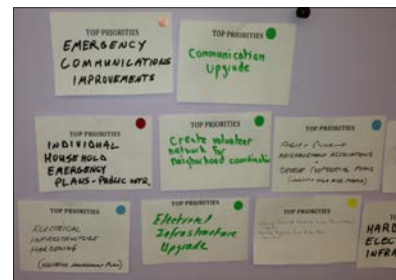
Planning for how residents will access critical resources such as fuel, food, medicine, and drinking water in the wake of emergency events is paramount for Madison. One successful approach used during Irene and Sandy was a cost-sharing agreement between the Town and a local business. The Town provided a generator to a centrally located gas station so that residents could get gas after the storms. The gas station paid for the costs of running the generator. To expand on this successful model the Town should identify other key businesses including grocery stores and pharmacies to form mutually beneficial agreements in strategic locations across town.



Top Recommendations to Improve Madison's Resilience to Hazards cont...

Education & Public Outreach

Ensuring that the residents are fully aware of the Town's emergency policies, procedures and services along with well-marked evacuation routes were highlighted as key recommendations. A specific, town emergency webpage to inform residents on how to increase individual personal preparedness in advance of major events was recommended. Guidance concerning household readiness around food, water, and medicinal supplies without power is needed. Attention should also be directed to better informing Madison's residents about the emergency sheltering network, both within Town and regionally (Guilford, Old Saybrook). Fortunately, residents are taking natural hazards more seriously and seem to be generally aware of the increasing frequency and intensity of severe weather events in Madison and across the state.



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Town Services

Madison's ability to provide services to its residents is currently strained during natural hazard events. With an anticipated increase in the frequency and intensity of these events, participants recommended that the Town make decisions informed by public input regarding which emergency services residents want from the Town and how much they are willing to pay for those services. The need for a compact between the Town and residents was raised in this regard. In many cases, there is not a definitive answer as to who is responsible for response and recovery efforts, if anyone. The unique suite of impacts to coastal neighborhoods as well as state/town owned roads were cited as points of confusion. Recommendations included suggestions that the Town could establish a funding reserve to cover costs associated with impacts on service extent and continuity from hazards. Maintaining and strengthening partnerships with electric utility companies around power restoration as well as neighboring towns on sheltering facilities were recommended. Also, at the regional level, the South Central Regional Council of Governments provides hazard mitigation planning in line with FEMA's requirements to obtain federal emergency response and preparedness funding.



Top Recommendations to Improve Madison's Resilience to Hazards cont...

Future Growth and Land Use Planning

As voiced by participants, a good way to reduce exposure and vulnerability to the health and safety of residents is to stop increasing the risk. Madison's zoning regulations can help to reduce future risk and improve resilience. Currently, a subcommittee of the Planning & Zoning Commission is considering several amendments to the Coastal Zone Regulations that would provide additional protection for coastal resources by requiring the enhancement of coastal buffers and other green infrastructure for proposed new construction and significant additions. There is a common perception that Madison is "built-out" and that more significant development will be limited. On the other hand, re-developments continues to occur, and not always with resiliency in mind. Clearly, recommendations to enhance land use policy and zoning was viewed as an important step for Madison to take towards improving resilience.

Workshop's Top Recommendations for Madison

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

Highest Priority

- Conduct a risk assessment for various flood scenarios for the Town Campus facilities and adjust contingency plans accordingly; include the identification of alternative locations during high impact flooding events. Conduct feasibility and cost analysis of longer-term, permanent relocation of Town Campus.
- Install highly visible evacuation route signage and develop/implement supportive communication program to ensure residents are aware of routes and expectations.
- For nursing homes and elderly care facilities, improve power supply with individual generator. Review building codes and zoning at existing and future facilities to find additional measures to reduce risk. Identify facilities in flood zones currently and under future scenarios.



Workshop's Top Recommendations for Madison

Highest Priority

- Assess current infrastructure concerns and needs for Town's communication system and look to improve current cell-phone coverage. Longer-term update microwave communications to address risk associated with land lines.
- Engage neighborhood associations and faith-based organizations to develop cooperative response plans with Town via a "Neighbor Helping Neighbor Program". Look to establish emergency support teams within participating neighborhoods along with the development of comprehensive, neighborhood-based preparedness and mitigation plans.
- Need to identify planning and zoning best management practices to ensure risk to property, structures, and natural infrastructure (beaches/dunes, wetlands, floodplains) is minimized during the recovery phase of future events.
- Implement improvement to the electrical distribution system by addressing the protection and long-term relocation of equipment out of floodplains. In addition, upgrade transformers, harden substations, maintain powerline protection zones via tree trimming, and ensure the provision of temporary power to critical areas during and after events.
- Identify potential improvement in most vulnerable sections of Madison's transportation network including storm drain upgrades. Develop detour plans for vulnerable locations during major storms and share with residents - particularly on coastal roads and neighborhoods. Seek to address current inability to effectively clear road network after major winter storms. Longer-term comprehensively address the road infrastructure alternatives such as raising, relocation, or abandonment.
- Consider relocation options for Fire Station on Route 1.



Workshop's Top Recommendations for Madison

Highest Priority

- Drinking water stations set-up plan established and coordinated with Town services in strategic locations during and after major events (particularly in North Madison).
- Assess and identify vulnerabilities of elderly care facilities to determine needs during emergencies and seek to coordinate planning efforts across facilities within Madison. Ensure that each facility is conducting routine evacuation drills to ensure readiness.
- Maintain existing beaches and dunes and assess value of natural infrastructure relative to protecting people and property in Madison.
- Advance management activities that will diversify the age structure of forests across Town. Implement a comprehensive tree health, maintenance, and removal plan to reduce the number of downed trees and limbs during future storm events.
- Ensure that forested uplands of North Madison remain undeveloped in perpetuity to secure local water supplies and protect against downstream flooding.
- Seek to maintain existing salt marsh resources and increase the sustainability of future wetlands by considering additional regulatory protection (increased setback requirements) and acquisition to prevent impacts to resource. Conduct salt marsh advancement zone assessment for Madison to determine where resource will be in the future given changes in sea level. Assess value of wetlands for defending against storm surge and flooding impacts to people and property.
- Maintain existing open space to help reduce hazard risks to Town. Strategically target for protection other areas with the highest risk reduction characteristics.



Workshop's Top Recommendations for Madison

Moderate Priority

- Improve communications between Amtrak and Town via an infrastructure vulnerability and improvement prioritization plan that includes the use of green infrastructure along railway lines and bridge structures.
- Assess and identify power requirements and gaps in power supply for commercial areas and downtown district during and after events. Seek to improve continuity of power and communications by securing grants for the strategic installation of generators. Longer-term, pursue the option of securing state funding to establish a microgrid for the downtown district.
- Advance green infrastructure options to improve stormwater management system alongside the promotion of low impact development projects across Town.
- Meet with the Regional Water Authority about maintenance, risk, and monitoring efforts at the Lake Hammonasset Dam. Communicate to downstream residents and facilities the emergency plan including evacuation in the event of catastrophic dam failure.
- Explore opportunities for community septic systems and alternative treatment facilities in flood prone or at-risk neighborhoods. Advance upgrade requirements to reduce contamination of local waterways and coastal embayments.
- Provide forum for community decision making and planning regarding retaining and relocating common infrastructure along the shoreline with an eye towards developing a comprehensive shoreline management plan.
- Review existing state-wide building codes and local zoning regulations and consider modifications to improve the resilience of flood prone structures and supporting infrastructure.
- Continue to enhance shellfish resource via water quality improvements so that coastal defenses for people and property in Madison are maximized.



Workshop's Top Recommendations for Madison

Moderate Priority

- Manage for long term viability of streams and rivers in Madison by assessing the impacts of septic systems on resilience of this natural infrastructure.
- Encourage a closer working relationship between the Hammonasset State Park and Town towards comprehensively maintaining town-wide natural resources, public amenities, emergency staging procedures, and water quality issues.

Lowest Priority

- Assess the vulnerability of the public well fields and aquifer to extreme weather events such as drought and develop actions designed to maintain the current quality and quantity of drinking water for Madison residents into the future.
- Assess cost and logistics of increasing the back-up power supply for private drinking water wells in north Madison.
- Assess existing tide gates and ensure they are maintained properly. Consider replacing undersized pipes that interfere with receding floodwater.

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Giny Fullam



Workshop Participants: Departments, Organizations and Other Entities

Barberry Farms Association*	Hammonasset State Park*
Lee Manor Association*	Menunkatuck Audubon Society*
Madison Beach Club*	Madison Chamber of Commerce
Madison Country Club*	Madison Hose Company No. 1
Madison Land Trust*	Madison Property Owners Association
Madison Public Schools	Northeast Utilities
Overshores Association	Pleasant View Association*
Seafield Association*	Seaview Beach Association*
Shorelands Association*	State Representative for Madison
South Central Regional Council of Governments	Town of Guilford Planning and Zoning
Town of Madison Ambulance Services	Town of Madison Assessor
Town of Madison Beach and Recreation Commission	Town of Madison Board of Selectmen
Town of Madison Board of Finance*	Town of Madison Building Official
Town of Madison Comm for Land Acquisition Strategy	Town of Madison Conservation Comm
Town of Madison Economic Development Commission	Town of Madison Emergency Mgmt.
Town of Madison Energy and Efficiency Committee	Town of Madison Finance Department
Town of Madison Fire Marshal	Town of Madison Health Department
Town of Madison Inland Wetland Agency	Town of Madison Inland Wetland
Town of Madison Planning and Zoning Commission	Town of Madison Planning and Zoning
Town of Madison Police Department	Town of Madison Public Works & Eng.
Town of Madison Senior Services Commission	Town of Madison Senior Services
Town of Madison Shellfish Commission	Town of Madison Technology Dept.
Town of Madison Water Pollution Control Authority	Town of Madison Zoning Brd of Appeals
Vista Vocational	Waterbury Avenue Association*

*invited but unable to attend.

Workshop Project Team: Organizations and Principal Contacts

The Nature Conservancy – Adam Whelchel, PhD (Project Lead) awhelchel@tnc.org

The Nature Conservancy—Amanda Ryan (Project Support)

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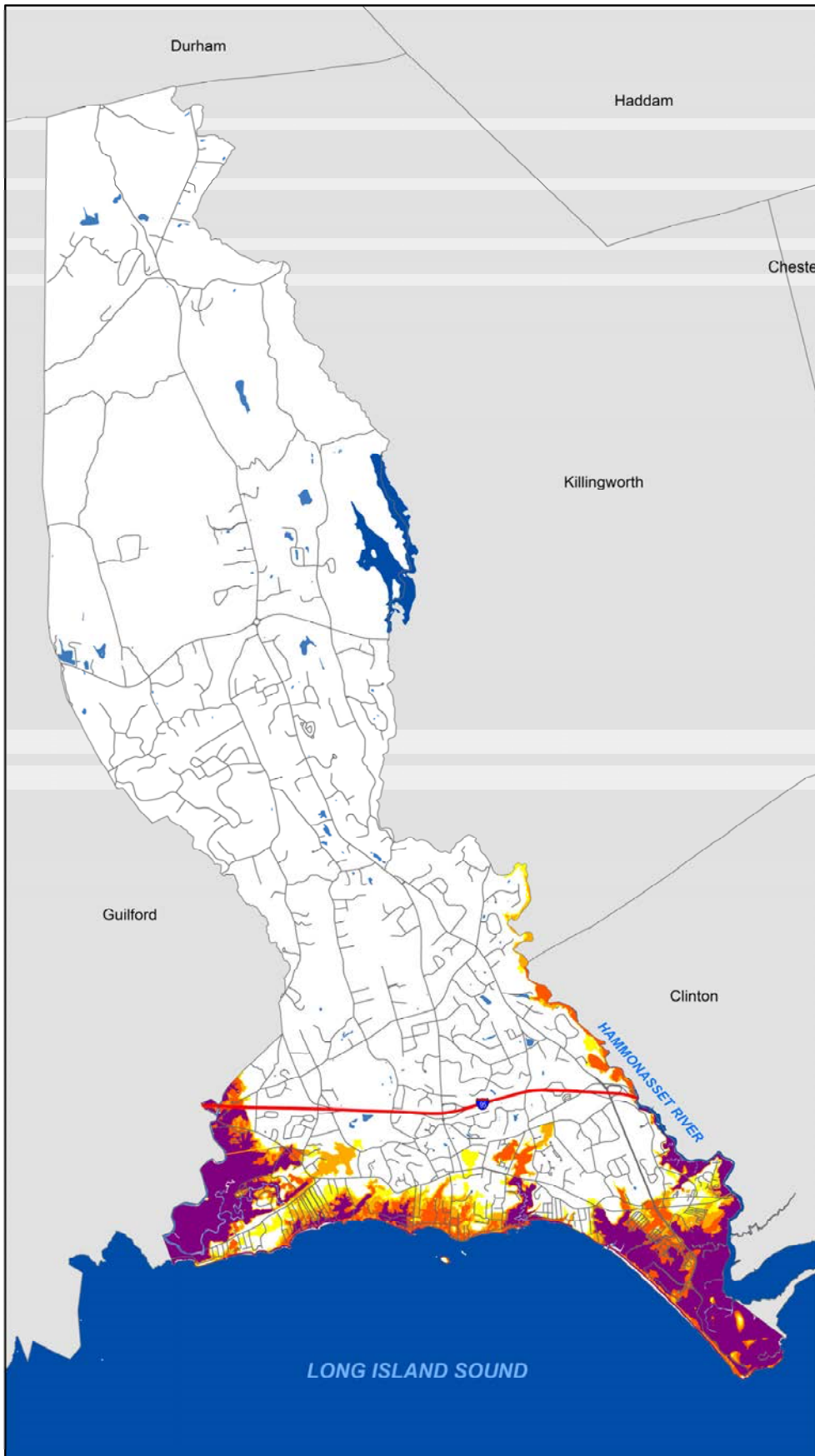


Appendix

Maps of Madison Used During Workshops

**Workshop map products kindly generated by
South Central Regional Council of Government**





Madison Storm Surge Hazard Areas

- Category 1 Storm Surge
- Category 2 Storm Surge
- Category 3 Storm Surge
- Category 4 Storm Surge
- Waterbody

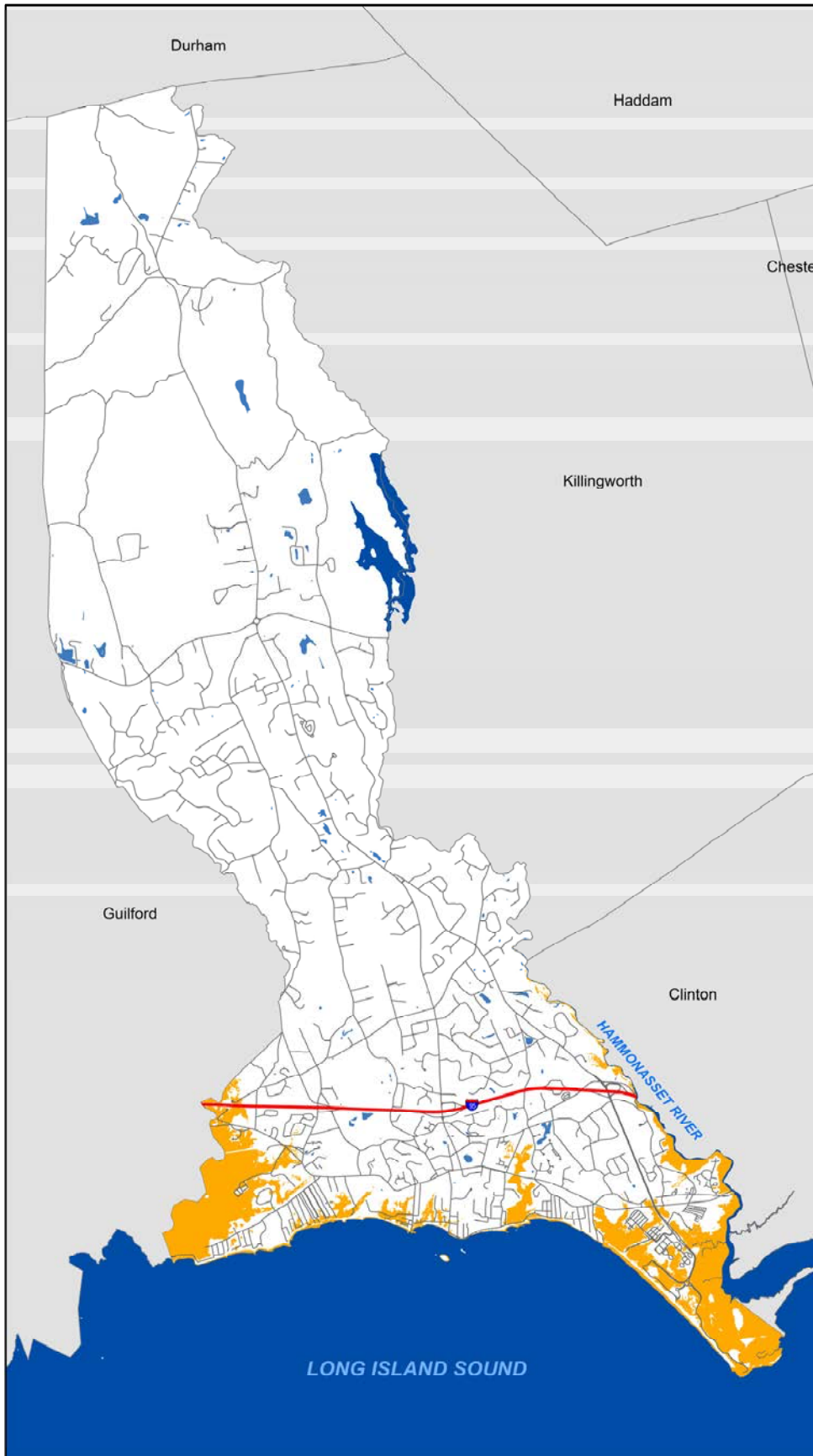
N

0 0.5 1 2 Miles



SOURCE OF DATA:
Connecticut Department of
Energy and Environmental Protection,
Worst Case Hurricane Surge Inundation for
Connecticut (6/2008)

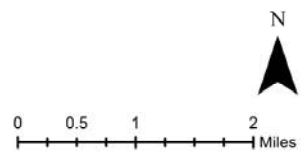
SCRCOG
SOUTH CENTRAL REGIONAL
COUNCIL OF GOVERNMENTS





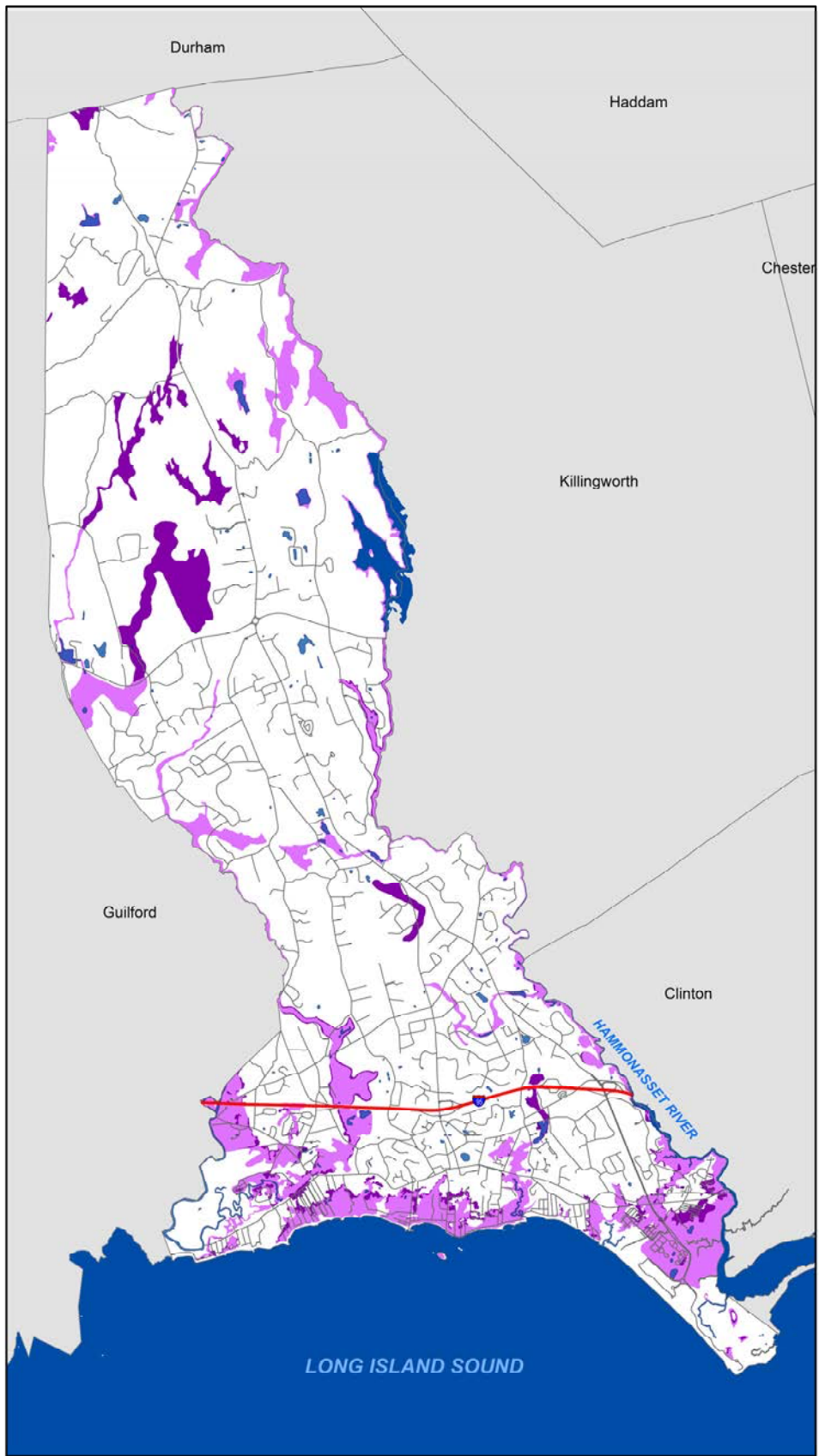
Madison Sea Level Rise Hazard Areas

-  Sea Level Rise (2080 Inundation)
-  Waterbody



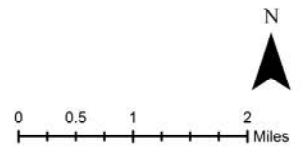
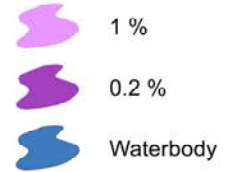
SOURCE OF DATA:
The Nature Conservancy,
Sea Level Rise Projections (2080 Inundation)





Madison Simple FIRM Data

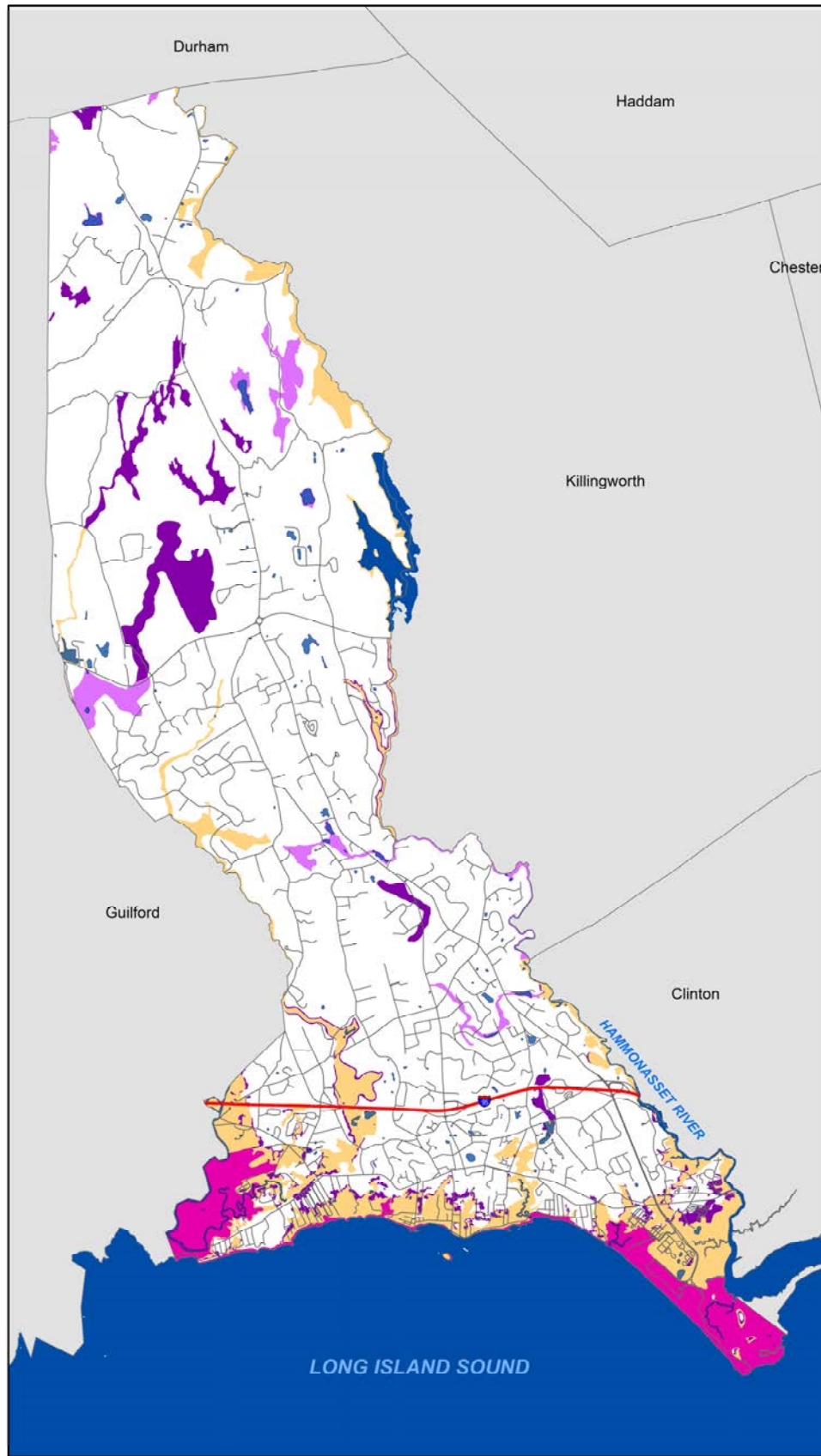
Flood Hazard Area



SOURCE OF DATA:
Federal Emergency Management
Agency, DFIRM for CT; Connecticut
Department of Energy and Environmental
Protection, Connecticut Waterbody Polygon

SCRCOG
SOUTH CENTRAL REGIONAL
COUNCIL OF GOVERNMENTS



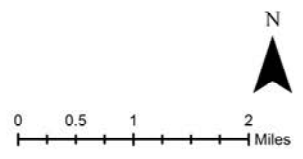


Madison Detailed FIRM Data

Flood Hazard Area

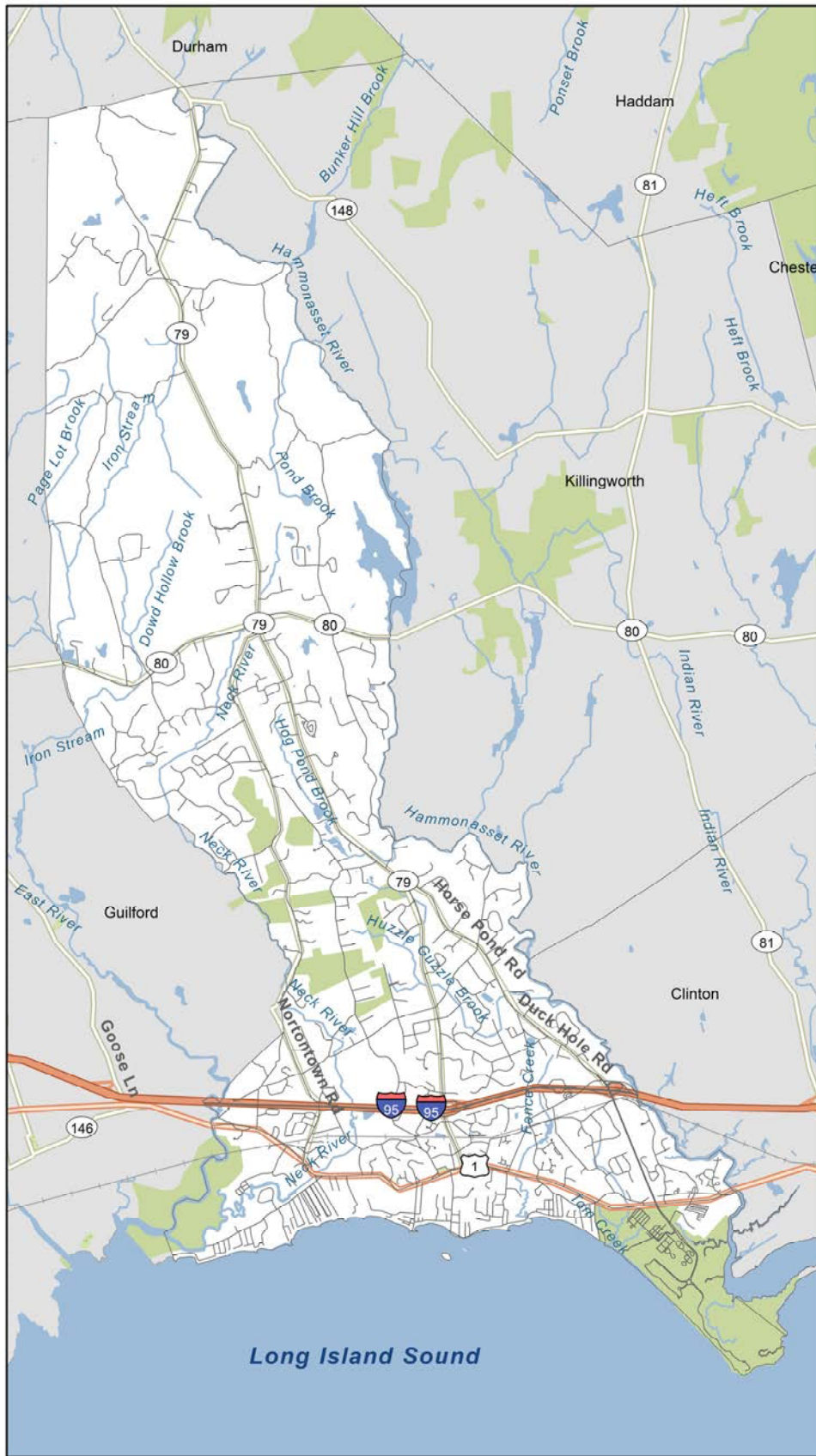
-  Zone A
-  Zone AE
-  Zone VE
-  0.2 %
-  Waterbody

Zone A – 1% chance of flooding with no depths of base flood elevations
Zone AE – 1% chance of flooding with base flood elevations
Zone VE – 1% chance of flood in coastal areas



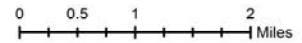
SOURCE OF DATA:
 Federal Emergency Management Agency, DFIRM for CT; Connecticut Department of Energy and Environmental Protection, Connecticut Waterbody Polygon





Madison Base Map

-  Interstates
-  Highways
-  Major Roads
-  Waterbody
-  Parks and Forests



SOURCE OF DATA:
ESRI, StreetMap North America, 2009





The Nature
Conservancy 
Protecting nature. Preserving life.™