HAZARD MITIGATION PLAN UPDATE
ANNEX FOR THE TOWN OF STONINGTON

Southeastern Connecticut Council of Governments
Multi-Jurisdictional Hazard Mitigation Plan Update

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ACKNOWLEDGEMENTS

This HMP annex update could not have been completed without the time and dedication of the following individuals at the local level:

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1.0 INTRODUCTION

1.1 Purpose of Annex

The purpose of this HMP annex is to provide an update to the natural hazard risk assessment and capability assessment provided in the previous HMP, and to evaluate potential natural hazard mitigation measures and prioritize natural hazard mitigation projects specific to mitigating the effects of natural hazards to the Town of Stonington. Background information and the regional effects of pertinent natural hazards are discussed in the main body of the Southeastern Connecticut Council of Governments (SCCOG) Multi-Jurisdictional Hazard Mitigation Plan. Thus, this annex is designed to supplement the information presented in the Multi-Jurisdictional HMP with more specific detail for the Town of Stonington and is not to be considered a standalone document.

The primary goal of this hazard mitigation plan annex is to identify particular vulnerability to natural hazards and potential mitigation measures for such natural hazards in order to ***reduce the loss of or damage to life, property, infrastructure, and natural, cultural, and economic resources.*** This includes the reduction of public and private damage costs. Limiting losses of and damage to life and property will also reduce the social, emotional, and economic disruption associated with a natural disaster.

1.2 Setting

The Town of Stonington is located in the southeastern corner of Connecticut. The Town was first settled in 1649 and incorporated in 1662. It is a distinct political entity from the Borough of Stonington although borough residents are also residents of the town and the two entities share some municipal services. The Town is approximately 38.8 square miles in area and includes several historical villages including Lords Point, Pawcatuck, Wequetequock, and the eastern halves of the villages of Mystic and Old Mystic (the remaining halves being in the Town of Groton). The population of the Town was 17,906 as of the 2000 census and decreased slightly to 17,616 as of the 2010 census.

The Town is located in the southeastern portion of the Connecticut shoreline. It is bordered by the Town of North Stonington to the north, Ledyard to the northwest, Groton to the west, Fishers Island Sound and Little Narragansett Bay to the south, and Westerly, Rhode Island to the east. The Town can be accessed via several major transportation arteries including Interstate 95, Route 1, Route 2, Route 27, Route 49, Route 184, Route 201, Route 234, and the Amtrak-Metro North Railroad. A railroad station is located on Route 1 in Mystic.

1.3 Plan Development

The 2005 HMP and its annexes were developed through a series of meetings and the completion of written questionnaires, personal interviews, and workshops as described in the Multi-Jurisdictional HMP update. Since that time, the HMP has been available in local governmental offices and available to emergency personnel. Residents were encouraged to contact the Emergency Management Director with any concerns regarding emergency response or potential projects related to natural hazard damage.

Based on the existing plan, existing information, and hazards that have occurred since 2005, SCCOG determined that the following data collection program would be sufficient to collect data to update the Multi-Jurisdictional plan and each annex.

- The SCCOG issued a press release on November 20, 2011 announcing a public information meeting on the multi-jurisdictional HMP update. This press release was published in the Norwich Bulletin and The Day. This notice was also posted on the SCCOG website and the *Patch* (a popular internet newspaper). The public information meeting was held on December 13, 2011 at the SCCOG office.

- The Nature Conservancy (TNC) and several partner agencies have developed a hazard planning tool and a risk assessment process designed to help communities identify and prioritize steps to reduce risks in a community. TNC has been promoting this tool in coastal Connecticut communities, with a focused effort in Stonington. TNC hosted an "Eastern Connecticut Climate Risk Assessment Workshop" in the nearby town of Waterford on January 11, 2012. This workshop was geared toward assisting with planning and hazard mitigation efforts. During the day-long event, Stonington planners and municipal officials were introduced to the coastal resilience tool and encouraged to complete a vulnerability assessment survey. The results of the survey were discussed during the data collection meeting (described in the next bullet) to aid the development of this plan update.

- A data collection meeting was held with the on January 18, 2012 to discuss the scope and process for updating the plan and to collect information. The Emergency Management Director coordinated the local planning team which included the Town Engineer and the Directors of Public Works and the Water Pollution Control Authority. The meeting focused on reviewing each section of the existing hazard mitigation plan and annex, critical facilities, and various types of hazards that have affected the town and that should be addressed in the update.

- The draft that is sent for State review will be posted on the Town website (http://www.stonington-ct.gov/) as well as the SCCOG website (http://www.seccog.org) for public review and comment. In addition, a hard copy will be made available in the SCCOG office in Norwich. A press release will announce the availability of the HMP for review. This will provide residents, business owners, and other stakeholders throughout the SCCOG region the opportunity to review and comment on a relatively complete draft with all annexes. Comments received from the public will be incorporated into the final draft where applicable following State and Federal comments.

The adoption of this HMP update by the Town of Stonington will be coordinated by SCCOG and the Emergency Management Director. The HMP update must be adopted within one year of conditional approval by FEMA, or the Town will need to update the HMP and resubmit it to FEMA for review. The adoption resolution is located in Appendix A of this annex.

1.4 Progress Monitoring

Following adoption, the Emergency Management Director will administer this HMP under the authority of the Board of Selectmen and will be the local coordinator of the HMP. The Emergency Management Director will coordinate with responsible departments as listed in Table 11-1 and ensure that the recommendations of this HMP are considered or enacted. Refer to

Section 1.8 of the Multi-Jurisdictional HMP for a description of how the local coordinator will perform progress monitoring. The majority of recommendations in this annex can be accomplished within or with only a slight increase in the operating budgets of the various departments. Projects that require capital improvements or additional funding will need to be approved by the Board of Selectmen.

The HMP will be on file with the Emergency Management Director, the Town Engineer, and the Department of Planning to assist in guiding growth decisions. See Section 2.5 for recommendations related to integrating the findings of this HMP into other Town planning documents. The Town will continue to encourage residents to contact the Emergency Management Director, Department of Public Works, or the Town Engineer with concerns related to natural hazards or emergency response via the Town's website. Such announcements will also state that the HMP is available for public review at the Town Hall as well as available on the Town's and the SCCOG's website.

The Town of Stonington will review the status of plan recommendations each year. The Emergency Management Director will be in charge of overseeing recommended projects and coordinating an annual meeting with applicable departments (those listed in Table 11-1) and other interested departments. Refer to Section 1.8 of the Multi-Jurisdictional HMP for a list of matters to be discussed at the annual meeting, including a review of each recommendation and progress achieved to date, or reasons for why the recommendation has not been enacted. The Emergency Management Director will keep a written record of meeting minutes and the status of the recommendations. These records of progress monitoring will form the basis for the next HMP update.

The Town of Stonington understands that the multi-jurisdictional HMP and this annex will be effective for five years from the date of FEMA approval of the first SCCOG jurisdiction regardless of the date of adoption by the Town. The Emergency Management Director will coordinate with SCCOG for the next HMP update which is expected to occur in 2016-2017.

2.0 COMMUNITY PROFILE

2.1 Physical Setting

The Town of Stonington is a large community located on the Connecticut shoreline that also has a significant inland area. Elevations range from sea level to just over 270 feet on hilltops in the northern portion of the town. Several inhabited islands are located along the Stonington shoreline, including Ram Island, Mason Island, Enders Island, Andrews Island, Dodges Island, and Elihu Island.

Geology is important to the occurrence and relative effects of natural hazards such as earthquakes. Thus, it is important to understand the geologic setting and variation of bedrock and surficial formations in lands underlying the Town of Stonington. The town lies above several bedrock types which trend west to east across the area except for circular banding around a fault line located parallel to the western boundary of the town. The majority of the town is underlain by Rope Ferry Gneiss, Hope Valley Alaskite Gneiss, or Potter Hill Granitic gneiss, with small areas of other bedrock formations. Each of these formations consists primarily of gneiss which is a relatively hard metamorphic rock.

The surficial geologic formations in the town include glacial till, stratified drift, and coastal formations. Refer to the Multi-Jurisdictional HMP for a generalized view of surficial materials. The majority of the town is underlain by glacial till. Till contains an unsorted mixture of clay, silt, sand, gravel, and boulders deposited by glaciers as a ground moraine. Areas in the vicinity of the Mystic River, Whitford Brook, Copps Brook, Pequotsepos Brook, Stony Brook, Anguilla Brook, and the Pawcatuck River are underlain by stratified drift. The amount of stratified drift present is important as areas of stratified materials are generally coincident with floodplains. The amount of stratified drift also has bearing on the relative intensity of earthquakes and the likelihood of soil subsidence in areas of fill.

2.2 Land Use and Development Trends

As noted in the 2004 *Plan of Conservation and Development*, Stonington is a developmentally-balanced community which is neither a pure residential suburb nor an economic hub. In addition to being a large residential community, Stonington is a major contributor to the region's economy. While nearly 70% of town residents work outside of the community, approximately 57% of the 7,000 jobs within Stonington are held by non-Stonington residents.

The earliest settlements in the 17th century in Mystic, Wequetequock, and Pawcatuck consisted of farming supplemented by fishing and other maritime activities. The first shipyard in the town was constructed in 1669 in Pawcatuck. The maritime industry grew quickly and by the middle of the 19th century the town would have many shipyards that were home to as many as 78 whaling vessels as Stonington became the second-largest whaling port in Connecticut in addition to maintaining a strong sealing, fishing, and shipping industry. By this time, the major villages were densely developed, with textile mills and allied industries developing in Pawcatuck and Old Mystic.

Following the decline of the whaling and sealing industry in the 1920's, the widespread availability of the automobile and interstate highways following World War II allowed residents to commute to jobs further from home. The Town's maritime history became the basis for major

tourist attractions such as Mystic Seaport and Mystic Aquarium. Suburban expansion followed in the 1960's through the 1980's as the population grew by nearly 25% with many residential homes built outside of the major villages during this time period.

According to the 2004 *Plan of Conservation and Development*, approximately 32% of the housing units in the town are multi-family, apartments, or mobile homes that provide a diverse housing stock. As many housing units predate 1990 particularly in the historic villages, it is believed that many structures are not aligned with current building codes. Such structures may be more susceptible to damage from natural hazards. The Building Official reports that many homes have undergone recent renovation and that some have installed flood and wind mitigation measures such as shutters and floodwalls.

Today, land in the town is approximately 25% residential, 5% commercial and industrial, 7% agricultural, 9% institutional or transportation related, and 15% open space. Davis Standard (a plastic extrusion equipment company) and Mystic Seaport are the two largest employers in the town. Approximately 40% of the total land area is considered to be vacant or underutilized and therefore have the potential for development. Approximately 96% of the vacant land is zoned residential and estimates suggest that this land could support an additional 3,530 housing units.

Despite the overall population of the community decreasing slightly between 2000 and 2010, the number of housing units in the community grew by 244 between 2005 and 2010. Several new developments have been constructed or approved since the last HMP as reported in the following list. Note that none of these developments will be located in the 1% annual chance floodplain.

- A tractor supply store was built at the intersection of Route 78 and Route 2 in 2011.
- There is a new La Quinta hotel on White Rock Road in Pawcatuck.
- Seven of 26 homes are built at Granview Farms.
- A new development known as Mystic Senior Living, located on Clara Drive, is approved and pending construction.
- 64 townhouse units off Mary Hall Road have been approved.
- 60 homes known as Old Mystic Estates off Pequot Trail have been approved.
- A new Volkswagen dealership and a few small commercial developments are pending.
- 40 to 60 units of affordable housing at Route 1 near South Broad Street have been approved.
- Target and Lowes were approved for the I-95 Exit 92 interchange on the south side of the highway, but this development is on hold.

2.3 Drainage Basins and Hydrology

The town lies within three regional drainage basins that eventually drain to Fishers Island Sound. These include the Southeast Eastern Complex, the Southeast Shoreline, and Pawcatuck Main Stem regional basins as delineated by the Connecticut DEEP. Sub-regional drainage basins include those associated with Whitford Brook and the Mystic River on the western boundary of the town, Copps Brook and Anguilla Brook in the central area of town, and the Pawcatuck River on the eastern boundary of the community. Minor drainage basins include Pequotsepos Brook near Mystic and Stony Brook which drains to Stonington Harbor.

There are many impoundments throughout the town including Silvias Pond on Stony Brook, Whitford Pond and Hyde Pond on Whitford Brook, Wequetequock Pond on Anguilla Brook, Quiambog Cove, Wequetequock River, and Mystic Reservoir on Copps Brook. Along the

shoreline, recreational boaters enjoy protected harbors and coves such as Mystic Harbor, Stonington Harbor, Wequetequock Cove, and Little Narragansett Bay. These areas are protected by from wave action by islands, beaches, and breakwaters located in Fishers Island Sound.

2.4 Governmental Structure

The Town of Stonington is governed by a Board of Selectman – Town Meeting form of government as authorized by the Town Charter of 1989. The First Selectman is the chief executive officer of the Town and is directly responsible for the administration of all departments, agencies, and offices. The Board of Selectman reviews and approves all Town business.

The Town has several departments that provide municipal services. Departments pertinent to natural hazard mitigation include the Building Official, Emergency Management, Town Engineer, Fire Department, Planning, Police, and Public Works. In addition, there are several boards and commissions that can take an active role in hazard mitigation, including the Conservation Commission, Inland Wetland and Watercourse Commission, the Harbor Management Commissions, the Planning & Zoning Commission, and the Zoning Board of Appeals. The general roles of most of these departments and commissions are common to most municipalities in SCCOG and were described in Section 2.8 of the Multi-Jurisdictional HMP. More specific information for certain departments and commissions of the Town of Stonington is noted below:

- The Building Official inspects new development and substantial redevelopment for compliance with current building codes. The Town of Stonington utilizes the Connecticut Building Code.

- The Conservation Commission maintains the Town's Open Space Plan and acquires open space from new developments.

- The Emergency Management Department oversees Police, Fire, and Ambulance services in the Town. It also maintains a comprehensive set of web links on the Town's website regarding how to prepare for natural hazards, how to sign up for the CT Alerts "Everbridge" notification system, a map of areas potentially affected by storm surge, and a link requesting residents to sign up for the Special Needs Registry if they need special assistance during an emergency.

- The Town Engineer supports the Town's Land Use Commissions and the Stormwater Task Force, oversees certain construction projects, provides flood awareness information, and manages the Town's Community Rating System compliance. The Town Engineer also prepares and distributes an Annual Flood Awareness Newsletter.

- The Town of Stonington has six volunteer fire departments encompassing six fire districts. The Departments provides fire suppression, fire/ disaster prevention, rescue, hazardous materials, and disaster mitigation to the town. Public Water Service for fire protection is provided by the Aquarion Water Company or the Westerly Water Department. The six districts have four Fire Marshalls, with fire marshal responsibilities for the remaining two districts being performed by the Emergency Management Director. Two of the fire districts extend into the Town of Groton. Emergency medical and ambulance services are provided

by Stonington Ambulance, Mystic River Ambulance in Groton, or Westerly Ambulance Corps in Westerly, Rhode Island.

- The Town has three Harbor Management Commissions (Mystic River, Pawcatuck River, and Stonington Harbor) who each maintain and enforce a Harbor Management Plan and ordinance for their jurisdiction. The Town also has a Waterfront Commission who oversees the development and use of the coastal waters in and around the Town of Stonington.

- The Inland Wetland & Watercourse Commission reviews plans for compliance with the Town's Inland Wetland and Watercourse Regulations

- The Planning & Zoning Commission oversees orderly and appropriate use and development of residential, commercial, and industrial land and the conservation of natural resources. They review and approve a wide range of land use applications, zoning regulation amendments, planning and development projects, and grant opportunities to ensure that development and growth in the town is consistent with existing land use, environmental policy, regulations, and the objectives of the *Plan of Conservation and Development*. They are assisted by the professional staff of the Department of Planning who administers the Town's Zoning Regulations, administer the Coastal Management Program, make flood zone determinations for residents, perform planning studies, and provide technical assistance to developers.

- Police services are provided by the Town of Stonington Police Department. Full-time, paid personnel provide situation containment and traffic services during emergencies.

- The Public Works Department provides services including safe, efficient and well-maintained infrastructure of roads and rights-of-way, bridges and stormwater management. The Public Works Department also conducts snow removal and deicing on roads; tree and tree limb removal in rights-of-way; and maintains and upgrades storm drainage systems to prevent flooding caused by rainfall. The department website includes guidelines for residents regarding laws and suggested procedures for hiring arborists and tree contractors.

The roles of Town departments have not changed since the time of the previous HMP. Thus, the Town of Stonington is technically, financially, and legally capable of implementing mitigation projects for natural hazards to the extent that grant funding is available. As discussed in the next section and the historic record throughout this annex, the Town is densely developed in certain areas and undeveloped in others, presenting particular vulnerabilities to different types of natural hazards in different areas.

2.5 Review of Existing Plans and Regulations

The Town has several Plans and regulations that suggest or create policies related to hazard mitigation. These policies and regulations are outlined in the Emergency Operations Plan, *Plan of Conservation and Developmen*t, the various *Harbor Management Plans* and Ordinance, Inland Wetland and Watercourse Regulations, Subdivision Regulations, and Zoning Regulations.

Emergency Operations Plan

The Town has an Emergency Operations Plan (EOP) that is updated and certified by the Board of Selectmen annually. This document provides general procedures to be instituted by the First Selectman, Emergency Management Director, and/or designee in case of an emergency. Emergencies can include but are not limited to natural hazard events such as hurricanes and nor'easters. The EOP is directly related to providing emergency services prior to, during, and following a natural hazard event.

The EOP recognizes that the Town of Stonington does not have a town-wide warning system such that emergency response organizations such as the Fire and Police Departments may need to help warn the public before and during emergencies. Emergency communications will be supplemented through a HAM radio operator. The EOP outlines how the public will be contacted, how evacuations will be conducted, and how shelters will be opened and operated. Prior to a hurricane, the EOP has a 96-hour checklist to follow in order to prepare emergency personnel and residents for the impending storm.

Plan of Conservation and Development (2004)

The Town's 2004 *Plan of Conservation and Development* 2007 Open Space amendments were written with contributions from local boards and commissions, citizens, and citizen groups. The purpose of the plan is to balance growth with maintaining the quality of life that citizens within the town embrace. The Plan was written prior to the previous HMP but includes many strategies pertinent to hazard mitigation. The Plan encourages the Town to preserve open space, protect important natural resources by adopting buildable land regulations, conserve coastal resources through lower development density regulations and creating water setbacks in coastal V zones, address community facility needs (such as at the Public Works Garage), and to provide for adequate utility services such as increasing fire hydrant volume and pressure.

Harbor Management Plans

The Stonington Harbor Management Plan as adopted May 3, 2000, the Pawcatuck River Management Plan (draft as of October 14, 2010), and the Mystic Harbor Management Plan of May 1995 authorizes the individual Harbor Masters to carry out harbor management directives and enforce all provisions of the Plan, including collecting fees for mooring permits and assigning mooring locations; standardizing mooring tackle requirements; and enforcing wake and speed, waterskiing, motor, noise, and refuse regulations. In particular, these ordinances allow the Town to maintain a list of persons who currently have moored boats such that removal or emergency response can be coordinated.

Zoning Regulations

The Zoning Regulations of the Town of Stonington, Connecticut were last updated in July 2011. The recent updates were performed concurrently with the release of the FIS and DFIRM for New London County in July 2011. They include a variety of preventative regulations pertinent to mitigating flooding hazards. These regulations are applied during the permitting process for new construction and during substantial improvement of existing structures. The regulations require a Flood Hazard Report be filed for properties located within the Flood Hazard Overlay District (Section 7.7) and utilizes the FEMA SFHAs to delineate this district, and further defines a

Coastal Area Management overlay district as being all areas within DFIRM areas subject to coastal flooding, within 1,000 feet of the mean high water mark for coastal waters, and within 1,000 feet of State-designated tidal wetlands. New construction or substantial improvements are required to be resistant to flood damage, and utilities must be located to be free of flooding. All new construction including mobile homes must be located such that the lowest floor is located one foot above the base flood elevation. The regulations further state that new utilities in Special Permit Areas must be placed underground.

Subdivision Regulations

The Subdivision Regulations in the Town of Stonington were last amended in June 2004. The regulations require that any drainage system located within the floodplain be designed for the 1% annual chance flood event and prohibit fill within 100 feet of watercourses, marshes, swamps, and bogs. The regulations further authorize the Tree Warden to move the proposed location of trees to not interfere with overhead utility lines and require that utilities be located underground whenever feasible.

Inland Wetland and Watercourses Regulations

The Inland Wetlands and Watercourses Regulations in the Town of Stonington were last amended in July 2004. The regulations require a permit for certain regulated activities which take place within 100 feet of a wetland or watercourse or that may impact a wetland or watercourse. These regulations build on the preventative flood mitigation provided by the Zoning and Subdivision regulations by preventing fill and sedimentation that could lead to increased flood stages.

2.6 Critical Facilities, Sheltering Capacity, and Evacuation

The Town of Stonington considers several facilities to be critical to ensure that emergencies are addressed while day-to-day management of the Town continues. These include both buildings and utility and transportation infrastructure. Critical facilities that are buildings are presented on figures throughout this annex and summarized in Table 2-1. Several critical facilities are located within the 1% annual chance floodplain including fire departments, water treatment plants, waste water treatment plants, and elderly housing facilities. In addition, critical facilities are located in areas that could be impacted by hurricane storm surge. These facilities are described in more detail below.

Police Department

The Town's Police Department facility includes the Town's Emergency Operations Center. This building has a generator and has a communication tower. The Town utilizes an Enhanced 911 system to route all emergency calls.

Town Hall

The Stonington Town Hall houses records, plans, and other documents important for administering the Town. It has emergency backup power and houses the Town's backup EOC with 90% redundancy of the primary EOC. This facility also has a repeater antenna.

TABLE 2-1
Critical Facilities

Facility	Address or Location	Emergency Power	Shelter	In 1% Annual Chance Floodplain?	In Hurricane Surge Zone?
Emergency Services					
Police Department / EOC	173 South Broad Street	✓			
Town Hall / Backup EOC	152 Elm Street	✓			
Mystic Fire Department	34 Broadway Avenue	✓		✓	✓
Old Mystic Fire Department	21 North Stonington Road	✓			✓
Pawcatuck Fire Department	33 Liberty Street	✓			
Quiambaug Fire Department	50 Old Stonington Road	✓		✓	✓
Stonington Borough Fire Department	100 Main Street	✓		✓	✓
Wequetequock Fire Department	6 Farmholme Road	✓			
Stonington Ambulance	86 Alpha Avenue				
Public Works Garage	86 Alpha Avenue	✓			
Shelters					
Stonington High School	176 South Broad Street	✓	✓		
Mystic Middle School	204 Mistuxet Avenue	✓	✓		
Utility Services					
Deans Mill Water Treatment Plant (Aquarion)	Mistuxet Avenue	✓		✓	
Pawcatuck Water Pollution Control Facility	38 Mary Hall Road	✓			
Mystic Water Pollution Control Facility	Edgemont Street	✓		✓	✓
Borough Water Pollution Control Facility	High Street	✓		✓	✓
Elderly Housing					
Stone Ridge	186 Jerry Browne Road	✓			
Brookside Village	Brookside Lane				
Stonington Arms	133 South Broad Street				
Edythe K. Richmond Elderly Housing (Town)	45 Sisk Drive				
Avalon Health Center	186 Jerry Browne Road	✓			
Pendleton Health & Rehabilitation	44 Maritime Drive	✓			
Apple Rehabilitation	28 Broadway Avenue	✓		✓	✓

Public Works Garage

The Town Public Works garage is located behind the Town Hall. It is used for vehicle and equipment storage and the facility also houses the Town's salt and sand supply. This facility also has a generator for emergency power.

Volunteer Fire Departments and Emergency Services

The Town of Stonington has Department has six fire districts that provide fire suppression, rescue, and emergency medical services out of six fire stations located in the respective village areas. Several of these facilities are located within the 1% annual chance floodplain and/or hurricane surge zones. The Stonington Borough Fire Department was recently constructed and has floodproofing measures installed at each of its doors. The Fire Departments and town staff perform emergency services training with local utilities each year.

Emergency medical services are provided by Mystic Ambulance in Groton, Stonington Ambulance, and Westerly Ambulance. Patients are transported to Westerly Hospital in Westerly, Rhode Island or to Lawrence & Memorial Hospital in New London for advanced care. The Stonington Ambulance facility was constructed in 1984 on fill material and was to be a temporary facility. According to information on the Stonington Ambulance website, the facility is reportedly settling due to the weight of the ambulances and a new facility is needed.

Utilities

The Aquarion Water Company Mystic System provides public water service to Mystic, Old Mystic, the northern portion of Mason Island, Lords Point, and to Stonington Borough and the nearby portion of the town. The Deans Mill Water Treatment Plant is considered a critical facility as the Town of Stonington must respond to emergencies there. A portion of this facility is located within the mapped floodway and 1% annual chance floodplain of Copps Brook. Recent improvements to the spillway of Mystic Reservoir and the downstream channel along Copps Brook were constructed due to flooding damage. The channel improvements may mean that the water treatment plant is no longer in the floodway. In addition to the treatment plant and water supply infrastructure, the two Aquarion water storage tanks in town are also considered critical facilities.

The Westerly Water Department provides public water service to most of Pawcatuck and extends westward towards Wequetequock. A water storage tank is located off Asher Avenue that is considered a critical facility. In addition, some of the Westerly Water Departments wells are located in Pawcatuck adjacent to the Pawcatuck River and are floodprone.

The three water pollution control facilities are considered critical facilities. The Mystic and the Borough Water Pollution Control Facilities are both located within the 1% annual chance floodplain and hurricane surge zones. The Town of Stonington also has 17 sewer pumping stations and associated infrastructure that they consider to be critical facilities. Many of these pumping stations are also located in the 1% annual chance floodplain and/or coastal surge zones.

Shelters

Stonington High School is the Town's shelter and can hold approximately 1,200 people with a bedding-down capacity of 520 people. The school has a generator and the shelter is American Red Cross certified. The Town's backup shelter is Mystic Middle School which can hold approximately 500 people with a bedding-down capacity of 200. The Middle School also has a generator and is American Red Cross Certified. In addition to Town departments, the American Red Cross and the Salvation Army provide services related to mitigation and emergency management. The American Red Cross and the Salvation Army help provide shelter and vital services during disasters and participate in public education activities. If additional space was needed, the Town would send evacuees to a regional American Red Cross shelter.

Communications

The Town's communication capability is considered adequate for most circumstances. Emergency communications are good except during long power outages. The Town relies on radios, cellular phones and email for much of its communications. The Town is also part of the CT Alerts "Everbridge" Reverse 9-1-1 system for emergency notification of residents. Typically, Town personnel post notifications on bulletin boards and on the Town website prior to major storms and also utilize local media (newspapers, television, and radio) to pass information during and after storms. Residents can also contact the First Selectman or any Town staff directly with comments related to natural hazards or emergency response.

As the Town's communication system is more than ten years old, the Town is finding that they are relying more and more on cellular communication during emergencies. Thus, the Town considers the five cell towers in town to be critical facilities. Note that these are not listed on Table 2-1 because they are not buildings. One of the cellular towers (in Quiambaug) is located in the 1% annual chance floodplain and the hurricane surge zone. The Borough, Quiambaug and Wequetequock Fire Departments as well as Stonington Volunteer Ambulance Corp reportedly have obsolete communications equipment. Radio repeaters have been recommended to close gaps in radio coverage.

Communication was difficult during the power outages following Hurricane Irene and Winter Storm Alfred due to downed trees and power outages at the nearby cellular towers. Town personnel posted information in public locations made personal contact with many residents by going door-to-door during the outage to pass along necessary information.

Health Care and Senior Living Facilities

Three elderly housing facilities and three nursing homes in town are considered critical facilities. The Stonington Housing Authority and several private entities operate Elderly Living Facilities as noted in Table 2-1. Only Apple Rehabilitation in Mystic is located within the 1% annual chance floodplain and hurricane surge zones, and only the Avalon Health Care is known to have backup power. Town of Stonington residents utilize the Seaport Walk-In Medical Center for minor ailments, but the Town does not consider this to be a critical facility.

Evacuation Routes

Stonington has identified evacuation routes for hurricane events. Typically, residents utilize State roads or local roads to exit the town. The highest capacity egress routes from Stonington include Interstate 95, Route 1 into Groton or Westerly, Rhode Island, Route 2 into North Stonington towards Norwich, Route 27 into Groton to Route 184, Route 49 into North Stonington to Route 184, Route 78 into Westerly, Route 184 into Groton or North Stonington to Route 2, and Route 201 into North Stonington to Route 2. Residents could also evacuate the town using the Amtrak-Metro North Railroad out of the Mystic Station but only prior to a flood event as the railroad station is also located in the floodplain.

In addition to these critical transportation routes, the Town considers the Masons Island Road bridge to be critical infrastructure since it is the only mode of egress for a year-round population of approximately 400. This bridge was submerged during Tropical Storm Irene. The Elihu Island Road bridge is important for the same reason although this population of the island is much smaller than at Masons Island.

2.7 Status of 2005 Plan Recommendations

The previous HMP included several general recommendations related to mitigating natural hazards. The recommendations and a summary of actions taken over the past several years towards those actions are listed below. Where progress was indicated, the progress was paid for out of the Town's operating budget. Updated recommendations are presented in Section 11 of this annex.

- Engineering Study of Masons Island Causeway / Provide Alternative Access to Island – The Town does not currently have funding to perform an engineering study of the bridge. The bridge overtopped during Tropical Storm Irene but was not extensively damaged. The Town considers this bridge to be a critical facility. Alternate access to the island is, and will continue to be, by boat for the foreseeable future. *This recommendation has been updated with a maintenance recommendation for the causeway and bridge.*

- Building Elevation, Floodproofing, or Relocation of Buildings in Lords Point – This small, private coastal community has a summer population of approximately 800 and contains nearly 200 structures with the majority located within the 1% annual chance floodplain and hurricane surge zones. The Town has not had the capital available over the past several years to promote such projects due to the recent economic downturn. *This recommendation remains valid provided residents are interested and grant funding is available.*

- Implement a Reverse 9-1-1 System to Automatically Call Telephones Throughout Town, Relaying Important Information During an Emergency – The Town is part of the statewide CT Alerts "Everbridge" System. *This recommendation has been completed and the Town will continue to encourage residents to participate. Additional recommendations related to this system are also presented in Section 11.*

- Upgrade/Install Drainage Structures and Make Drainage Improvements on Washington Street and Holmes Street – The drainage systems in these areas backup during high tides and flood the roadways. A drainage study has not yet been performed to determine a solution, but a

large-scale diking project may be the only permanent solution. *This recommendation remains valid.*

- Evaluate the Hazard Resistant Nature of Critical Facilities – This is ongoing as part of the Town's annual EOP update. No critical facilities are believed to be more or less susceptible to natural hazards except for those located outside of the 1% annual chance floodplain (and the Stonington Borough Fire Station which has floodproofing measures installed). *This recommendation remains valid but has been subsumed into the EOP update.*

- Comprehensive Evaluation of Emergency Communication Capabilities Throughout the Town – This is ongoing along with the annual EOP update. The Town has communication capability with surrounding communities but has identified areas where improvements could be made. *This recommendation remains valid.*

- Develop a Flood Audit Program –The Town is aware of floodprone areas and a formal flood audit program is not proposed due to the expense involved. *This recommendation will not be pursued further and is replaced in favor of adding floodprone areas to the CT Alerts "Everbridge" Reverse 9-1-1 database.*

- Evaluation of Town Dock – The Town Dock in the Borough of Stonington is located within the 1% annual chance floodplain and is subject to wave velocity. This area houses a commercial fishing fleet and has been damaged by coastal flooding in the past. Stonington Harbor is protected by breakwaters. *This recommendation remains valid particularly as sea levels rise over the next few decades.*

- Review of Transportation Facilities to Identify Critical Risks – This is ongoing annually as part of the Emergency Operations Plan update. The Town has identified several roads and bridges that are at risk of overtopping during coastal and inland flood events. *This recommendation remains valid but has been subsumed into the EOP update.*

- Identify Appropriate Improvements to Traffic Infrastructure and Emergency Response Training and Equipment – This is ongoing annual as part of the Emergency Operations Plan update. Emergency Response Training occurs regularly with equipment upgrades as funding allows. *This recommendation remains valid but has been subsumed into other recommendations as shown in Section 11.*

- Distribute or Post Public Information Regarding Hazards in the Town – The Town has an extensive amount of information available for residents online and at the Town Hall. Notifications are also posted on bulletin boards at public locations, town buildings, and the Town website. Local media is utilized to pass information during storms, including newspaper, television, and radio. Town employees made personal contact with residents during recent power outages. *The level of outreach in the town is considered excellent and will be continued in the future.*

- Evaluate Emergency Shelters, Update Supplies, and Check Communication Equipment – This is done at least quarterly or following any use of the facilities. *This recommendation remains valid.*

- Maintain Emergency Personnel Training as Well as Maintaining and Updating Emergency Equipment and Response Protocols – Training is performed monthly, with equipment upgrades occurring to the extent the budget will allow. *This recommendation remains valid.*

- Evaluate and Consider Burying Power Lines Underground and Away from Possible Tree Damage – This is required for new subdivisions and for projects located in zoned areas that require a Special Permit. There are no plans to move existing utilities underground because the utilities are not owned by the Town. *This recommendation remains valid for future developments and should be placed into an ordinance for new development or substantial redevelopment regardless of zoning.*

- Complete an Earthquake Survey of all Critical Facilities and Infrastructures –A formal survey is not proposed. *This recommendation will not be pursued further due to the low occurrence of this hazard type.*

- Complete Catch Basin and Culvert Surveys to Identify Structures in Need of Maintenance or Replacement – Inspections are performed annually by Public Works. Public Works also inspects catch basins in floodprone areas for blockages prior to major storms. *This recommendation remains valid.*

- Complete a Survey of Fire Hydrants to Assess Vulnerabilities and Capabilities for Fire Protection – Fire protection capabilities are reviewed with the respective water companies each year. The Town also has some dry hydrants cisterns in certain developments although the Town does not prefer these types of fire protection due to the maintenance required. The Town has large pump trucks capable of moving a lot of water into rural areas. The Town believes that its fire protection level is more than adequate. *This recommendation remains valid.*

3.0 INLAND FLOODING

3.1 Setting / Historic Record

Flooding is the primary hazard that impacts the town each year as documented in the previous HMP. While riverine flooding is a concern, nuisance flooding and poor drainage have also created flooding issues at several locations in the town. Flooding is typically caused by heavy rainstorms, but can also be caused by relatively light rains falling on frozen ground. Flooding of roadways is more common than damage to structures.

The town has been affected by many inland flooding events over the past several years including the following which were documented to the National Climatic Data Center. For example, on October 28, 2006 local fire departments responded to flooded basements in Old Mystic. The heaviest storms in recent memory occurred on July 1, 2009 and at the end of March, 2010.

A severe thunderstorm on July 1, 2009 produced up to 6.5 inches of rainfall in four hours that resulted in local fire departments pumping water out of more than 100 basements in Mystic, Groton, Stonington, and Ledyard. Flooding was widespread throughout Stonington. Approximately 50 to 60 cars were inundated with water and trapped in the Mystic Aquarium parking lot. Several vehicles were also stranded in high water on Coogan Boulevard near the aquarium. A portion of Route 1 in Mystic was closed due to flooding, and a bridge on Collins Road overtopped and was damaged. Emergency responders in Stonington pulled an occupied vehicle out of the area of Washington Street and Broadway Avenue. In addition, this storm caused two dams to overtop as described in Section 10.

The flooding of July 2009 was extreme but not as extensive in comparison to the heavy widespread flooding experienced during March 29-30, 2010. A nor'easter produced an extended period of heavy rainfall totaling 8.6 inches that caused widespread flooding in Stonington. Over $4.5 million in damage was reported in Stonington and North Stonington. The 2010 storm is most notable to Town officials for destroying the Route 184 bridge and submerging a large area of Old Mystic. Numerous homes throughout the town had serious basement flooding of three feet. Several basement offices in Stonington Town Hall on Elm Street were flooded. Residents on Milan Terrance also experienced basement flooding.

Numerous roads in throughout the town were closed due to flooding. Route 1 was closed due to flooding from Anguilla Brook and also closed near Long Wharf Drive in Mystic. Route 27 was closed at the Groton-Stonington boundary with water rescues being performed by the Old Mystic Fire Department. Potions of Pequot Trail (at Copps Brook, Stony Brook, and Anguilla Brook), Coogan Boulevard (poor drainage) and Mistuxet Avenue (Copps Brook, Pequotsepos Brook) were closed due to flooding.

Many roads and bridges were also damaged. A small bridge on Collins Road that passes an unnamed stream was destroyed by the flooding. In Wequetequock, a bridge on Green Haven Road over Anguilla Brook was damaged by flood waters. A large section of the road was also washed away and several nearby homes were flooded. Raging waters from Whitford Brook entered the Mystic River and destroyed a small bridge on Route 184 and flooded numerous homes and businesses such as the Old Mystic General Store, Post Office, and Old Mystic Mill on Main Street as well as trapped cars. The intersection of Jerry Browne Road and Mistuxet Avenue

at Copps Brook was closed due to flooding and the culvert was damaged, prompting a culvert and channel upgrade project in 2011.

3.2 Existing Programs, Policies, and Regulations

The Town attempts to mitigate inland flood damage and flood hazards by utilizing a wide range of measures including restricting activities in floodprone areas, replacing bridges and culverts, promoting flood insurance, acquiring floodprone structures, maintaining drainage systems, through education and outreach, and by utilizing warning systems. Many mitigation measures are common to all hazards and therefore were listed in Section 2.5 and Section 2.6. Additional mitigation measures have been put in place by the Federal government along the Pawcatuck River to reduce nearby flooding.

Flood Control Structural Projects

As noted in Section 3.4.4 of the Multi-Jurisdictional HMP, the USACE constructed a 0.36-mile levee in Pawcatuck in 1962 and 1963. The levee protects an industrial area and surrounding residential area on Mechanic Street that totals approximately 28 acres. However, the levee does not protect against the 1% annual chance flood event. The Town has installed a $100,000 pumping system to remove water from behind the dike and clears trees and brush. The levee system is inspected by the USACE each year and is believed to be in good condition.

Bridge Replacements, Drainage, and Maintenance

The Department of Public Works cleans and inspects catch basins and culverts at least annually or more often if problems are noted. The Town fields phone calls related to drainage complaints. Roadway drainage complaints are directed to the Director of Public Works. When flooding occurs, the Public Works department or the Fire Department would handle complaints depending on the location. For example, Public Works would inspect bridges and culverts and erect barricades to close roads, while the Fire Department responds to calls requesting help for flooded basements. The Department of Public Works recently performed several culvert repairs following the March 2010 storms.

The Town is currently applying for grant funding under HMGP to perform drainage upgrades that will prevent basement flooding to eight homes on Mistuxet Avenue, Hewitt Road, and Pequotsepos Avenue Extension. A sizeable watershed drains to a six-inch pipe at the end of a drainage swale. When the six-inch pipe backs up, the drainage swale overtops and floods nearby homes. Other projects have been completed in-house. For example, a home in a low section of Mistuxet Avenue formerly experienced flooding related to poor drainage, but a recent culvert upgrade performed by the Town has mitigated the flooding issue.

Regulations, Codes, and Ordinances

The Town of Stonington has planning and zoning tools in place that incorporate floodplain management. The Town has recently updated its flood protection regulations in its Zoning and Regulations in July 2011 as noted in Section 2.5. The Town utilizes the 1% annual chance floodplain as defined by FEMA to regulate floodplain and floodway activities and requires 100 percent compensatory storage for any encroachment in the floodplain. The Town also requires new construction or substantial renovations to be located at an elevation of one foot greater than

the base flood elevation, and requires the preparation of elevation certificates to verify that a structure has been elevated or built to the proper height.

The Town's Subdivision Regulations require that adequate drainage be provided to reduce exposure to flood hazards and that buildings and utilities are located to minimize the effects of flood damage. Regulations covering development in or within 100 feet of inland wetland or watercourse areas were last updated in 2010 and are enforced by the Town's Inland Wetlands and Watercourses Commission. The Town has also adopted a map prepared by the Inland Wetland and Watercourse Commission which regulates building in wetland areas.

Acquisitions, Elevations, and Property Protection

The Town of Stonington has not performed acquisitions or elevations of floodprone property. Property protection has focused instead on preventive measures and maintaining and upgrading drainage systems. The Town is not opposed to performing acquisitions, elevations, or relocations if property owners were willing and grant funding was available. For example, this type of mitigation was recommended in the previous HMP for the Lords Point neighborhood, and one repetitive loss property owner is known to be interested in acquisitions although funding for the purchase is not immediately available.

Flood Watches and Warnings

The Emergency Management Director and the Fire Department access weather reports through the National Weather Service and local media. Residents can also sign up for the Statewide Reverse 9-1-1 to receive warnings when storms are imminent. The Town can telephone warnings into potentially affected areas using this system.

Community Rating System

The Town of Stonington joined the Community Rating System in 2004 and currently has policies and procedures in place that exceed the minimum standards for an NFIP-compliant community. Stonington is currently a Class 9 Community which qualifies flood insurance policy holders in the town a 5% discount on flood insurance. The Town has performed several accomplishments to earn this rating including providing and maintaining flood elevation certificates, conventional flood maps, and digital flood data for public information purposes; completing a public information outreach project; and for additional accomplishments in both open space preservation and stormwater management. It is believed that recent improvements such as completion of the previous HMP and this update and the installation of the CT Alerts "Everbridge" Reverse 9-1-1 system will further improve the Town's score with the Community Rating System.

3.3 Vulnerabilities and Risk Assessment

This section discusses specific areas at risk to inland flooding within the Town. Nuisance flooding and poor drainage and overbank flooding are about equal in occurrence in the Town, with additional areas affected during more severe events.

3.3.1 Vulnerability Analysis of Areas along Watercourses

Major inland watercourses and water bodies in Stonington have the 1% annual chance floodplain defined by FEMA. The majority of the inland watercourses and water bodies south of Interstate 95 in Stonington are mapped as Zone AE, while watercourses north of Interstate 95 are generally mapped as Zone A. The Mystic River, Copps Brook, Stony Brook, Anguilla Brook, and the Pawcatuck River each have inland sections mapped as Zone AE, indicating that flood elevations are available. The remaining streams mapped as Zone A include the upper reaches of Anguilla Brook, Wheeler Brook, the upper reaches of Stony Brook, the upper reaches of Copps Brook, and Whitford Brook. Refer to Figure 3-1 for the location of the 1% annual chance floodplains related to inland flooding within Stonington.

Based on the information in the previous HMP and that provided by Town officials, the following areas along watercourses are vulnerable to flooding damage. This flooding occurs due to insufficient culvert sizes at crossings or due to overbank flooding from heavy rainfall. Ice jams have not previously been an issue along watercourses in Stonington.

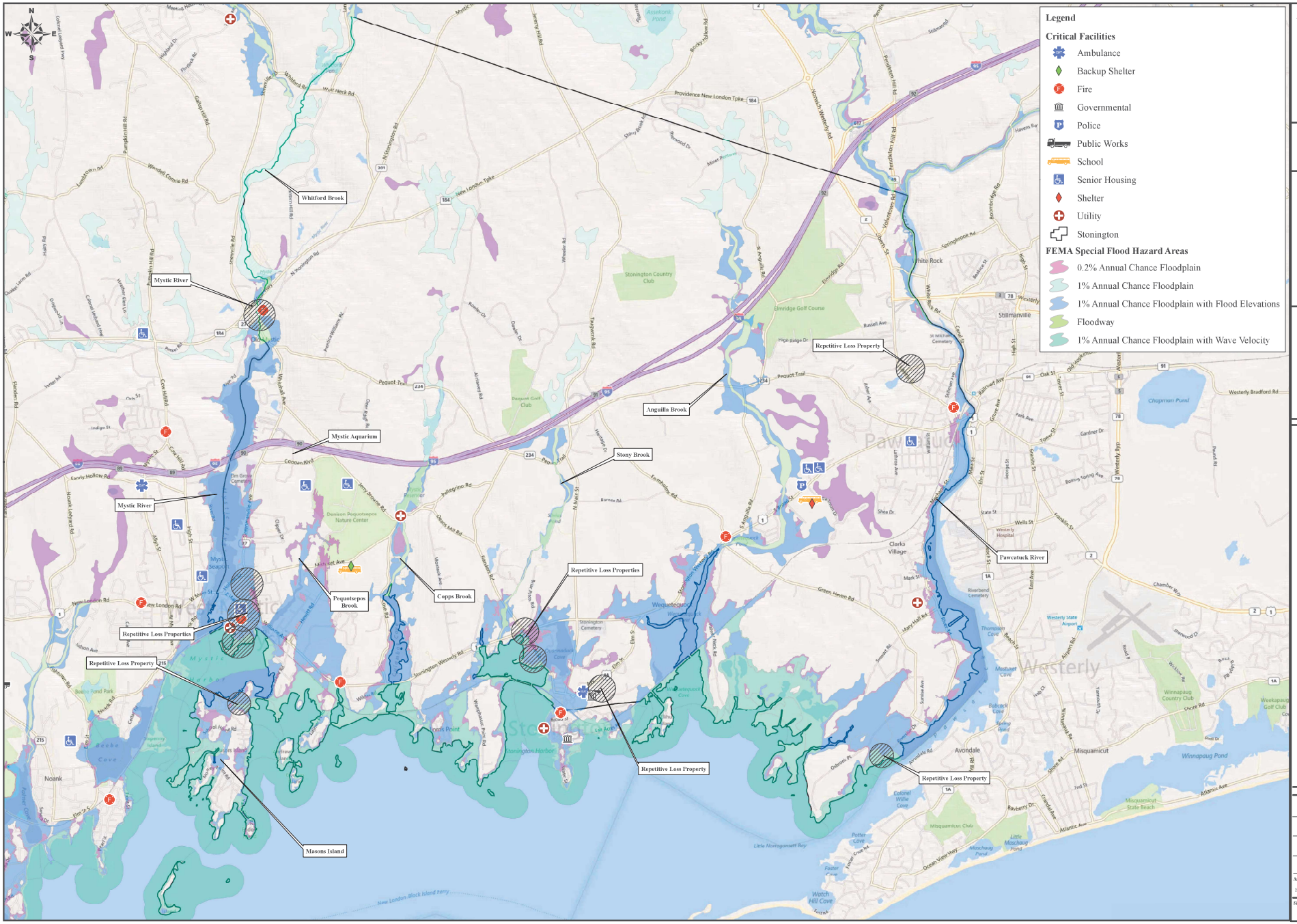
Anguilla Brook

While the upper reaches of Anguilla Brook are generally free from flooding, Anguilla Brook caused flooding of Pequot Trail (Route 234), South Anguilla Road, South Broad Street (Route 1), and at Green Haven Road (just downstream of Wequetequock Pond) during March 2010. In particular, the 2010 storm washed out the bridge at Green Haven Road. Flooding of yards and sometimes structures occurs nearby Green Haven Road each year. Route 1 is also a repeated problem area for flooding and is also overtopped by a small tributary stream to Wequetequock Pond. Anguilla Brook enters Wequetequock Cove downstream of Green Haven Road where it is susceptible to coastal flooding.

Copps Brook

Similar to Anguilla Brook, the majority of the upper reaches of Copps Brook are generally free from flooding with the exception of an unnamed tributary to Copps Brook which occasionally floods Al Harvey Road. Copps Brook overtopped Pequot Trail (Route 234) near the head of the Mystic Reservoir, and the July 2009 flooding also caused damage to the outlet structure and downstream channel from the reservoir as well as damage to the culverts beneath Jerry Browne Road and Mistuxet Avenue. This damage was repaired by Aquarion Water Company in 2011. In addition, Deans Mill Road is located to the east of the Mystic Reservoir and has low areas within the 1% annual chance floodplain.

Further downstream, an unnamed tributary to Copps Brook flooded Mistuxet Avenue in March 2010. Cove Road, the next road downstream, was not affected. Copps Brook enters Quiambog Cove downstream of this area where it is susceptible to coastal flooding.



SOURCE(S):
Town of Stonington, FEMA, Microsoft (basemap)

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REVISIONS

FEMA Special Flood Hazard Areas
SCCOG HMP Update
Town of Stonington Annex
Stonington, Connecticut

SJB	SJB	DM
DESIGNED	DRAWN	CHECKED

SCALE: 1 inch = 2,000 feet

1st VERSION: 7/16/2012
REVISION: 7/16/2012

PROJECT NO: 3570-05

MXD NAME:
H:\3570-05\GIS\Maps\Stonington\Figure3-1.mxd

SHEET:
FIGURE 3-1

Mystic River

Hyde Pond lies at the confluence of Whitford Brook with the Mystic River. The pond is impounded by a small dam that does not protect against flooding. The Mystic River was inundated with floodwaters from Whitford Brook during the March 2010 storms and overtopped the Gold Star Highway (Route 184) washing out the bridge. The river then flows into Old Mystic where several roads are at risk of being inundated by the 1% annual chance flood including North Stonington Road, Lantern Hill Road, Main Street, Route 27, Smith Street, and Haleys Way. The Mystic River enters its tidal portion downstream of Old Mystic where it is susceptible to coastal flooding.

Pawcatuck River

The Pawcatuck River forms the eastern boundary of Stonington with Westerly, Rhode Island. Areas vulnerable to inland flooding lie adjacent to the river from the North Stonington boundary to just downstream of Route 78. Areas downstream of this point can be inundated by both inland and coastal flooding. For example, flooding along the Pawcatuck River reached sufficient stages as to be dangerous such that the Town closed access across the bridge that connects Stillman Avenue in Pawcatuck with Canal Street in Westerly as well as the Route 1 bridge. Fortunately, neither bridge was overtopped by flood waters. Route 78 and White Rock Road also span the river but based on the 2011 FIS both are elevated above the 0.2% annual chance floodplain and thus are not susceptible to overtopping.

Pequotsepos Brook

Pequotsepos Brook does not typically present inland flooding issues. However, the intensity of the 2009 and 2010 storms was sufficient to cause flooding of Mistuxet Avenue, and an unnamed tributary also overtopped Pequotsepos Road. Pequotsepos Brook enters its tidal portion downstream of Mistuxet Avenue where it is susceptible to coastal flooding.

Stony Brook

Similar to other streams in Stonington, the upper reaches of Stony Brook do not typically present issues with flooding. Floodwaters overtopped Pequot Trail (Route 234) during the March 2010 storm. Floodwaters during the July 2009 storm caused the dam at Silvias Pond, an impoundment of Stony Brook, to overtop causing downstream damage as described in Section 10. Flanders Road and Route 1 downstream are also located within the 1% annual chance floodplain of Stony Brook. After passing beneath Route 1, Stony Brook immediately reaches its confluence with Stonington Harbor.

Whitford Brook

Whitford Brook forms the boundary between Stonington and Groton from the North Stonington boundary until its confluence with Hyde Pond. Based on the DFIRM, the 1% annual chance flood has the potential to overtop Wolf Neck Road, Campground Road, and a portion of the Seaport Campground on Campground Road.

Other Small Streams

Several small streams in Stonington also can overtop roadways. An unnamed stream at Collins Road caused extensive damage to the culvert during the March 2010 flood. A small unnamed pond in Pawcatuck between West Vine Street and West Arch Street has caused flooding of West Arch Street near the outlet to the pond as well as minor flooding in the neighborhood between West Arch Street and Garden Street. Some of this problem could be related to poor drainage.

Poor Drainage Flooding

Flooding due to poor drainage occurs throughout Stonington including in coastal areas. One example was provided in Section 3.2 for the overtopping drainage swale near Mistuxet Avenue. Another example from the historic record is the July 1, 2009 thunderstorm that produced poor drainage flooding in downtown Mystic on Route 1 and near the intersection of Washington Street and Broadway Avenue.

Poor drainage flooding is also an issue along Coogan Boulevard and in the parking lot of the Mystic Marinelife Aquarium as noted in the historic record. Drainage systems are believed to be undersized in this area which can cause up to three feet of water to collect in the parking lot and the road. Eventually, this water drains out to the Mystic River. Businesses located north of Interstate 95 near the Aquarium are also subject to flooding from poor drainage.

3.3.2 Vulnerability Analysis of Private Properties

As noted in Table 3-4 of the Multi-Jurisdictional HMP, a total of 1,381 structures in Stonington appear to be located in the 1% annual chance floodplain. A total of 12 are located in Zone A, 25 appear to be located in the Zone AE floodway, and 1,204 are located within Zone AE. A minority of the structures located in Zone AE are vulnerable to inland flooding. The majority of the structures located in Zone AE are susceptible to coastal flooding but not inland flooding, and with some structure susceptible to both flooding sources. The majority of these structures are residential but some commercial and industrial structures are also located in the floodplain.

As noted in the historic record, numerous structures across Stonington experience basement flooding during severe rain events. The majority of these structures are located outside of the 1% annual chance floodplain. Table 3-1 presents areas where private properties are susceptible to inland flooding damage from poor drainage or nearby watercourses.

In some cases, drainage upgrades may eliminate the flooding issue. For example, the industrial area near Jerry Browne Road could benefit from drainage improvements that would allow the area to drain more quickly, and the West Arch Street flooding is likely drainage related. The remaining areas are generally associated with overbank flooding that will require additional effort to mitigate. Areas in Mystic are also susceptible to poor drainage flooding, particularly Washington Street and Denison Road. This area is further described in Section 4.0.

TABLE 3-1
Private Properties Susceptible to Inland Flooding in the Town of Stonington

Flooding Source	Road	Comment
Anguilla Brook	Anguilla Brook Road	Homes in floodplain
	Green Haven Road	Several homes flooded in March 2010
	Pequot Trail	Business in floodplain
	South Broad Street (Route 1)	Homes in floodplain
	Trolley Crossing	Home flooded in March 2010
Copps Brook	Cove Road	Homes in floodplain
	Mistuxet Avenue	Aquarion Water Treatment Plant may be in floodplain / floodway
Mystic River	Main Street (including Route 27)	Homes, businesses in floodplain & floodway
	North Stonington Road	Homes in floodplain
	Smith Street	Homes in floodplain
Pawcatuck River	Coggswell Avenue	Businesses / Industry in floodplain
	Elmata Avenue	Businesses in floodplain
	Mechanic Street	Homes, businesses, industry in floodplain
	Noyes Avenue	Homes in floodplain
	Walnut Street	Homes in floodplain
	West Broad Street	Businesses in floodplain
Poor Drainage	Jerry Browne Road	Industries can flood
Stony Brook	Flanders Road	Homes in floodplain
	Stonington-Westerly Road (Route 1)	Homes in floodplain
Unnamed Pond	West Arch Street / Garden Street	Homes have experienced flooding
Unnamed Stream	Timber Ridge Drive	Homes have experienced flooding
	Liberty Street (Route 2)	Businesses have experienced flooding
White Hall Pond	Whitehall Avenue (Route 27)	The pond has no outlet. Walk-out basements of adjacent condominiums can flood up to two feet of water. The Fire Department has had to pump out the pond in the past.
Whitford Brook	Campground Road	Seaport Campground, businesses, homes

No repetitive loss properties related to inland flooding existed in Stonington at the time of the previous HMP. As of November 2011, four repetitive loss properties related to inland flooding damage were reported in Stonington. These properties lay along Whitford Brook, an unnamed tributary to the Pawcatuck River, a property in Mystic that floods due to poor drainage, and a property located just north of the Borough of Stonington that appears to be flooded due to poor drainage. Damage events are reported in Table 3-2.

TABLE 3-2
Storms Causing Repetitive Loss Damage Claims in Stonington

Repetitive Loss Property	October 2005	July 2009	March 2010
"Mystic"	✓	✓	
"Near Borough"		✓	✓
"Pawcatuck"		✓	✓
"Whitford"	✓		✓*

*Property damaged twice, namely on March 14 and March 30.

The owner of one of the four properties is known to be interested in an acquisition project. In addition, a drainage study is underway to determine the best mitigation option for a submerged drainage system outlet in the Meadow Avenue / Bayview Avenue area. This drainage system reportedly backs up during rain events resulting in damages at one of the repetitive loss properties.

3.3.3 Vulnerability Analysis of Critical Facilities

As noted in Section 2.6, several critical facilities in Stonington are located within the 1% annual chance floodplain including three fire stations, two waste water treatment plants, a water treatment plant, and an elderly housing development. The majority of these facilities are not affected by inland flooding but rather by coastal flooding.

The Deans Mill Water Treatment Plant owned by Aquarion Water Company appears to lie partially within the floodplain and floodway of Copps Brook based on the current DFIRM. However, recent improvements to the plant and the downstream channel may have resulted in this facility being located above the level of the 1% annual chance floodplain. Other critical facilities are located outside of the 1% annual chance floodplain but are also susceptible to flooding. For example, the basement of the Town hall has flooded during severe storms as noted in the historic record.

The Town of Stonington is concerned with several roads that are the only egress into large neighborhoods that are also located within the 1% annual chance floodplain. For example, the vicinity of Route 1 and Long Wharf Road has low spots that can flood due to poor drainage in the nearby wetland or due to coastal flooding. Up to 300 residences in the Bishops Cove neighborhood (including condominiums and single family homes) can become isolated due to the single mode of egress via Long Wharf Road.

3.4 Potential Mitigation Measures, Strategies, and Alternatives

Potential mitigation measures for reducing or eliminating the impact of inland flooding fall into the categories of prevention, property protection, emergency services, public education and awareness, natural resource protection, and structural projects. General potential mitigation measures that can be taken to reduce the effects of inland flooding were discussed in Section 3.7 and in Section 11.2.2 of the Multi-Jurisdictional HMP. General recommendations pertinent to all natural hazards that could affect the town are listed in Section 11 of this annex, as are specific measures pertinent to reducing inland flooding in the Town of Stonington.

4.0 COASTAL FLOODING & SHORELINE CHANGE

4.1 Setting / Historic Record

The shorefront of Stonington primarily contains developed shorefront, modified bluffs and escarpments, rocky shorefronts, islands, and tidal wetlands. Modified beaches and dunes, coastal bluffs and escarpments, and beaches and dunes are also present but are more limited in area. Much of the Mystic River has developed shorefront; the majority of the remaining shoreline of the town consists of rocky shorefront, modified bluffs and escarpments, or tidal wetlands. The largest area of tidal wetlands is within the Barn Island Wildlife Management Area located to the northwest of Pawcatuck Point near the Rhode Island border. This 1,013-acre area is the State's single largest coastal property managed for wildlife conservation. The coastal resources found in Connecticut and described by DEEP are defined in the Multi-Jurisdictional HMP.

Nearby coastal water bodies are defined as estuarine embayments (defined as a protected coastal water body with a direct connection to Long Island Sound), near-shore waters, or offshore waters. Estuarine embayments include the Pawcatuck River, Wequetequock Cove, Stonington Harbor, Quiambog Cove, Mystic Harbor, and the Mystic River.

The mapped islands include inhabited areas such as Masons Island (approximately 400 year-round residents with approximately twice that population in the summer), Andrews Island (two homes), Dodges Island (three homes), Elihu Island (six homes), Enders Island (six structures), and Ram Island (one home). Other smaller islands also exist but are uninhabited.

Homes, businesses, and industry are located in close proximity to the coastline along the majority of the shoreline of Stonington. Structures and infrastructure in the southern section of the town are closer to sea level than in northern areas and are therefore more susceptible to coastal flooding. Hurricanes, tropical storms, and nor'easters have the potential to induce coastal flooding and storm surge that can impact structures. Astronomical high tides can also cause coastal flooding of low-lying areas.

Roadway closures are the most common result of coastal flooding although structures are also affected during moderate events. For example, flooding during Tropical Storm Irene overtopped the causeway to Masons Island, and a minor storm surge and high tide on January 12, 2012 caused flooding in downtown Mystic. Only a few structures are known to have received damage by coastal floodwaters since 2005. However, the Town is concerned with the potential long-term effects of sea level rise and its potential to exacerbate flooding conditions in the future.

4.2 Existing Programs, Policies, and Regulations

The Town primarily attempts to mitigate coastal flood damage and flood hazards by controlling and restricting activities in floodprone areas, encouraging the elevation of homes and roadways, maintaining hard structures in good condition, and providing signage and warning systems. Many of the existing programs, policies, and mitigation measures utilized in the Town for inland flood mitigation (Section 3.2) are also applicable to coastal flood mitigation.

As noted in Section 3.2 and Section 2.5, the Town utilizes the 1% annual chance floodplains delineated by FEMA. These consist of the 1% annual chance floodplain with elevations (Zone AE), and the 1% annual chance floodplain subject to wave velocity (Zone VE) for coastal

flooding areas. As noted by the Zoning Regulations and the Subdivision Regulations, building activities in these areas are restricted and new construction or substantial redevelopment must prove that the lowest horizontal member of the new construction will be above the base flood elevation. The Town requires elevation certificates to certify such work as part of its Community Rating System efforts. The Planning and Zoning Commission, Department of Planning, and the Building Official are all required to review and approve portions of applications that involve structures within FEMA Special Flood Hazard Areas.

The Town has conducted outreach to residents about flood mitigation but most residents are not interested in acquisitions or elevations. As such, the Town has further attempted to streamline restrictions to its regulations through its recent amendments to the Zoning Regulations, Subdivision Regulations and by maintaining its activities with the Community Rating System.

As explained elsewhere in this HMP, the National Weather Service issues a flood watch or a flash flood watch for an area when conditions in or near the area are favorable for a flood or flash flood, respectively. A flash flood watch or flood watch does not necessarily mean that flooding will occur. The National Weather Service issues a flood warning or a flash flood warning for an area when parts of the area are either currently flooding, highly likely to flood, or when flooding is imminent. The Town of Stonington utilizes these warnings and forecasts to prepare emergency responders for flooding events.

The shoreline of Stonington contains many coastal flood control structures. Small, private seawalls and bulkheads can be found in many of the residentially developed coastal neighborhoods such as on Enders Island, Lords Point, and Wamphassuc Point. Larger structures are associated with the breakwaters and seawalls outside of Stonington Harbor and the causeways leading to Masons Island, Enders Island, and Elihu Island. Developed shorefront areas in Mystic also have a variety of natural and manufactured seawalls. Groins and jetties do not appear to be in use in Stonington due to the lack of widespread beach areas. Most of these structures were designed to retain land as well as protect against wave action, but have the secondary effect of reducing coastal erosion.

Like many communities, the Town lacks existing policies and mitigation measures that are specifically designed to address sea level rise, although the 2004 *Plan of Conservation and Development* has taken the first step towards getting the Town thinking about a long term regulatory solution by suggesting water setbacks. Although the Town of Stonington does not currently have a specific plan to address sea level rise, important pieces are in place in the form of the codes and regulations cited in this HMP that have been enacted to minimize storm, erosion, and flood damage.

As noted in Section 1.3, the Town of Stonington is working with The Nature Conservancy on Coastal Resilience planning. Town personnel began mapping potential coastal vulnerabilities in the spring of 2012 and are developing a risk analysis to address sea level rise and developing costs for potential mitigation projects.

4.3 Vulnerabilities and Risk Assessment

This section discusses specific areas at risk to coastal flooding within the Town. This flooding can be the result of astronomical high tides, hurricanes, nor'easters, or storm surge. As shown by the historic record, coastal flooding can impact many roads and neighborhoods, potentially cause

severe damage, and impede transportation in the Town. Refer to Figure 3-1 for a depiction of areas susceptible to coastal flooding, and Figure 4-1 for areas susceptible to storm surge from hurricanes.

Note that *HAZUS-MH*, FEMA's hazard loss estimation software, was utilized to calculate the potential damages to the Town of Stonington from a combined 1% annual chance riverine and coastal flood. Results were presented in Section 3.5.2 of the Multi-Jurisdictional HMP.

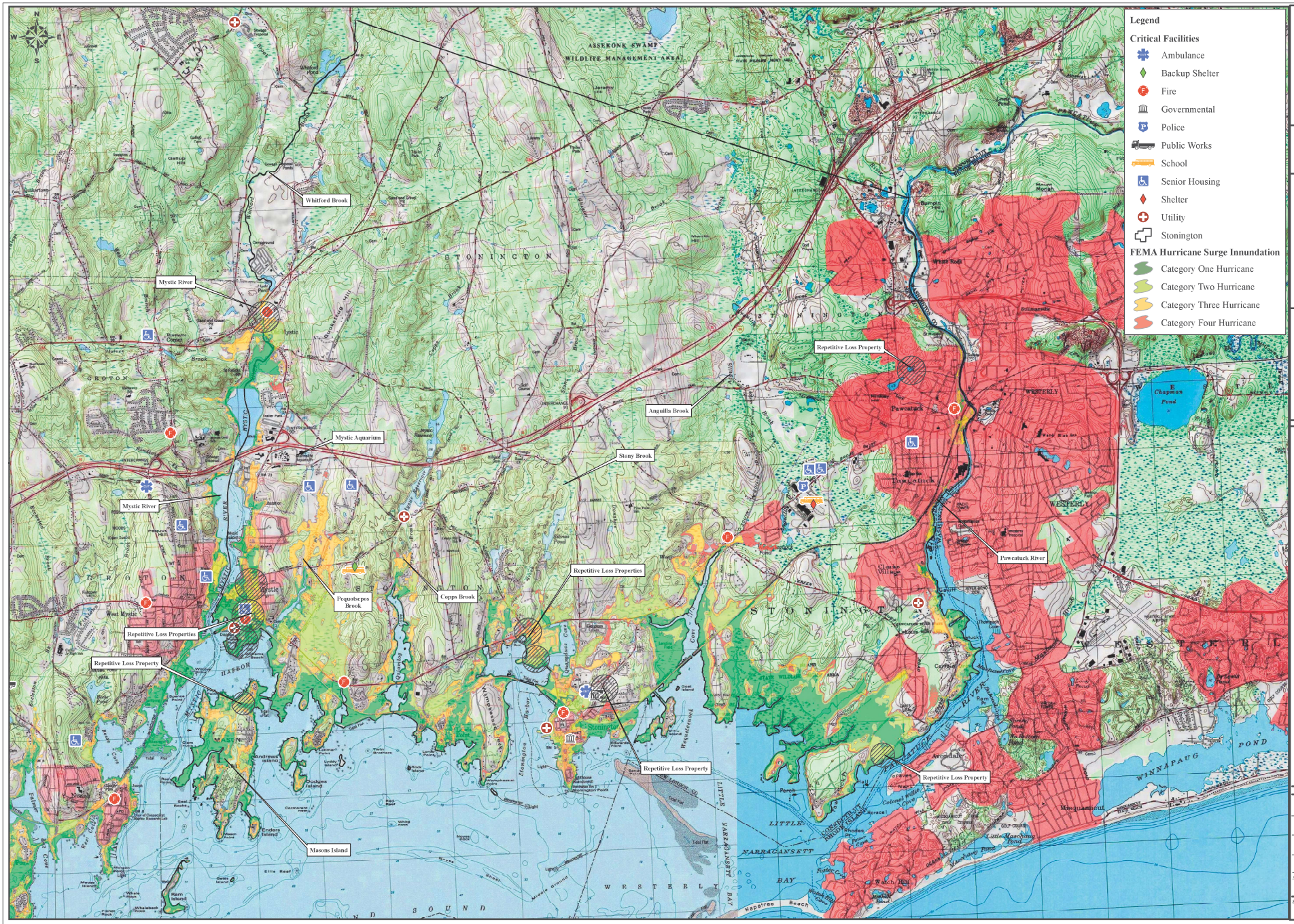
4.3.1 Vulnerability Analysis of Areas along Coastal Waters

The low-lying shoreline areas of the town are subject to periodic flooding. The most severe flooding in Stonington occurs during hurricanes or coastal storms which can occur during any season. Such storms have intense winds and rainfall that can create high tidal surges, wave runoff, and peak runoff to drainage systems where coastal outlets are submerged. Tidally-influenced flooding also occurs along the lower portion of major watercourses including the Mystic River, Pequotsepos Brook, Copps Brook, Stony Brook, Anguilla Brook (Wequetequock Pond), and the Pawcatuck River. FEMA has defined 1% annual chance and 0.2% annual chance floodplains associated with coastal flooding, as well as 1% annual chance floodplains with wave velocity for the Town.

The southern portion of the town is exposed to the wave action from Fishers Island Sound. An additional concern for this area of the Town is that the primary roadways may flood before structures are affected making subsequent evacuation very difficult. The Town of Stonington has identified several important roads that could potentially flood during major storms as presented in Table 4-1. Important roads include major roadways or those that are the only mode of egress into a neighborhood.

TABLE 4-1
Important Roadways at Risk of Overtopping During Coastal Flooding

Road	Road
Chippechaug Trail	River Road
East Main Street (Route 1)	Riverside Drive
Elihu Island Road	Roosevelt Street (Route 1)
Elm Street	Route 1 at Pequotsepos Brook estuary
Greenmanville Avenue (Route 27)	Route 1 at Quannaduck Cove
Latimer Point Road	Route 1 at Quiambog Cove
Main Street (Route 27)	Route 1 at Lamberts Cove
Masons Island Road	Route 1 near Long Wharf Drive
North Water Street	Wamphassuc Point Road
Osbrook Point Road	Yacht Club Road



SOURCE(S):
Town of Stonington, FEMA,
USGS Topographic Map (via ESRI)

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REVISIONS

FEMA Hurricane Surge Zones
SCCOG HMP Update
Town of Stonington Annex
Stonington, Connecticut

SJB DESIGNED	SJB DRAWN	DM CHECKED

SCALE: 1 inch = 2,000 feet

1st VERSION: 7/16/2012
REVISION: 7/16/2012

PROJECT NO: 3570-05

MXD NAME:
H:\3570-05\GIS\Maps\Stonington\Figure4-1.mxd

SHEET:
FIGURE 4-1

The Masons Island Road causeway is a particular area of concern as it can be overtopped by a moderate coastal flood event and is the only mode of egress for 400 to 800 people on Masons Island and Enders Island. In addition, the Amtrak-Metro North railroad can be overtopped by storm surge in several areas by a Category Two hurricane (except for a small area between Matthews Street and Cutler Street near the Borough which can be overtopped by storm surge from a Category One hurricane). Other roads that provide access to coastal structures are also located in the 1% annual chance coastal floodplain as described in Section 4.3.2.

As shown on Figure 4-1, areas of storm surge are generally coincident with the areas of coastal flooding described above. In general, a Category Two Hurricane is expected to produce storm surges that are equivalent to the 1% annual chance flood event, while a Category Three Hurricane is expected to approximate the 0.2% annual chance flood event. A Category Four Hurricane would affect additional areas, while a Category One Hurricane is expected to only impact low-lying coastal areas. Areas potentially affected by storm surge from a Category One Hurricane include significant portions of downtown Mystic, Masons Island, Lords Point, and low-lying areas adjacent of the Pawcatuck River as well as smaller portions of other coastal areas.

In general, it is assumed that as sea level rises, the frequency and magnitude of coastal flooding in the Town will increase with structures and roadways closest to existing sea level being affected more quickly. In addition, tidal marsh areas located in Mystic, Old Mystic, north of Latimer Point, at Lords Point, west of Wequetequock Cove, and at Barn Island State Wildlife Management Area will either migrate inland or be eroded by constant inundation.

Aside from the tidal marshes, coastal erosion is generally not a serious issue in Stonington since the majority of the shorefront is either developed (particularly along the Mystic River), rocky shorefronts consisting of stones and boulders, or modified bluffs and escarpments consisting of seawalls, bulkheads, or revetments. The minor beach and some tidal wetland areas are susceptible to coastal erosion but are generally protected from direct wave action by local islands, Sandy Point, and Napatree Point. However, as sea level rises, the effectiveness of these structures will be undermined such that erosion will be able to occur.

4.3.2 Vulnerability Analysis of Private Properties

The coastal areas of the Town of Stonington have properties that are inhabited year-round. This intensifies risk to life and property in coastal areas. Waterfront properties are very susceptible to damage, not only as a result of flooding but also due to the velocity zones located along the Stonington's shoreline. Shoreline erosion is a relatively minor concern for private property owners at this point in time since most have seawalls or rocky shorefront protecting their structures.

Buildings located in flood hazard areas are primarily residential but also include some commercial, industrial, and critical facility structures. Most of the structures that are threatened by flooding are located within the 1% annual chance floodplain, but some are also in the coastal velocity zone. Location in the velocity zone poses an increased threat to structures due to high wind and potential wave damage, as well as inundation by flood waters. Other areas located more inland or behind protective seawalls are only subject to coastal flooding without wave action.

The above is particularly true in Mystic where nearly the entire area is located within the 1% annual chance floodplain. Businesses located in the floodplain include many shops, restaurants, marinas, and hotels in the downtown area, with residences located on side streets and areas set slightly away from downtown. The roads that service such properties are also susceptible to damage or drainage system failures that exacerbate flooding conditions. For example, in addition to being low-lying, many drainage system outlets in Mystic are located below the high tide line. As such, during high tides sea water backs up into the drainage system which can cause flooding of Washington Street and Holmes Street. In addition, portions of Route 27 can flood which isolates neighborhoods in the Clipper Drive area. A system of dikes and pumping stations may be the only possible solution for resolving long-term flooding issues in very low areas that are as densely developed as downtown Mystic.

Commercial and industrial areas along the Pawcatuck River are also susceptible to coastal flooding, although a large area on Mechanic Street is protected from storm surge by the levee system (see Section 3.2).

Floodprone residences are located throughout the coastal areas of Stonington. As noted in Table 3-4 of the Multi-Jurisdictional HMP, a total of 1,381 homes appear to be located within the 1% annual chance floodplain in Stonington. A total of 140 of these properties are located within Zone VE, and nearly 1,000 properties are located within Zone AE that are vulnerable to coastal flooding. The most concentrated development in floodplains occurs in Mystic, east of the Pequotsepos Brook estuary, at Lords Point, north of the Borough, in Wequetequock in the vicinity of Route 1, and on Riverside Drive. Areas with relatively fewer floodprone homes include Latimer Point and Masons Island. Areas located in the coastal velocity zone are believed to be particularly at risk. Table 4-2 presents roadways with nearby structures located within the 100-year coastal floodplain that is subject to wave velocity in Stonington. The majority of structures in Stonington that are located in the floodplain are located in Zone AE but for brevity are not listed here.

Historically, Lords Point has experienced the most damage from coastal flooding caused by hurricanes in the town. Lords Point is a small private community with an average summer population of about 800 people and over 200 homes and summer cottages. The majority of the homes are located in the 1% annual chance coastal floodplain. Approximately 46 homes are located in Zone VE with the majority of the remaining homes are located in Zone AE. In addition, the majority of the area would be inundated by storm surge caused by a Category Two hurricane, and many homes would be affected by storm surge associated with a Category One hurricane. A flood control project was proposed for this area including sand fill, diking along the rocky portions of the shore, and tieback dikes to higher ground. However, no flood protection structures have been completed to date in this private community. Town officials have also expressed an interest in performing structural elevations in this area if property owners are interested.

TABLE 4-2
Roads Near Structures Located in Zone VE

Road	Road
Alley Way	Oak Street
Andrews Road	Osbrook Point Road
Boulder Avenue	Quarry Path
Chippechaug Trail	Ram Point Road
East Forest Road	Riverside Drive
Elihu Island Road	Roseleah Drive
Gled Hill Street	School House Road
Harbor View Terrace	Shore Drive
Hill Avenue	Skiff Lane
James Street	Skipper Street
Jerome Avenue	Solon Avenue
Joy Avenue	Stafford Street
Lamberts Lane	Sylvia Avenue
Lindberg Road	Walnut Street
Masons Island Road	Water Street
North Water Street	Wilcox Road
Noyes Avenue	Yacht Club Road

At the time of the previous HMP, two repetitive loss properties existed in the Town of Stonington related to coastal areas. Since that time, five additional repetitive loss properties related to coastal flooding have been identified in the town. These repetitive loss properties are located near the Mystic River (two), Mystic Harbor (two), Stonington Harbor (two), and the Pawcatuck River as noted in Table 4-3. Five of the repetitive loss properties are single family homes with the remaining two which containing businesses. Since the majority of these properties were damaged during known heavy rainfall events, it is assumed low-lying topography and poor drainage near the coastline contributes to flooding at these properties.

TABLE 4-3
Storms Causing Repetitive Loss Damage Claims in Stonington

Repetitive Loss Property	October 2005	July 2009	March 2010
"Mystic River #1"	✓	✓	
"Mystic River #2" (Note 1)			
"Mystic Harbor #1"	✓		✓
"Mystic Harbor #2" (Note 2)			
"Stonington Harbor #1"		✓	✓
"Stonington Harbor #2"		✓	✓
"Pawcatuck River"	✓	✓	✓

1. This property reported damages in 1999 (Tropical Storm Floyd) and 1996.
2. This property reported damages twice in 1991, and once in 1987, 1985 (Hurricane Gloria), and 1978. Based on aerial photos, it appears the property owner installed a small floodwall around the home which may have mitigated flooding events since 1991.

As stated previously, coastal flooding is a particular concern in the town because these areas are low-lying and existing drainage systems do not operate effectively. The Town recognizes that many private properties may suffer coastal flood damage that is not reported because the structures are not insured under the NFIP, or because they choose to not report the damage. These residents and business owners are likely repairing structures on their own. Coastal flood mitigation as recommended in this HMP will likely assist many of these property owners. The Town of Stonington is interested in all forms of flood mitigation, including acquisitions, elevations, drainage upgrades, and other structural projects provided property owners are interested and funding is available.

The Town of Stonington has no formalized program currently in place to identify the location or the number of structures that are susceptible to flooding. Such information would be valuable in directing hazard mitigation efforts to locations with the greatest risk. Town planning staff should use the recently released DFIRM to identify the approximately 1,381 structures in the town that are located in the 1% annual chance floodplain (with or without wave velocity). This could provide a list of areas to inspect following a storm event and allow for the town to track building permits from repairs following a natural hazard. This information, in turn, would provide supporting data for future grant applications.

4.3.3 Vulnerability Analysis of Critical Facilities

As noted in Section 2.6 and shown on Figure 4-1, several critical facilities in Stonington are located within the 1% annual chance floodplain including three fire stations, two waste water treatment plants, and an elderly housing development. The same facilities and one additional fire station are also located in hurricane surge zones. For example, Apple Rehabilitation in Mystic is vulnerable to storm surge from a Category Two hurricane.

The Mystic Fire Department and the Quiambog Fire Department are susceptible to storm surge from a Category Two hurricane, while the Old Mystic Fire Department and the Borough Fire Department are only susceptible to flooding from a Category Three hurricane. As noted in Section 2.6, only the Borough fire station is known to have specific mitigation measures installed to resist flooding.

The wastewater treatment facility in Mystic is not vulnerable to wave velocity but would be inundated by storm surge from a Category One hurricane. The wastewater treatment facility in the Borough is vulnerable to wave velocity but is partially protected by a sea wall. This facility is vulnerable to storm surge from a Category Two hurricane. It is understood that if the water level rose high enough either of the wastewater treatment facilities would be rendered inoperable.

Storm surge flooding can also hinder emergency response, particular in low-lying roads located along the coastline. For example, the causeway on Masons Island Road is a particular concern for emergency personnel because it is the only mode of egress to the mainland for a large number of residents (approximately 400). The timing of evacuations from the southern part of the town prior to a hurricane event is therefore very important as the majority of the roads in this area will be flooded or washed out by a major hurricane.

4.4 Potential Mitigation Measures, Strategies, and Alternatives

Potential mitigation measures for reducing or eliminating the impact of coastal flooding and sea level rise fall into the categories of prevention, property protection, emergency services, public education and awareness, natural resource protection, and structural projects. General potential mitigation measures that can be taken to reduce the effects of coastal flooding were discussed in Section 4.7 and in Section 11.2.2 of the Multi-Jurisdictional HMP. General recommendations pertinent to all natural hazards that could affect the town are listed in Section 11 of this annex, as are specific measures pertinent to reducing inland flooding in Stonington.

5.0 HURRICANES AND TROPICAL STORMS

5.1 Setting / Historic Record

Several types of hazards may be associated with tropical storms and hurricanes including heavy or tornado winds, heavy rains, and flooding. Flooding and storm surge hazards are discussed in Section 3 and Section 4 of this annex. Wind hazards are widespread and can affect any part of the town. However, some buildings and areas in the town are more susceptible to wind damage than others.

The last major hurricane or tropical storm wind event to affect the town was associated with Tropical Storm Irene in August 2011. Trees fell throughout the town and the region, causing power outages that on average lasted five days. Some areas were out for as many as eight days including several town facilities that were operated with generators. Debris removal took a few weeks to complete because a significant number of trees were damaged.

5.2 Existing Programs, Policies, and Mitigation Measures

Wind loading requirements for new buildings are addressed through the Connecticut Building Code which is utilized by the Town. Effective December 31, 2005, the design wind speed for the Town of Stonington is 120 miles per hour for areas south of Route 184, and 115 miles per hour for all other areas. Town personnel note that recent buildings all meet the building code for wind loading.

Parts of trees (limbs) or entire tall and older trees may fall during heavy wind events, potentially damaging structures, utility lines, and vehicles. The town receives electrical service from Connecticut Light & Power who has an active tree pruning program. In the case of an extended power outage, residents would be directed to the shelter at Stonington High School or Mystic Middle School.

The Town requires that new developments or substantial redevelopment in Special Permit areas must locate utilities underground and that utilities must be protected from flooding damage. The Town also encourages that utilities be placed underground for all new developments. However, utility lines are located underground in only a few areas of the town. While the Town of Stonington would be interested in placing utilities underground, such activities would need to be localized and combined with private projects since the Town does not own any of the overhead utilities. For example, Town officials noted that a streetscape project on the Groton side of Mystic will include underground utilities. The Town would need to work with Connecticut Light & Power and acquire grant funding to complete any large-scale utility relocation project since it would be very expensive.

The Town has a volunteer Tree Warden who can post notification and schedule tree removal for damaged or dangerous trees located in rights-of-way or on Town land. The Highway Department also monitors trees as part of their normal rounds and has a budget for minor tree maintenance. For example, the Town recently removed 34 trees on North Main Street that were considered hazardous. The Town hires outside contractors for larger jobs such as tree removal. The Town does anything possible to ensure that dangerous trees and debris are cleaned up following a storm. For example, a commercial building in Town was damaged by winds from Tropical Storm Irene

and the property owner refused to clean up or repair the damage. The Town placed a lien on the building to remove the debris, and the property is now abandoned.

Warning is one of the best ways to prevent damage from hurricanes and tropical storms, as these storms often are tracked well in advance of reaching Connecticut. The Town can access National Weather Service forecasts via the internet as well as listen to local media outlets (television, radio) to receive information about the relative strength of the approaching storm. This information allows the Town to activate its EOP and encourage residents to take protective or evacuation measures if appropriate. During Tropical Storm Irene, a voluntary evacuation notice was issued for the town, and many people heeded the evacuation and moved inland.

The Town also has links regarding hurricane preparedness and disaster preparedness on the Emergency Management webpage on its website. Links are provided to NOAA, the CT Alert "Everbridge" Reverse 9-1-1 system, a copy of the local hurricane inundation map, and the Special Needs Registry. Residents are encouraged to sign up for the Special Needs Registry if they need specific assistance during an emergency situation. The Public Works webpage on the Town website also has guidelines and advice for residents who wish to hire tree contractors.

Prior to severe storm events, the Town ensures that warning/notification systems and communication equipment are working properly and prepares for the possible evacuation of impacted areas. The Town also participates in Mock Hurricane Exercises to prepare for such events. The statewide CT "Everbridge" Reverse 9-1-1 system can be utilized to warn coastal residents of an impending evacuation. Although hurricanes that have impacted the Town have historically passed in a day's time, coordination with the Borough of Stonington is important since many Borough residents will be utilizing the Town's shelters, and one of the Town's fire districts is also shared with the Borough. Additional shelters could be outfitted following a storm with the assistance of the American Red Cross on an as-need basis for long-term evacuees.

5.3 Vulnerabilities and Risk Assessment

The entire town is vulnerable to hurricane and tropical storm wind damage and from any tornadoes (Section 6) accompanying the storm, as well as inland flooding (Section 3) and coastal flooding and storm surge (Section 4). Of particular concern are the blockage of roads and the damage to the electrical power supply from falling trees and tree limbs. The town is also susceptible to damage occurring in other areas damaging the electrical supply as occurred following Tropical Storm Irene.

Direct wind damage to newer buildings from hurricane or tropical storm-level winds is rare in the town since the new buildings were constructed to meet or exceed current building codes. Many buildings in the town are greater than 50 years old and do not meet current building codes. Older buildings in the town are particularly susceptible to roof and window damage from high wind events, although this risk will be reduced with time as these buildings are remodeled or replaced with buildings that meet current codes. For example, many homes have been renovated recently and some property owners have installed shutters and other wind mitigation measures.

Stonington has a diverse housing stock with many rental properties, several mobile home parks, and campgrounds. These areas are also at particular risk of damage during a hurricane or tropical storm because rental properties are not owner-occupied and therefore may not be properly maintained, and because mobile home parks and recreational vehicles are not as structurally

sound as permanent buildings. Fortunately, recreational vehicles in such campgrounds can be evacuated relatively easily given the usually long lead time prior to a hurricane or tropical storm event. Mobile home parks often have structures that are difficult to relocate such that these areas require an additional level or effort to inform the public about shelters and evacuation prior to a hurricane or tropical storm event.

The strength of a large hurricane could cause a significant economic impact to the town. The potential economic effect of wind damage to SCCOG was evaluated in the Multi-Jurisdictional HMP. A separate analysis was not performed specifically for the Town of Stonington.

5.4 Potential Mitigation Measures, Strategies, and Alternatives

Potential mitigation measures for reducing or eliminating the impact of wind damage fall into the categories of prevention, property protection, emergency services, public education and awareness, natural resource protection, and structural projects. General potential mitigation measures that can be taken to reduce the effects of wind damage from hurricanes and tropical storms were discussed in Section 5.7 and in Section 11.2.3 of the Multi-Jurisdictional HMP. General recommendations pertinent to all hazards that could affect the town are listed in Section 11 of this annex, as are specific measures pertinent to reducing wind damage to the Town of Stonington.

6.0 SUMMER STORMS AND TORNADOES

6.1 Setting / Historic Record

Similar to hurricanes and winter storms, wind damage associated with summer storms and tornadoes has the potential to affect any area of the town. Furthermore, because these types of storms and the hazards that result (flash flooding, wind, hail, and lightning) might have limited geographic extent, it is possible for a summer storm to harm one area within the town without harming another. Such storms occur in the town each year, although hail and direct lightning strikes to the town are rarer. For example, the NCDC reported that the July 1, 2009 thunderstorms produced lightning that struck several houses in Stonington resulting in minor house fires. No tornadoes have occurred in the town since the last HMP.

6.2 Existing Programs, Policies, and Mitigation Measures

Warning is the most viable and therefore the primary method of existing mitigation for tornadoes and thunderstorm-related hazards. The NOAA National Weather Service issues watches and warnings when severe weather is likely to develop or has developed, respectively. The Town can access National Weather Service forecasts via the internet as well as listen to local media outlets (television, radio) to receive information about the relative strength of the approaching storm. This information allows the Town to activate its EOP and encourage residents to take protective measures if appropriate.

Aside from warnings, several other methods of mitigation for wind damage are employed by the Town as explained in Section 5.2 within the context of hurricanes and tropical storms. In addition, the Connecticut Building Code includes guidelines for the proper grounding of buildings and electrical boxes to protect against lightning damage.

6.3 Vulnerabilities and Risk Assessment

Summer storms are expected to occur each year and are expected to at times produce heavy winds, heavy rainfall, lightning, and hail. All areas of the town are equally likely to experience the effects of summer storms. The density of damage is expected to be greater near the more densely populated sections of the town.

Most thunderstorm damage is caused by straight-line winds exceeding 100 mph. Experience has generally shown that wind in excess of 50 miles per hour (mph) will cause significant tree damage during the summer season as the effects of wind on trees is exacerbated when the trees are in full leaf. The damage to buildings and overhead utilities due to downed trees has historically been the biggest problem associated with wind storms. Heavy winds can take down trees near power lines, leading to the start and spread of fires. Such fires can be extremely dangerous during the summer months during dry and drought conditions. Fortunately, most fires are quickly extinguished due to the Town's strong fire response.

Lightning and hail are generally associated with severe thunderstorms and can produce damaging effects. All areas of the town are equally susceptible to damage from lightning and hail, although lightning damage is typically mitigated by warnings and proper grounding of buildings and equipment. Hail is primarily mitigated by warning, although vehicles and watercraft can often not be secured prior to the relatively sudden onset of a hailstorm. Lightning and hail are

considered likely events each year, but typically cause limited damage in the town. Older buildings are most susceptible to lightning and hail damage since they were constructed prior to current building codes.

Although tornadoes pose a threat to all areas of Connecticut, their occurrence is least frequent in New London County as compared with the rest of the State. Thus, while the possibility of a tornado striking the town exists, it is considered to be an event with a very low probability of occurrence.

6.4 Potential Mitigation Measures, Strategies, and Alternatives

General potential mitigation measures that can be taken to reduce the effects of wind damage were discussed in Section 5.7 and in Section 11.2.3 of the Multi-Jurisdictional HMP. No additional recommendations are available specific to reducing damage from summer storms and tornadoes. Refer to Section 11 of this annex for recommendations related to wind damage and general recommendations related to emergency services.

7.0 WINTER STORMS AND NOR'EASTERS

7.1 Setting / Historic Record

Similar to hurricanes and summer storms, winter storms have the potential to affect any area of the town. However, unlike summer storms, winter storms and the hazards that result (wind, snow, and ice) have more widespread geographic extent. In general, winter storms are considered highly likely to occur each year (major storms are less frequent), and the hazards that result (nor'easter winds, snow, and blizzard conditions) can potentially have a significant effect over a large area of the town.

Winter storms and nor'easters have affected the town since the last HMP, with the storms occurring in the winter of 2010-2011 having the most significant effect. For example, one business (Connecticut Castings) was known to have a roof collapse in January 2011.

7.2 Existing Programs, Policies, and Mitigation Measures

Existing programs applicable to winter storm winds are the same as those discussed in Sections 5.2 and 6.2. Programs that are specific to winter storms are generally those related to preparing plows and sand and salt trucks; tree trimming and maintenance to protect power lines, roads, and structures; and other associated snow removal and response preparations.

As it is almost guaranteed that winter storms will occur annually in Connecticut, it is important to locally budget fiscal resources toward snow management. Snow is the most common natural hazard requiring additional overtime effort from Town staff, as parking lots and roadways need constant maintenance during storms. This is particularly important in Mystic and Pawcatuck where off-street parking is sometimes unavailable.

The Public Works Department oversees snow removal in the town. Salt and sand is stored at the Town of Stonington Public Works facility. The Town has established 16 plowing routes and 11 salt routes that prioritize access to and from critical facilities. Plows are diverted to address emergency service needs whenever necessary. The Connecticut Department of Transportation plows the State roads in the town.

The Connecticut Building Code specifies that a pressure of 30 pounds per square foot be used as the base "ground snow load" for computing snow loading for roofs. The Town did not experience significant snow load problems at its buildings during the winter of 2010-2011, although the Town checked its flat-roofed buildings and the school system followed its evaluation / inspection procedure that they have in place. Some residents shoveled roofs and at least one business had a roof collapse as noted in the historic record.

7.3 Vulnerabilities and Risk Assessment

Severe winter storms can produce an array of hazardous weather conditions, including heavy snow, blizzards, freezing rain and ice pellets, flooding, heavy winds, and extreme cold. Further "flood" damage could be caused by flooding from frozen water pipes. Often, tree limbs on roadways are not suited to withstand high wind and snow or ice loads.

This section focuses on those effects commonly associated with winter storms, including those from blizzards, ice storms, heavy snow, freezing rain, and extreme cold. Warning and education can prevent most injuries from winter storms. This is particularly important as the town includes many residents who are elderly and additional elderly developments are proposed. Most deaths from winter storms are indirectly related to the storm, such as from traffic accidents on icy roads and hypothermia from prolonged exposure to cold. Damage to trees and tree limbs and the resultant downing of utility cables are a common effect of these types of events. Secondary effects can include loss of power and heat.

The majority of buildings in the town are recently constructed and therefore not susceptible to damage from heavy snow. While some Town buildings could be susceptible to heavy snow loads, they will be cleared quickly if safety is a concern. Some buildings in the town have flat roofs which are more susceptible to damage from heavy snow than sloped roofs.

Icing is not a significant issue in the town. In general, there are few steep slopes such that extra sanding and salting of the roadways in necessary locations alleviates any trouble spots.

7.4 Potential Mitigation Measures, Strategies, and Alternatives

Potential mitigation measures for flooding caused by nor'easters include those appropriate for flooding that were discussed in Section 3.7 and Section 4.7 of the Multi-Jurisdictional HMP and Section 11 of this annex. General potential mitigation measures that can be taken to reduce the effects of wind damage were discussed in Section 5.7 and in Section 11.2.3 of the Multi-Jurisdictional HMP and Section 11 of this annex. However, winter storm mitigation measures must also address blizzards, snow, and ice hazards. These were discussed in Section 7.7 and Section 11.2.4 of the Multi-Jurisdictional HMP and Section 11 of this annex.

8.0 EARTHQUAKES

8.1 Setting / Historic Record

An earthquake is a sudden rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. Earthquakes can cause buildings and bridges to collapse; disrupt gas, electric, and telephone lines; and often cause landslides, flash floods, fires, avalanches, and tsunamis. Earthquakes can occur at any time and often without warning. Detailed descriptions of earthquakes, scales, and effects can be found in Section 8 of the Multi-Jurisdictional HMP. Despite the low probability of an earthquake occurrence, earthquake damage presents a potentially catastrophic hazard to the town. However, it is very unlikely that the town would be at the epicenter of such a damaging earthquake. No major earthquakes have affected the town since the last HMP.

8.2 Existing Programs, Policies, and Mitigation Measures

The Connecticut Building Codes include design criteria for buildings specific to each region as adopted by Building Officials and Code Administrators (BOCA). These include the seismic coefficients for building design in the Town of Stonington. The Town has adopted these codes for new construction, and they are enforced by the Building Official.

Due to the infrequent nature of damaging earthquakes, Town land use policies do not directly address earthquake hazards. However, the potential for an earthquake and emergency response procedures is addressed in the Town's EOP.

8.3 Vulnerabilities and Risk Assessment

Surficial earth materials behave differently in response to seismic activity. Unconsolidated materials such as sand and artificial fill can amplify the shaking associated with an earthquake. As noted in Section 2.1, a several areas of the town (particularly near watercourses) are underlain by stratified drift. These areas are potentially more at risk for earthquake damage than the areas of the town underlain by glacial till. The best mitigation for future development in areas of sandy material is the application of the most stringent standards in the Connecticut Building Code, exceeding the building code requirements, or, if the Town deems necessary, the possible prohibition of new construction. The areas that are not at increased risk during an earthquake due to unstable soils are the areas underlain by glacial till.

An inactive fault has been mapped along the western boundary of the town. Unlike seismic activity in California, earthquakes in Connecticut are not associated with specific known active faults. However, bedrock in Connecticut and New England in general is typically formed from relatively hard metamorphic rock that is highly capable of transmitting seismic energy over great distances. For example, the relatively strong earthquake that occurred recently in Virginia was felt in Connecticut because the energy was transmitted over a great distance through such hard bedrock.

The built environment in the town primarily includes some more recent construction that is seismically designed. However, most buildings were built before the 1970's and therefore are not built to current building codes. Thus, it is believed that most buildings would be at least

moderately damaged by a significant earthquake. Those residents who live or work in older, non-reinforced masonry buildings are at the highest risk for experiencing earthquake damage.

Areas of steep slopes can collapse during an earthquake, creating landslides. The town has several areas with steep slopes greater than 15% in the vicinity of Old Mystic, southeast of Mystic Reservoir, and located sporadically throughout the remainder of the town. Thus, landslides are not a particular concern in the town, but these areas could be vulnerable to landslide damage during a major earthquake.

Seismic activity can also break utility lines such as water mains, gas mains, electric and telephone lines, and stormwater management systems. Damage to utility lines can lead to fires, especially in electric and gas mains. Dam failure can also pose a significant threat to developed areas during an earthquake. For this HMP, dam failure has been addressed separately in Section 10.0. As noted previously, most utility infrastructure in the town is located above ground. A quick and coordinated response with Connecticut Light & Power and other utilities will be necessary to inspect damaged utilities following an earthquake, to isolate damaged areas, and to bring backup systems online. This is covered in the EOPs for these entities.

A *HAZUS-MH* analysis of the potential economic and societal impacts to the SCCOG region from earthquake damage is detailed in the Multi-Jurisdictional HMP. The analysis addresses a range of potential impacts from any earthquake scenario, estimated damage to buildings by building type, potential damage to utilities and infrastructure, predicted sheltering requirements , estimated casualties, and total estimated losses and direct economic impact that may result from various earthquake scenarios.

8.4 Potential Mitigation Measures, Strategies, and Alternatives

Due to the low probability of occurrence, potential mitigation measures related to earthquake damage primarily include adherence to building codes and emergency response services. Both of these are mitigation measures common to all hazards as noted in Section 11 of this annex. The Multi-Jurisdictional HMP also includes additional recommendations for mitigating the effects of earthquakes that are also listed in Section 11.

9.0 WILDFIRES

9.1 Setting / Historic Record

Wildfires are considered to be highly destructive, uncontrollable fires. The most common causes of wildfires are arson, lightning strikes, and fires started from downed trees hitting electrical lines. Thus, wildfires have the potential to occur anywhere and at any time in both undeveloped and lightly developed areas of the town. However, the town has strong fire coverage through six fire districts and therefore does not typically experience major wildfires.

The last major wildfire occurred in the late 1990s when 300 acres burned in the reserve located north of the Barn Island Wildlife Sanctuary. The area of the blaze reached from Palmer Neck Road to Stewart Road to the landfill across Green Haven Road and even crossed the railroad tracks. The blaze required four days to extinguish and required equipment from all six fire districts and the State to contain. Structural fires in higher density areas of the town are a larger concern for the Town, although these are not directly addressed herein.

9.2 Existing Programs, Policies, and Mitigation Measures

Monitoring of potential fire conditions is an important part of mitigation. The Connecticut DEEP Forestry Division uses the rainfall data recorded by the Automated Flood Warning system to compile forest fire probability forecasts. This allows the DEEP to monitor drier areas to be prepared for forest fire conditions. The Town can access this information over the internet. The Town also receives "Red Flag" warnings via local media outlets.

Existing mitigation for wildland fire control is typically focused on building codes, public education, Fire Department training, and maintaining an adequate supply of equipment. The Town Fire Departments have strong inter-municipal cooperation agreements with other municipalities to fight wildfires and structure fires. Fire protection water is obtained from the public water systems owned and maintained by the Aquarion Water Company and the Westerly Water Department. Aquarion provides water in Old Mystic, Mystic, Lords Point, and the vicinity of the Borough, while Westerly provides water to Pawcatuck and the eastern portion of Wequetequock. These water companies test fire flows regularly and informs the fire departments of the pressure available.

A large area of town (primarily the north-central area) is not serviced by public water service. Fire fighters responding to these areas rely on tanker trucks and drafting of surface water sources to provide fire protection water. While the 2004 *Plan of Conservation and Development* encourages the installation of dry hydrants, fire ponds, and cisterns in these outlying areas, Town emergency personnel discourage their use in new developments because of the maintenance involved. Instead, the Town prefers to rely on its large tanker trucks to fight fires in outlying areas. The Town goes to the fires as quickly as possible and has good access to most areas for fire-fighting.

The level of fire protection afforded by the existing public water service and tanker trucks in outlying areas is considered to be adequate for the development level of the Town. The Fire Department will continue to evaluate the level of risk and the need for additional public water system hydrants or other water sources in the future.

9.3 Vulnerabilities and Risk Assessment

Stonington has a mix of densely developed areas (Mystic, Pawcatuck), relatively developed areas (Old Mystic, Masons Island, Lords Point), and rural areas such as Wequetequock and the north-central areas of the town. The most vulnerable areas for a wildfire include the Barn Island Management Area and the surrounding area that burned in the late 1990s. Fortunately, public water service is available along Green Haven Road which would provide a steady supply of firefighting water to the area, although access south of Green Haven Road is still difficult due to the undeveloped nature of the area. This area is considered to be at moderate risk for a major wildfire occurrence.

The north-central area of Stonington is relatively rural and does not have public water service. Fire protection in this area is achieved through the use of large tanker trucks quickly bringing water to the site of a fire. The Fire Departments can also draft water from nearby streams, swamps, and ponds. Due to the necessity of transporting water, this area is considered to be at moderate risk for minor wildfires. Access to these areas is generally better than near the Barn Island Management Area since there are many utility easements and north-south roadways that can provide access to fire areas.

Another area that may be vulnerable to wildfires is the Lords Point area. While this area has public water service, a significant amount of *phragmites* vegetation is located east of the developed area. Fortunately, no major wildfires have occurred in this area. The remaining areas of the town that are located nearby water sources are considered to be a low-risk area for wildfires. Refer to Figure 9-1 in the Multi-Jurisdictional HMP for a general depiction of wildfire risk areas within Stonington.

9.4 Potential Mitigation Measures, Strategies, and Alternatives

The Town of Stonington is a low- to moderate-risk area for wildfires. Potential mitigation measures for wildfires include a combination of prevention, education, and emergency planning measures as presented in Section 11.

10.0 DAM FAILURE

10.1 Setting / Historic Record

Dam failures can be triggered suddenly with little or no warning and often in connection with natural disasters such as floods and earthquakes. Dam failures can occur during flooding when the dam breaks under the additional force of floodwaters. In addition, a dam failure can cause a chain reaction where the sudden release of floodwaters causes the next dam downstream to fail. While flooding from a dam failure generally has a limited geographic extent, the effects are potentially catastrophic depending on the downstream population. A dam failure affecting Stonington is considered a possible event each year with potentially critical effects.

According to the NCDC, the July 1, 2009 storm produced heavy rainfall that resulted in three dam emergency events in Stonington.

- First, a small farm dam off Lane Way overtopped causing flooding and the temporary closure of Route 1 at Anguilla Brook.
- Around 7:30 p.m., floodwaters at the Mystic Reservoir Dam breached and eroded the banks at the edges of the dam causing overtopping. An unscheduled release of water was performed to protect the integrity of the dam. The release of water in combination with the floodwaters resulted in soil erosion and damage at Jerry Browne Road and Mistuxet Avenue immediately downstream resulting in road closure, as well as the closure of Route 1 at Quiambog Cove.
- Finally, around 10 p.m. Silvias Pond Lower Dam overtopped resulting significant damage to a home just downstream of the dam. This family needed to be rescued by the Fire Department, and two other nearby homes were also evacuated.

The Lane Way dam was also a problem in March 2010 as the Town evacuated downstream residents in case of a dam failure, and Silvias Pond Dam was damaged during the March 2010 storms.

10.2 Existing Programs, Policies, and Mitigation Measures

The Connecticut DEEP administers the Dam Safety Section and designates a classification to each state-registered dam based on its potential hazard. As noted in the Multi-Jurisdictional HMP, Stonington is home to three Class C (high hazard) dams, and one additional Class B (significant hazard) dam is located upstream of Stonington whose failure could potentially lead to flooding within the town. These dams are listed on Table 10-1.

TABLE 10-1
High and Significant Hazard Dams Within and Upstream of the Town of Stonington

Dam	Hazard Class	Location	Owner	River System
Deans Reservoir Dam	C	Stonington	Aquarion Water Company	Copps Brook
Long Pond Dam	B	Ledyard	Private	Whitford Brook
Mystic Reservoir Dam	C	Stonington	Aquarion Water Company	Copps Brook
Silvias Pond Lower Dam	C	Stonington	Private	Stony Brook

Dams in the region whose failure could impact Stonington are under the jurisdiction of the Connecticut DEEP. The dam safety statutes are codified in Section 22a-401 through 22a-411 inclusive of the Connecticut General Statutes. Sections 22a-409-1 and 22a-409-2 of the Regulations of Connecticut State Agencies have been enacted, which govern the registration, classification, and inspection of dams. Dams must be registered by the owner with the DEEP according to Connecticut Public Act 83-38.

Owners of high and significant hazard dams are required to maintain EOPs for such dams. The Town of Stonington does not own any dams. Aquarion Water Company maintains EOPs for its two dams in the town. In addition, Aquarion draws down the upper Mystic Reservoir (impounded by the Deans Reservoir Dam) prior to major rain events to prevent backwater flooding of Pequot Trail (Route 234). The Town of Stonington does not currently possess copies of EOPs for high and significant hazard dams.

10.3 Vulnerabilities and Risk Assessment

The potential impacts related to the failure of Class C and Class B dams within or upstream of Stonington are described below. Where information was available, the descriptions below are based on information available at the Connecticut DEEP Dam Safety files.

- *Deans Reservoir Dam* – This dam is also known as the Mystic Reservoir Upper Dam. The purpose of this dam is to impound Copps Brook for public water supply purposes. A dam failure analysis prepared by GZA Environmental, Inc. suggests that a complete dam failure could inundate an area a portion of Deans Mill Road east of the Mystic Reservoir, a business on Mistuxet Avenue, and the Aquarion Water Treatment Plant. The Palmer Dam is also expected to fail, washing out Jerry Browne Road and Mistuxet Avenue, and flooding five homes downstream along Cove Road to Quiambog Cove. Flooding in Quiambog Cove would be of a magnitude less than the 1% annual chance flood event and would not cause any additional damage to structures. Floodwaters are expected to be mitigated upon reaching Fishers Island Sound.

- *Long Pond Dam* – Long Pond Dam impounds Long Pond on the Ledyard – North Stonington boundary. This impoundment is used for recreational purposes and is privately owned by the Lantern Hill Valley Association. Failure of this dam would likely result in an inundation area downstream similar to the 1% annual chance floodplain. The property most at risk of flooding downstream in Stonington would be the Seaport Campground located on Campground Road. An EOP for this dam was not available at the Connecticut DEEP at the time of file inspection.

- *Mystic Reservoir Dam* – This dam is also known as the Palmer Dam and is located adjacent to the Deans Mill Water Treatment Plant owned by Aquarion Water Company. The purpose of this dam is to impound Copps Brook for public water supply purposes. The dam failure analysis prepared by GZA Environmental for the Deans Reservoir Dam includes the failure of the Mystic Reservoir Dam such that a similar area would be inundated. This dam was recently repaired by Aquarion including downstream channel and culvert repairs and is believed to be in good condition.

- *Silvias Pond Lower Dam* – While a lower hazard dam impounds the main portion of Silvias Pond along Stony Brook, an outlet structure on that dam allows water to flow into a smaller impoundment known as the Lower Pond. This pond is impounded by a high hazard dam and eventually outflows along an unnamed stream o Quannaduck Cove instead of Stony Brook. One home is located immediately downstream of this dam and was flooded when the dam overtopped in July 2009. While the Connecticut DEEP ordered that repairs be performed to the dam and an EOP be created following the damage sustained during the March 2010 floods, Town personnel indicate that such activities have yet to occur.

In addition the high and significant hazard dams, Town officials have identified other low hazard dams of concern:

- The Hyde Pond Dam, a Class A structure, is located immediately upstream of Route 184. The proximity of the dam to this significant roadway has prompted concerns from the Town.

- The Lane Way Dam located on Anguilla Brook upstream of Route 1 is currently being removed after concerns with the integrity of the dam developed and homes downstream were evacuated during the March 2010 storms. This dam is not currently registered with the Connecticut DEEP.

- Finally, a dam at the end of Alice Court in Pawcatuck may be a concern. The structure is located on the Pawcatuck River at the Rhode Island state line approximately 1,300 feet downstream of the Shunock River confluence. This dam is not currently registered with the Connecticut DEEP, so very little information is available. Aerial mapping indicates that the structure includes a raceway that was most likely historically used for process water at one of the many mills that were located along the river.

10.4 Potential Mitigation Measures, Strategies, and Alternatives

Stonington is considered a generally moderate-risk area for dam failure. The Aquarion Water Company dams are well-maintained in close coordination with Connecticut DEEP. The privately owned dams are not believed to be as well maintained although limited structures would be affected downstream if either dam failed. Recommendations are presented in this HMP with the goal of reducing Stonington's long-term risk of experiencing a dam failure. Potential mitigation measures for dam failure include a combination of prevention, education, and emergency planning, as well as dam removal projects as discussed in Section 11.

11.0 RECOMMENDATIONS

11.1 Summary of Specific Recommendations

The Multi-Jurisdictional HMP provided several region-wide recommendations applicable to all hazards that are also pertinent to the Town of Stonington. In addition, recommendations throughout the sections of this annex are also applicable as recommendations. These recommendations are listed below:

11.1.1 Recommendations Applicable to All Hazards

Regional Coordination

- Continue to promote inter-jurisdictional coordination efforts for emergency response.
- Continue to promote local and regional planning exercises that increase readiness to respond to disasters.
- Continue to evaluate communication capabilities and pursue upgrades to communication and ensure redundant layers of communication are in place within the Town and with other SCCOG communities, New London County, and the State of Connecticut.
- Continue to promote regional transportation planning through SCCOG to balance general transportation, shipping, and potential evacuation needs.
- Work with SCCOG to perform a regional study to identify the vulnerability of critical facilities that may be unable to withstand natural hazard damage. Emphasis should be placed on critical infrastructure, shelters and other sites to ensure structural integrity against various hazards and adequacy of backup supplies.

Local Emergency Response & Public Information

- Continue to review and update the Town EOP at least once annually.
- Continue to maintain emergency response training and equipment and upgrade equipment when possible.
- Encourage local officials to attend FEMA-sponsored training seminars at the Emergency Management Institute (EMI) in Emmitsburg, Maryland. All of these workshops are free of charge. Tuition, travel and lodging are provided by FEMA for the EMI training. Annual training sessions include emergency management, environmental reviews, the FEMA grant programs, the NFIP and CRS and others related to other hazards.
- Continue to evaluate emergency shelters, update supplies, and check communication equipment.
- Continue to promote dissemination of public information regarding natural hazard effects and mitigation measures into local governmental and community buildings. Specifically,

- ⇨ Obtain copies of the disaster planning guides and manuals from the "Are You Ready?" series (http://www.ready.gov/are-you-ready-guide).

- ⇨ Encourage residents to purchase NOAA weather radios with an alarm feature.

- ⇨ Continue to post hazard preparedness information on the Town's website. Include links to established sources at the State of Connecticut and FEMA.

- ❑ Continue to residents to submit contact information to the CT Alerts Reverse 9-1-1 system on the CT Alerts website, and continue utilizing the system to telephone warnings into affected areas.

- ❑ Support Stonington Ambulance's efforts to construct a new ambulance facility.

Prevention

- ❑ Develop a checklist for land development applicants that cross-references the specific regulations and codes related to disaster resilience.

- ❑ Integrate elements of this HMP into the *Plan of Conservation and Development* during the next update of that plan.

- ❑ Require the underground installation of utilities for all new development where possible.

- ❑ Continue reviewing building plans to ensure proper access for emergency vehicles.

- ❑ Continue to enforce the appropriate building code for new building projects.

- ❑ Encourage residents to install and maintain lightning rods on their buildings.

Natural Resource Protection & Open Space

- ❑ Continue to regulate development in protected and sensitive areas including steep slopes, wetlands, and floodplains.

11.1.2 Recommendations Applicable to Inland Flooding, Coastal Flooding, and Shoreline Change

Prevention

- ❑ Continue to regulate new development activities within SFHAs to the greatest extent possible within the local land use regulations.

- ❑ Consider requiring buildings located in floodprone areas to be protected to the highest recorded flood level regardless of SFHA status.

- ❑ Require developers to demonstrate whether detention or retention of stormwater is the best option for reducing peak flows downstream.

- Conduct an annual inspection of floodprone areas that are accessible to Town officials. Determine if potential flood damage is stormwater facility related and make recommendations as appropriate.

- Utilize the recently released DFIRM and 2008 hurricane storm surge mapping to compile a list of addresses with structures within the 1% annual chance floodplain and storm surge areas. Track the cost of repairs to these properties following major storm events through outreach or building permits to develop a database of information for potential future grant funding.

- Work with State and Federal agencies to ensure that flood protection regulations reflect current thinking and standards especially with regard to long-term rise in sea levels.

- Continue to maintain good standing with the Community Rating System, and consider additional achievements to enhance the Town's classification.

Property Protection

- Incorporate information on the availability of flood insurance into all hazard-related public education workshops.

- Make available FEMA-provided flood insurance brochures at public accessible places such as the local government buildings. Continue to encourage residents to purchase flood insurance if they are located within a FEMA SFHA.

- Provide technical assistance to owners of non-residential structures that suffer flood damage regarding floodproofing measures such as wet and dry floodproofing.

- Encourage residents to submit flood insurance claims following damage events.

- Pursue elevation of properties that suffer flood damage, prioritizing repetitive loss properties and the Lords Point area.

- Consider floodproofing measures for fire departments located within the 1% annual chance floodplain or that are susceptible to hurricane storm surge.

- Consider floodproofing measures for the two wastewater treatment plants. Work with the Borough of Stonington in regards to the Borough facility.

- Ensure that sewer pumping stations have a method of connecting emergency power and are adequately floodproofed.

Emergency Services

- Pursue mutual aid agreements with such organizations as the American Red Cross and the Boy Scouts of America to provide volunteer labor during flooding to assist with response activities.

- Include structures within the 1% annual chance floodplain and storm surge areas in the Reverse 9-1-1 contact database.

- Consider establishing a second mode of egress for the Bishops Cove neighborhood.

Public Education and Awareness

- Consider having a local Natural Hazards Awareness Week each year. As part of this week, conduct an annual "Flood Fair" so that residents, business owners, insurance and real estate agents, and all interested parties can familiarize themselves with functions of a floodplain, the laws governing development in a floodplain and the associated hazards, mitigation alternatives, and precautions necessary for living in flood prone areas. Invite local insurance agents and the NFIP representatives from FEMA's insurance contractors to educate the public on the program.

- Visit schools (as is currently done under fire prevention) and educate children about the risks of floods (and other natural hazards) and how to prepare for them.

- Establish a relationship with local homeowners associations and other community groups. If there is enough interest, develop a workshop to educate interested residents in flood proofing techniques and strategies for flood prone residential properties. Training would include audits of individual homes and recommendations for flood proofing measures.

- Encourage builders, developers, and architects to become familiar with the NFIP land use and building standards by attending annual workshops.

Natural Resource Protection

- Pursue the acquisition of additional municipal open space in SFHAs including along the coast.

- Pursue the acquisition and demolition of floodprone properties with conversion to open space. Repetitive loss properties should be prioritized.

- Continue to aggressively pursue wetlands protection through existing wetlands regulations. Incorporate performance standards into subdivision reviews to include additional protective measures such as conservation easement areas around wetlands and watercourses.

- Conduct beach nourishment and vegetation replacement along any affected beaches to keep up with erosion.

Structural Projects

- Encourage the use of floodplain storage, diversions, berms, dikes, and other flood control methods in new developments and at existing properties where appropriate.

- Utilize recently available extreme rainfall data to determine existing sizing of culverts. Encourage bridge replacements and culvert replacements in areas found to be undersized.

- Continue to perform catch basin and culvert surveys to perform maintenance and cleaning and to identify and prioritize structures in need of replacement. Pursue funding to perform projects whenever possible.

- Investigate funding sources and feasibility of elevating portions of locally-owned roads with an emphasis on those needed for inland evacuation.

- Upgrade stormwater collection and discharge systems to keep up with rising sea level, particularly in Mystic.

- Maintain existing hard structures along the coast in good condition, particularly in the vicinity of Stonington Harbor. Coordinate with the Borough and the State to maintain these structures.

- Maintain the causeways and bridges to Masons Island, Enders Island, and Elihu Island in good condition, and pursue elevation of these structures.

- Continue to maintain the levee system in Pawcatuck per USACE specifications.

- Consider investigating the scale and cost of a large-scale diking project to protect Mystic from inland and coastal flooding.

11.1.3 Recommendations Applicable to Wind Damage from Hurricanes, Tropical Storms, Summer Storms, Tornados, and Winter Storms

Prevention

- Work with the SCCOG to implement a region-wide Marina Management Plan addressing wind damage mitigation. Share that plan with the local marinas and yacht clubs and encourage them to develop plans on their own.

- Consider working with Connecticut Light & Power to obtain funding to place utilities underground in coastal areas.

Property Protection

- Promote the use of functional shutters for older buildings in the town to guard against window breakage which can result in structural failure.

- The Building Department should make information on wind-resistant construction techniques (such as hurricane straps) available to all building permit applicants.

Emergency Services

- Identify a location or locations in the town for a brush disposal operation for dealing with debris after wind storms. Determine how these trees can be reused within the town (chips, firewood, composting) to reduce costs of exporting.

- Consider surveying all Town-owned buildings to determine their ability to withstand wind loading, particularly the local shelters.

- Develop agreements, if necessary, with land owners and with companies to chop/chip in order to ensure that plans are in place prior to damage and cleanup needs (as is done for snow plow operations).

Public Education and Awareness

- Consider having a local Natural Hazards Awareness Week each year. As part of this week, conduct an annual workshop so that local building contractors, residents, business owners, insurance and real estate agents, and all interested parties can familiarize themselves with wind associated risks, retrofitting techniques, importance of evacuation, and the understanding of warning mechanisms used in the region.

- Visit schools (as is currently done under fire prevention) and educate children about the risks of wind events (and other natural hazards) and how to prepare for them.

11.1.4 Recommendations Applicable to Other Damage from Winter Storms

- Consider conducting a study to identify municipal buildings, critical facilities, and commercial / industrial buildings that are vulnerable to roof damage or collapse due to heavy snow loads. This study could be included in the regional critical facility study described in Section 2.8.

- Consider drafting a written plan for inspecting and prioritizing the removal of snow from Town-owned structures.

- Continue making funding available to the Public Works Department each budget year for clearing snow from roads and parking lots.

- Provide information for generally protecting town residents during cold weather and for mitigating icing and insulating pipes at residences.

- Consider posting the snow plowing routes in local government buildings and on the Town's website such that residents and business owners may better understand their risks during winter travel.

- Continue to identify areas that are difficult to access during winter storm events and develop contingency plans for emergency personnel.

11.1.5 Recommendations Applicable to Earthquakes

- Ensure that Town departments have adequate backup supplies and facilities for continued functionality in case earthquake damage occurs to these buildings and critical facilities. This should be part of the regional critical facility study discussed in Section 2.8.

- Consider preventing residential development in areas prone to collapse such as below steep slopes or in areas prone to liquefaction.

11.1.6 Recommendations Applicable to Wildfires

- Continue to evaluate public water supply hydrants and areas at risk of wildfire in the town.
- Encourage the extension of public water supply to provide fire protection to areas identified as being particularly at risk.
- Pursue additional sources of fire-fighting water where adequate supplies do not exist, such as through the installation of fire ponds.
- Continue to support public outreach programs to increase awareness of forest fire danger, equipment usage, and protecting homes from wildfires. Educational materials should be made available at the Town Hall.
- Ensure that provisions of Town regulations regarding fire protection facilities and infrastructure are being enforced.

11.1.7 Recommendations Applicable to Dam Failure

- Include dam failure inundation areas within the Connecticut Alerts "Everbridge" Reverse 9-1-1 contact database.
- Work with the Connecticut DEEP to ensure that the owners of high and significant hazard dams that could impact the town have a current EOP, particularly the Silvias Lower Pond Dam. The Town Hall should keep a copy of such plans.
- Provide assistance to owners of lesser-ranked dams regarding resources available for inspections and maintenance.

11.2 Prioritization of Specific Recommendations

As explained in Section 11.3 of the Multi-Jurisdictional HMP, the STAPLEE method was utilized in this annex to prioritize recommendations. Table 11-1 presents the STAPLEE matrix for the Town of Stonington. Each recommendation includes the department or commission responsible for implementing the recommendation, a proposed schedule, and whether or not the recommendation is new or originally from the previous HMP. Refer also to Section 2.7 for the list of previous plan recommendations and whether or not each recommendation was carried forward into this HMP.

TABLE 11-1: TOWN OF STONINGTON STAPLEE MATRIX FOR PRIORITIZING RECOMMENDATIONS

Implementation of Current Recommendations	Existing or New Recommendation?	Responsible Department [1]	Schedule	Cost [2]	Potential Funding Source [3]	Weighted STAPLEE Criteria [4]															Total STAPLEE Score
						Benefits								*Costs*							
						Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	STAPLEE Subtotal	Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	STAPLEE Subtotal	
ALL HAZARDS																					
Regional Coordination																					
Continue to promote inter-jurisdictional coordination efforts for emergency response	New	EM, BoS	2012-2017	Minimal	OB	1	1	1	1	1	1	1	**9.0**								**0.0**	***9.0***
Continue to promote local and regional planning exercises that increase readiness to respond to disasters	New	EM, BoS	2012-2017	Low	OB	1	1	1	1	1	0.5	1	**8.0**								**0.0**	***8.0***
Continue to evaluate communication capabilities and pursue upgrades to communication and ensure redundant equipment is available	Existing	EM, FD	2012-2017	Low	OB, CI	1	1	1	1	1	1	1	**9.0**						-0.5		**-1.0**	***8.0***
Continue to promote regional transportation planning through SCCOG	Existing	PL, TE	2012-2017	Low	OB	1	1	1	1	1	0.5		**7.0**								**0.0**	***7.0***
Work with the SCCOG to perform a regional study of the vulnerability of critical facilities to natural hazard damage	New	PL, EM	2012-2017	Low	OB	1	1	1	1	1	1		**8.0**		-0.5				-0.5		**-2.0**	***6.0***
Local Emergency Response & Public Information																					
Continue to review and update the Town EOP at least once annually	Existing	EM, FD, BoS	2012-2017	Low	OB	1	1	1	1	1	1	1	**9.0**								**0.0**	***9.0***
Continue to maintain emergency response training and equipment and upgrade equipment when possible	Existing	EM, FD, BoS	2012-2017	Moderate	OB, CI	1	1	1	1	1	0.5	1	**8.0**						-0.5		**-1.0**	***7.0***
Encourage Town officials to attend FEMA-sponsored training seminars at EMI	New	EM	2012-2017	Minimal	OB	0.5	0.5	1	1	1	1	0.5	**7.0**								**0.0**	***7.0***
Continue to evaluate emergency shelters, update supplies, and check communication equipment	Existing	EM	2012-2017	Low	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***
Continue to promote dissemination of public information regarding natural hazard effects into Government buildings, with additions	Existing	EM, TE	2012-2017	Minimal	OB	1	1	1	1	1	1	1	**9.0**								**0.0**	***9.0***
Encourage residents to submit contact information to the CT Alerts Reverse 9-1-1 system and utilize it during emergencies	Existing	EM, TE	2012-2017	Minimal	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***
Support Stonington Ambulance's efforts to construct a new ambulance facility	New	EM, BoS	2012-2017	Moderate	CI	1	1	1	1	0.5	1		**7.5**			-0.5			-0.5		**-1.5**	***6.0***
Prevention																					
Develop a checklist for land development applicants that cross-references the specific regulations and codes related to disaster resilience	New	PL	2012-2017	Minimal	OB	1	1	1	1	1	1		**8.0**			-0.5					**-0.5**	***7.5***
Integrate elements of this HMP into the Plan of Conservation and Development during the next update	New	PZC, PL	2012-2017	Low	OB	1	1	1	1	1	1	1	**9.0**			-1	-0.5				**-1.5**	***7.5***
Continue reviewing building plans to ensure proper access for emergency vehicles	New	EM	2012-2017	Minimal	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***
Require the underground installation of utilities for all new development	Existing	PZC	2012-2017	Minimal	OB	1	1	1	1	1	0.5		**7.0**	-0.5			-0.5				**-1.0**	***6.0***
Continue to enforce the appropriate building code for new building projects	New	BD	2012-2017	Minimal	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***
Encourage residents to install and maintain lightning rods on their structures	New	BD, EM	2012-2017	Minimal	OB	1	0.5	1	1	1	1	0.5	**7.5**								**0.0**	***7.5***
Natural Resource Protection & Open Space																					
Continue to regulate development in protected and sensitive areas including steep slopes, wetlands, and floodplains	New	PZC	2012-2017	Minimal	OB	1	1	1	1	1	1	1	**9.0**								**0.0**	***9.0***
FLOODING RECOMMENDATIONS																					
Prevention																					
Continue to regulate new development activities within SFHAs to the greatest extent possible within Town land use regulations	New	PZC	2012-2017	Minimal	OB	1	1	1	1	1	1	1	**9.0**								**0.0**	***9.0***
Consider requiring buildings located in floodprone areas to be protected to the highest recorded flood level regardless of SFHA status	New	PZC, TE	2012-2017	Minimal	OB	0.5	1	1	0.5	1	1		**7.0**	-1	-1	-1	-0.5	-0.5			**-5.0**	***2.0***
Require developers to demonstrate whether detention or retention of stormwater is the best option for reducing peak flows downstream	New	PZC, TE	2012-2017	Minimal	OB	0.5	1	1	1	1	1	0.5	**8.0**								**0.0**	***8.0***
Conduct an annual inspection of floodprone areas that are publically accessible. Recommend drainage improvements as appropriate.	New	DPW, TE	2012-2017	Low	OB	1	1	1	0.5	1	0.5	0.5	**7.0**								**0.0**	***7.0***
Work with State and Federal agencies to ensure that flood protection regulations reflect current standards regarding sea level rise	New	TE, PL	2012-2017	Low	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***
Compile a list of addresses of structures within the 1% annual chance floodplain and storm surge areas, and track repair costs	New	PL, TE	2012-2017	Low	OB	0.5	1	1	0.5	1	1		**7.0**	-0.5		-0.5					**-1.0**	***6.0***
Continue to maintain good standing with the Community Rating System and consider additional achievements	New	TE	2012-2017	Low	OB	1	1	1	1	1	1		**8.0**			-0.5					**-0.5**	***7.5***
Property Protection																					
Incorporate information on the availability of flood insurance into all hazard-related public education workshops	New	EM, TE	2012-2017	Low	OB	1	1	0.5	0.5	1	1		**7.0**	-0.5							**-0.5**	***6.5***
Make available FEMA-provided flood insurance brochures and encourage residents to purchase insurance if they are in a SFHA	New	EM, TE	2012-2017	Minimal	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***
Provide technical assistance to owners of non-residential structures regarding floodproofing techniques	Existing	BD, TE	2012-2017	Low	OB	1	0.5	0.5	1	1	1	0.5	**7.0**								**0.0**	***7.0***
Encourage residents to submit flood insurance claims following damage events	New	All	2012-2017	Minimal	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***
Pursue elevation of properties that suffer flood damage, prioritizing repetitive loss properties and the Lords Point area	Existing	EM, TE	2012-2017	Moderate	CI*	0.5	1	1	1	1	1		**7.5**	-0.5		-0.5			-1		**-3.0**	***4.5***
Consider floodproofing measures for fire departments susceptible to flooding and storm surge	New	EM, TE	2012-2017	Moderate	CI*	1	1	1	1	1	1	1	**9.0**						-1		**-2.0**	***7.0***
Consider floodproofing measures for wastewater treatment plants susceptible to flooding and storm surge	New	TE, EM	2012-2017	Moderate	CI*	1	1	1	1	1	1	1	**9.0**						-1		**-2.0**	***7.0***
Ensure that sewer pumping stations have a method for connecting emergency power and are adequately floodproofed	New	TE, EM	2012-2017	High	CI*	1	1	1	1	1	1	1	**9.0**						-0.5		**-1.0**	***8.0***

TABLE 11-1: TOWN OF STONINGTON STAPLEE MATRIX FOR PRIORITIZING RECOMMENDATIONS

Implementation of Current Recommendations	Existing or New Recommendation?	Responsible Department [1]	Schedule	Cost [2]	Potential Funding Source [3]	Weighted STAPLEE Criteria [4]																Total STAPLEE Score
						Benefits								*Costs*								
						Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	STAPLEE Subtotal	Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	STAPLEE Subtotal	
Emergency Services																						
Pursue mutual aid agreements with non-profits to provide volunteer labor for response activities	New	EM	2012-2017	Low	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***
Include structures within the 1% annual chance floodplain and storm surge areas within the Reverse 9-1-1 contact database	Existing	EM, TE	2012-2017	Low	OB	1	1	1	1	1	1		**8.0**	-0.5		-0.5					**-1.0**	***7.0***
Consider establishing a second mode of egress for the Bishops Cove neighborhood	New	PL, TE, EM	2012-2017	Moderate	CI	0.5	1	1	1	1		0.5	**6.0**	-1	-0.5	-0.5			-1	-0.5	**-5.0**	***1.0***
Public Education and Awareness																						
Consider an annual "Flood Fair" to familiarize the public with floodplains, flooding, flood insurance, and floodproofing	New	EM, TE, PL	2012-2017	Low	OB	1	1	1	1	1	1		**8.0**	-0.5							**-0.5**	***7.5***
Visit schools and educate children about the risks of flooding and how to prepare	New	EM, FD	2012-2017	Low	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***
Work with homeowners associations to develop a floodproofing workshop	New	TE, EM	2012-2017	Low	OB	1	1	1	1	1	1		**8.0**	-0.5							**-0.5**	***7.5***
Encourage builders, developers, and architects to become familiar with NFIP land use and building standards at annual workshops	New	PL, BD, TE	2012-2017	Low	OB	1	1	1	1	1	1		**8.0**			-0.5					**-0.5**	***7.5***
Natural Resource Protection																						
Pursue the acquisition of additional open space in SFHAs including along the coast	New	BoS, PL	2017-2022	High	CI*	1	1	1	1	1	1	1	**9.0**						-1		**-2.0**	***7.0***
Pursue the acquisition and demolition of floodprone properties with conversion to open space, prioritizing repetitive loss properties	New	TE, PL	2012-2017	High	CI*	1	1	1	1	1	1	1	**9.0**	-0.5					-1		**-2.5**	***6.5***
Continue to aggressively pursue wetlands protection and incorporate performance standards into subdivision reviews	New	PZC	2012-2017	Low	OB	1	1	1	1	1	1	1	**9.0**	-0.5		-0.5					**-1.0**	***8.0***
Conduct beach nourishment and vegetation replacement along any affected beaches to keep up with erosion	New	TE, DPW	2012-2017	Moderate	OB	1	1		1	1	0.5	1	**7.0**			-0.5			-0.5		**-1.5**	***5.5***
Structural Projects																						
Encourage the use of floodplain storage and other flood control methods in new developments and at existing properties where appropriate	New	PZC, PL	2012-2017	Minimal	OB	1	1	0.5	1	0.5	1		**7.0**		-0.5					-1	**-2.0**	***5.0***
Utilize the recently available extreme rainfall data to determine existing culvert sizing and encourage upgrades where undersized	New	TE, DPW	2012-2017	Moderate	CI	0.5	1	1	0.5	1	1		**7.0**						-1		**-2.0**	***5.0***
Continue to perform catch basin and culvert surveys to prioritize upgrades and perform maintenance and cleaning	Existing	TE, DPW	2012-2017	Moderate	OB	1	1	1	1	1	0.5	0.5	**7.5**								**0.0**	***7.5***
Investigate funding sources and the feasibility of elevating locally owned roads with an emphasis on those needed for evacuation	New	TE	2012-2017	Moderate	OB	1	1	0.5	1	1	0.5		**6.5**			-0.5			-0.5		**-1.5**	***5.0***
Maintain existing hard structures along the coast in good condition, particularly near Stonington Harbor	Existing	TE, DPW	2012-2017	Moderate	OB	1	1	1	1	0.5	1	1	**8.5**		-0.5	-0.5			-0.5	-0.5	**-3.0**	***5.5***
Maintain the causeways and bridges to inhabited islands in good condition and pursue elevation	Existing	TE, DPW	2012-2017	Moderate	OB	1	1	1	1	1	1	0.5	**8.5**	-0.5		-0.5			-1	-0.5	**-3.5**	***5.0***
Continue to maintain the Pawcatuck levee system per USACE specifications	New	TE, DPW	2012-2017	Low	OB	1	1	1	1	1	1	1	**9.0**	-0.5							**-0.5**	***8.5***
Consider investigating the scale and cost of a large-scale diking project to protect Mystic from flooding	Existing	TE, DPW	2017-2022	Moderate	OB	1	1	0.5	1	1	1		**7.5**						-0.5		**-1.0**	***6.5***
WIND DAMAGE RELATED TO HURRICANES, SUMMER STORMS, TORNADOES, AND WINTER STORMS																						
Prevention																						
Work with SCCOG to implement a regional Marina Management Plan for wind damage, and encourage local clubs to develop plans	New	PL, EM	2012-2017	Low	OB	1	1	1	1	1	0.5		**7.0**			-0.5					**-0.5**	***6.5***
Consider working with CL&P to obtain funding to place utilities underground in coastal areas	New	TE, EM	2012-2017	Low	OB	1	1	1	1	1	1		**8.0**		-0.5				-1		**-3.0**	***5.0***
Property Protection																						
Promote the use of functional shutters for older buildings	New	BD	2012-2017	Minimal	OB	1	0.5	1	1	1	0.5		**6.0**								**0.0**	***6.0***
Make information on wind-resistant construction techniques available to all building permit applicants	New	BD	2012-2017	Low	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***
Emergency Services																						
Identify a location for a brush-disposal operation for dealing with debris following wind storms and determine potential reuse	New	TE, DPW	2012-2017	Minimal	CI	0.5	1	1	1	1	1		**7.5**								**0.0**	***7.5***
Consider surveying all Town-owned buildings to determine their ability to withstand wind loading	New	BD	2012-2017	Low	OB	1	0.5	1	0.5	1	0.5		**5.5**								**0.0**	***5.5***
Develop agreements with landowners and companies to chop/chip to ensure backup plans are in place for debris removal	New	TE, DPW	2012-2017	Low	OB	0.5	0.5	1	0.5	1	0.5		**5.0**								**0.0**	***5.0***
Public Education and Awareness																						
Consider an annual "Wind Fair" to familiarize the public with wind hazards and potential mitigation measures	New	EM, TE, PL	2012-2017	Low	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***
Visit schools and educate children about the risks of wind events and how to prepare for them	New	EM, FD	2012-2017	Low	OB	1	1	1	1	1	0.5		**7.0**								**0.0**	***7.0***

TABLE 11-1: TOWN OF STONINGTON STAPLEE MATRIX FOR PRIORITIZING RECOMMENDATIONS

Implementation of Current Recommendations	Existing or New Recommendation?	Responsible Department [1]	Schedule	Cost [2]	Potential Funding Source [3]	Weighted STAPLEE Criteria [4]																Total STAPLEE Score
						Benefits								*Costs*								
						Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	STAPLEE Subtotal	Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	STAPLEE Subtotal	
WINTER STORMS																						
Consider conducting a study to identify buildings vulnerable to roof damage or collapse from heavy snow in the town	New	BD	2012-2017	Moderate	OB	1	1	1	0.5	0.5	1		**7.0**			-0.5			-1		**-2.5**	***4.5***
Consider drafting a written plan for inspecting and prioritizing the removal of snow from Town-owned structures	New	BD, TE	2012-2017	Low	OB	0.5	1	1	1	1	0.5		**6.5**								**0.0**	***6.5***
Continue making funding available to the Public Works Department each year for clearing snow from roads and parking lots	New	BoS	2012-2017	High	OB	1	1	1	1	1	0.5		**7.0**								**0.0**	***7.0***
Provide information for protecting Town residents during cold weather and for mitigating icing and insulating pipes at residences	New	BD, EM	2012-2017	Low	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***
Consider posting the snow plowing routes in local government buildings and on the Town's website	New	TE	2012-2017	Minimal	OB	1	0.5	0.5	0.5	1			**4.0**				-0.5	-0.5			**-1.0**	***3.0***
Continue to identify areas that are difficult to access during winter storm events and develop contingency plans to access such areas	New	EM, FD, DPW	2012-2017	Minimal	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***
EARTHQUAKES																						
Ensure that Town departments have adequate backup supplies and facilities for continued functionality following an earthquake	New	BoS, EM	2012-2017	Moderate	OB, CI		0.5	1	0.5	0.5			**3.0**		-0.5		-1				**-2.0**	***1.0***
Consider preventing residential development in areas prone to collapse such as below steep slopes or areas prone to liquefaction	New	PZC	2012-2017	Minimal	OB	0.5	1	1	0.5	0.5	1	0.5	**7.0**				-0.5				**-0.5**	***6.5***
WILDFIRES																						
Continue to evaluate public water supply hydrants, dry hydrants, and areas at risk of wildfire in the town	Existing	EM, FD	2012-2017	Minimal	OB	1	1	1	1	1	1	0.5	**8.5**								**0.0**	***8.5***
Encourage the extension of public water supply for fire protection to areas identified as being particularly at-risk	New	EM, PL	2012-2017	Low	CI	1	1	1	1	1	1	1	**9.0**	-0.5					-0.5		**-1.5**	***7.5***
Pursue additional sources of firefighting water where adequate supplies do not exist such as through the use of fire ponds	New	EM, TE	2012-2017	Moderate	CI*	1	1	1	1	1	1	1	**9.0**		-0.5					-1	**-2.0**	***7.0***
Continue to support public outreach programs to increase awareness of forest fire danger, equipment usage, and protecting homes	New	EM, FD	2012-2017	Low	OB	1	1	1	1	1	0.5	1	**8.0**								**0.0**	***8.0***
Ensure that provisions of Town regulations regarding fire protection facilities and infrastructure are being enforced	New	EM	2012-2017	Low	OB	0.5	0.5	1	0.5	1	0.5		**5.0**								**0.0**	***5.0***
DAM FAILURE																						
Include dam failure inundation areas in the Reverse 9-1-1 contact database	New	EM, TE	2012-2017	Low	OB	1	1	1	1	1	1		**8.0**	-0.5		-0.5					**-1.0**	***7.0***
Work with CT DEEP to ensure that the owners of high hazard dams have current EOPs and keep local copies	New	EM, TE	2012-2017	Minimal	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***
Provide assistance to the owners of lesser ranked dams regarding resources available for inspections and maintenance	New	TE	2012-2017	Minimal	OB	0.5	0.5	0.5	0.5	1		0.5	**4.0**								**0.0**	***4.0***

NOTES

1. Departments:
   BD = Building Official
   BoS = Board of Selectmen
   DPW = Department of Public Works
   EM = Emergency Management Director
   FD = Fire Department
   PL = Department of Planning
   PZC = Planning & Zoning Commission
   TE = Town Engineer
2. Minimal = To be completed by staff or volunteers where costs are primarily printing, copying, or meetings; Low = Costs are less than $10,000; Moderate = Costs are less than $100,000; High = Costs are > than $100,000.
3. OB = Operating Budget; CI = Capital Improvement budget; a * indicates that grant funding is needed and will be pursued
4. A beneficial or favorable rating = 1; an unfavorable rating = -1. Technical and Financial benefits and costs are double-weighted (i.e. their values are counted twice in each subtotal)

APPENDIX A

ADOPTION RESOLUTION

RESOLUTION

TOWN OF STONINGTON REGIONAL HAZARD MITIGATION PLAN UPDATE

WHERAS, the Town of Stonington has historically experienced severe damage from hazards and continues to be vulnerable to the effects of flooding, thunderstorms, high wind, winter storms, wildfires, earthquakes, and dam failure, resulting in loss of property and life, economic hardship, and threats to public health and safety;

WHERAS, the Southeastern Connecticut Council of Governments, of which the Town of Stonington is a member, has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its Hazard Mitigation Plan Update under the requirements of 44 CFR 201.6;

WHERAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedures for the Town of Stonington;

WHERAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific hazards that impact the Town of Stonington, with the effect of protecting people and property from loss associated with those hazards;

WHERAS, the adoption of this Plan will make the Town of Stonington eligible for funding to alleviate the impacts of future hazards;

NOW THEREFORE BE IT RESOLVED by the Board of Selectmen of the Town of Stonington that:

1. The Plan is hereby adopted as an official plan of the Town of Stonington.

2. The respective Town Officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them within funding limitations.

3. Future revisions and Plan maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as part of this resolution for a period of five (5) years from the date of this resolution.

4. An annual report on the progress of the implementation elements of the Plan shall be presented to the Board of Selectmen by the end of each calendar year.

Adopted this 9th day of January, 2013 by the Board of Selectmen

Edward Haberek, Jr.
First Selectmen