

HAZARD MITIGATION PLAN UPDATE ANNEX FOR THE CITY OF NEW LONDON

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

**DECEMBER 2017
ADOPTED**

MMI #3570-09



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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 hazard mitigation projects specific to mitigating the effects of natural hazards to the City of New London. 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 City of New London and is not to be considered a standalone document.

The primary goal of this hazard mitigation plan annex is to identify risks 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 City of New London is an urbanized municipality incorporated as a city in 1784. It is approximately six square miles in area and had a population of 27,620 as of the 2010 census. It is located in the south-central portion of the southeastern Connecticut shoreline. It is bordered by the City of Groton and Town of Groton to the east across the Thames River, the Town of Waterford to the north and west, and Fishers Island Sound to the south. The City of New London can be accessed by Interstate 95.

1.3 Plan Development

The 2012 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 2012, 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 4th, 2016 announcing two public information meetings on the multi-jurisdictional HMP update. This press release was published in the Norwich Bulletin and The Day, as well as in relevant local "Patch" news

Websites. This notice was also posted on the SCCOG Facebook page and website. The public information meetings were held on November 28 and December 1, 2016, at the Town of Groton Library and the SCCOG office, respectively.

- ❑ A survey soliciting public input was hosted at www.surveymonkey.com/r/SCCOGHazard from October 17, 2016 through March 17, 2017. Topics addressed by the survey included the types of natural hazards that concern participants, the assets, infrastructure, and government services they feel are most at risk, and the types of mitigation measures they support. The survey link was publicized along with the public meetings in The Day, The Norwich Bulletin, and local Patch websites, and at all public meetings.
- ❑ Two data collection meeting were held with New London Staff in November 2016. A third meeting was held internally, and notes sent to Milone & MacBroom, Inc. electronically.
 - An initial meeting was held on November 8, 2016. The City Planner coordinated the local planning team which included members of the Public Works, Development and Planning, Community Development, and Fire Departments. At this meeting, the scope and process for updating the plan was discussed and some initial information was collected.
 - A second meeting was held on November 21, 2016. The City Planner, Development and Planning Director, and Fire Chief / Emergency Management Director attended. A plan for further internal data collection was developed.
 - An internal meeting was held on February 23, 2017, during which updates to this HMP, as well as a variety of other municipal planning documents, were discussed. This 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 City and that should be addressed in the update. This meeting was attended by the City Planner, Development and Planning Director, Fire Chief / EMD, Police Department Captain, and the Public Works/Parks Manager.
- ❑ The draft that is sent for State review will be posted on the City website (<http://www.ci.new-london.ct.us/>) 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 City of New London will be coordinated by SCCOG and the Planning Department. The HMP update must be adopted within one year of conditional approval by FEMA, or the City 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 Planning Department will be the local coordinator of the HMP (a change since 2012), and will administer this HMP under the authority of the Mayor and City Council. The Fire Department will assist the Planning department as the deputy local administrator. The Planning Department 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 City Council.

The HMP will be on file with the Office of Development and Planning (which includes the Planning Department), Fire Department, and Department of Public Works to assist in guiding growth decisions. See Section 2.5 for recommendations related to integrating the findings of this HMP into other City planning documents. The City will encourage residents to contact these departments with concerns related to natural hazards or emergency response via the City's website. Such announcements will also state that the HMP is available for public review at the departments listed above, as well as available on the City's and the SCCOG's website.

The City of New London will review the status of plan recommendations each year. The Planning Department 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 Planning Department 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 City of New London 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 City. The Planning Department will coordinate with SCCOG for the next HMP update which is expected to occur in 2022.

2.0 COMMUNITY PROFILE

2.1 Physical Setting

The City of New London is a coastal community located on the Connecticut shoreline. Elevations range from sea level along the Thames River and Fishers Island Sound to just over 200 feet in the northwest corner of the City.

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 City of New London. The City of New London lies above six metamorphic bedrock types which trend northwest to southeast across the area. From north to south these are the Potter Hill Granite Gneiss, the Plainfield Formation, the Hope Valley Gneiss, the Mamacoke Formation, the New London Gneiss, and the Rope Ferry Gneiss. Each of these formations consists primarily of gneiss, a relatively hard metamorphic rock. There are no faults mapped within or near the City of New London boundary.

The City's surficial geologic formations include glacial till, stratified drift, and coastal formations. Refer to the Multi-Jurisdictional HMP for a generalized view of surficial materials. Much of the City is underlain by glacial till. The exceptions are coastal areas along the Thames River and Alewife Cove which are underlain by stratified drift, and the Shaw's Cove area which is underlain by fill material.

The amount of stratified drift present is important as areas of stratified materials are generally coincident with floodplains. These materials were deposited at lower elevations by glacial streams, and these valleys were later inherited by the larger of our present day streams and rivers. The amount of stratified drift also has bearing on the relative intensity of earthquakes as described later in this annex.

2.2 Land Use and Development Trends

The Thames River has played an important part in the development of the City of New London. The city is well known as the home of the State Pier, Fort Trumbull, Connecticut College, and Coast Guard Academy. Amtrak's busy rail line traverses the City as well.

New London's State Pier is Connecticut's only major deep water seaport within a multi-use Foreign Trade Zone. The Thames River directly accesses the major transatlantic and coastal sea lanes, which allows companies to utilize freight shipping and receiving from around the world. Immediately south of the State pier is Cross Sound Ferry Services, which provides ferry service to Orient Point, New York and Block Island, Rhode Island. Other ferry services provide service to Fishers Island, New York and Montauk Point, New York. Ferry service to Orient Point on Long Island and Fishers Island is year round while service to other locations is seasonal. This terminal has become increasingly important to the transport of visitors to the New London area from Long Island, NY.

A mix of residential, commercial, and industrial development is found along the City's shoreline, with predominantly residential development occupying the central and southern areas of the City. Much of the northern portion of the City is institutional land associated with Connecticut College and the Coast Guard Academy. Open space properties of significance include Bates Woods and portions of the college campus.

Several major employers in New London have helped boost the City's economic development. These employers include Yale Lawrence & Memorial Hospital, The Day Publishing Co., General Dynamics Electric Boat, Connecticut College, the United States Coast Guard Academy, and Cross Sound Ferry Services.

The City of New London is nearly fully-developed with the exception of a few areas of dedicated open space. SCCOG data on land use collected in 2011 indicates that approximately 83% of city land is developed, 12% has been dedicated to open space, and 5% remains hypothetically open to development.

Most development in New London entails the redevelopment of existing properties. Several developments have been recently completed, are underway, or are likely to be completed in the future; additionally, at least one property is slated for demolition.

Development projects listed in the previous plan include:

- The high-rise public housing on Crystal Avenue, where previously there had been interest in renovation, is slated for demolition after a court order in 2017.
- 33 units are approved but not yet constructed on Georgetown Street. The developer has been granted an extension on the site plan and Inland Wetlands Commission Permit.
- "Shipway 221" proposed developments of 60 to 70 units residential apartments in the first phase. Additional 60-70 units at phase 2.
- Mansfield Apartment, approved and under construction a total of 104 units.
- Proposed Development of Parcel J by A.R. Building Company is a residential multifamily condominium of 91 units.

Current development projects include:

- Oaktree Development has completed Phase I of a project to build 127 condominiums at Shaw's Landing / Bank Street.
- Nine two-bedroom residential and four commercial rental spaces have been completed at 147-153 Bank Street by Academy Group Properties.
- A post-fire reconstruction project was completed in May 2017 by Bill Cornish at the Bacon Building on State Street. This included 21 one-bedroom efficiency rental apartments.
- Twenty two-bedroom townhouse condominiums have been constructed by Ken Boyer on Crystal Avenue and Williams Street.
- 84 rental apartments at Crocker House have been completed by AME Development.
- New England Developers have gained approval for a project to build 31 three-bedroom townhouse condominiums on Georgetown Road. They have not yet broken ground. The approval expires in 2019.

- On September 3, 2015, the Planning and Zoning Commission approved The Connection Fund's plans for construction of 12 studio and nine one-bedroom apartments at 10 Huntington Street and 42-52 Jay Street.
- 104 rental units are under construction on Mansfield Road by AR Building Company
- 73 Washington Street has been completed with 28 studio, artist studio, and one-to-two bedroom rental apartments.
- Foti & Foley Developers are in the construction planning stage of apartments and commercial space at 253 State Street.
- Caruso has completed six studio and one one-bedroom rental apartments on State Street.
- AME Development has completed four one-bedroom rental apartments on State Street.
- Anthony Silvestri has completed work on 6,000 square-feet of office space, 3,000 square-feet of retail space, and 39 condominiums in the New London Harbour Towers at 429-461 Bank Street.
- 25 apartments and two commercial spaces have been completed by Peter Levine at 13 Washington Street.
- Newly O'reilly Auto Shop
- Upswing of mixed use in Downtown

More downtown redevelopment potential is believed to exist.

Clearly, redevelopment and infill in New London is anticipated to continue. The City must strive to ensure that these projects are resilient to the hazards discussed in this plan.

2.3 Drainage Basins and Hydrology

The City of New London is divided among two sub-regional watersheds as delineated by the Connecticut DEEP. The eastern side of the City drains directly to the Thames River, whereas the remainder of the City drains to the Southeast Shoreline basin (Long Island Sound). The western perimeter of the city drains to the Southeast Shoreline via Fenger Brook, which outlets to Alewife Cove. The northern section of the city along I-95 drains to the Thames River via Green Swamp Brook. There are few significant water bodies within city limits.

2.4 Governmental Structure

The City of New London is governed by a Mayor-City Council government. The Mayor is the chief executive officer of the City and is directly responsible for the administration of all departments, agencies, and offices. The City Council is the City's legislative body, consisting of seven members. The Councilors are elected at large and serve for two-year terms. A majority of all the members elected to the Council shall constitute a quorum to do business. The President and the President Pro Tempore are selected by vote of the members of the Council. The President presides over the meetings of the Council.

The City of New London has several departments that provide municipal services. Departments pertinent to hazard mitigation include the Fire Department, Office of Development & Planning, Police, and Public Works. In addition, there are several boards and commissions that can take an active role in hazard mitigation, including the Planning & Zoning Commission. 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 City of New London is noted below:

- ❑ It is the primary mission of the New London Fire Department to provide a range of programs and services designed to protect the lives and property of inhabitants and visitors in the City of New London from the adverse effects of "Fires, Sudden Medical Emergencies, Exposure to Hazardous Materials or Exposure to any other dangerous conditions, either natural or man-made." The New London Fire Department provides 24 hour, 365-day emergency and non-emergency services in the City. In addition to providing traditional fire suppression activities, the Fire Department provides Emergency Medical Services at the R-2 level (ambulance transport) as well as a full range of Fire Prevention services from Code Enforcement to Public Education. The Fire Department also has specific emergency and non-emergency responsibilities in the event of Radiological, Hazardous Materials and extreme weather emergencies.
- ❑ The Office of Development & Planning (ODP) administers and is responsible for a broad and complex array of planning, regulatory, economic and community development programs designed to improve the quality of life in New London. The office is divided into four separate divisions: Planning, Zoning & Wetlands; Economic Development; Community Development; and Building Division. The programs administered by the ODP staff include the Community Development Block Grant Program, the Housing Conservation Program, the Neighborhood Improvement Program, the Enterprise Zone, and a variety of other federal, state and locally funded special programs. The ODP personnel implement the objectives within the City's community and special area plans such as the Plan of Conservation and Development, the Downtown Action Agenda, Comprehensive Economic Development Strategy and the Consolidated Housing and Community Development Strategy. ODP personnel also provide technical assistance and expertise to other city departments and a wide range of boards, commissions and agencies.
- ❑ The Building Division of the ODP is the City's regulatory authority for the Connecticut Building Code, the City's Demolition Ordinance, the City's Housing and Property Maintenance Code and the City's Flood Plain Management Ordinance. The Building Official has a unique responsibility when it comes to hazard mitigation as he is responsible for overseeing a number of codes such as those related to wind damage prevention as well as those related to inland and coastal flood damage prevention. Although other departments and commissions may review development plans and develop or revise regulations, many important types of pre-disaster mitigation are funneled through and enforced by the Building Department. For example, the Building Department enforces A- and V-zone standards for construction and building elevations, maintains elevation certificates, and enforces building codes that protect against wind and fire damage.
- ❑ The Planning & Zoning Commission oversees orderly and appropriate use and development of residential, commercial, and industrial land and the conservation of natural resources. It reviews and approves 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 City is consistent with existing land use, environmental policy, and the objectives of the Plan of Conservation and Development.

- The Inland Wetlands/Conservation Commission reviews plans for compliance with the Inland Wetland Regulations.
- The Department of Public works is responsible for the maintenance of all City owned buildings, streets, parks and equipment. The Public Works Department's operational divisions are Administration, Building Maintenance, Highway Maintenance, Parks Maintenance, Solid Waste & Recycling and Mechanical Maintenance.

As is common throughout Connecticut, the Public Works Department is charged with implementing numerous projects that are related to hazard mitigation. Specifically, roadway/infrastructure maintenance and complaint logging/tracking are the two primary duties of the Public Work Department. For example, the Public Works Department tracks, plans, prepares for, and responds to flooding, inundation, and/or erosion of roads and infrastructure such as the sewer pumping station and the wastewater treatment plants. 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. Because of these duties, the Public Works Department is often the de facto first responder during emergencies.

- The Police Department provides law enforcement services. The Department also provides important press release services such as the notification of snow emergency operations in 2015 and the availability of FEMA disaster assistance as appropriate.

In addition to the departments described above, the City of New London has several other departments similar to surrounding municipalities, including Finance, Health and Social Services, etc. The roles of City departments have not changed since the time of the previous HMP. Thus, the City of New London is technically, financially, and legally capable of implementing mitigation projects for natural hazards. As discussed in the next section and the historic record throughout this annex, the City of New London is densely developed and thus has particular vulnerability to certain types of natural hazards.

2.5 Review of Existing Plans and Regulations

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

Emergency Operations Plan

The City has an Emergency Operations Plan (EOP) that is updated and certified by the Mayor annually. This document provides general procedures to be instituted by the Mayor and/or

designee, Police Department, and Fire Department 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 New London EOP provides current, detailed instructions regarding the timing of evacuations.

Plan of Conservation and Development

The most recent version of the New London POCD was adopted in 2007. It was developed with contributions from local boards, commissions, committees, citizens and citizen groups. The Plan seeks to be a statement of policies, goals and standards for the physical and economic development of the Town and recommends the most desirable uses types and population densities in various parts of the municipality.

The 2007 New London POCD includes the following actions, among others:

- New London maintains a flood plain ordinance, which establishes policies and permit requirements related to land use management.
- City identifies the need to make improvements to catch basins and drainage to reduce flood risk.
- City recognizes the need for public outreach and awareness as it pertains to flooding and evacuation routes.
- City identifies need to improve emergency services, through the upgrading of radio/dispatch coverage, emergency facilities, and supplies.

The POCD has significant content regarding flood hazards. Section 12 of the POCD stresses the importance of *"implementing programs and projects aimed at insuring that future development in the City is appropriately managed to insure that the waters of the Thames River and Long Island Sound are maintained to a high water quality standard, the flood hazard areas in the City do not pose a threat to life and property...."* Section 12.15 follows with *"Not surprisingly, the areas of New London that are subject to flooding are limited to locations along the City's coastal area. These areas have been identified under the National Flood Insurance Program which was established through the adoption of an ordinance which took effect on May 24, 1977 to reduce the threat to public safety and the loss of property values resulting from periodic flooding within areas of special flood hazard within the City. These areas are subject to the City's flood plain management ordinance which establishes policies and permit requirements related to land use and development."*

Section 12.3 of the POCD opens with the following policy statement: *Prevent loss of life and minimize property damage from the hazards of flooding.* The section then states:

"As a coastal community portions of the City fronting on Long Island Sound, the Thames River and Alewife Cove are vulnerable to tidal and riverine flooding. 455 structures in the City are located in flood prone areas. However, the majority of New London is not in danger of flooding. New London has experienced flood damage from several hurricanes with the biggest occurring in September of 1938 when extensive damage

occurred, primarily along Mott Avenue in the area of what is now Ocean Beach Park. In 1954 Hurricane Diane reached an elevation of 8.9 feet. Damage from these hurricanes amounted to six million and three million dollars respectively. Additionally, the City has experienced the hurricanes of 1893, 1915 and 1944. In 1977, the City Council adopted the City's first Flood Plain Management Ordinance which has since been modified several times (85, 87, 92 and 1993). The City must continue to monitor all development within the flood plain and enforce the regulations to the fullest extent so that we may avoid loss of life and extensive damage that could occur from a flood. The City should also monitor wind and weather instruments at Millstone power plant in Waterford and the airport in Groton so it can further predict when flooding might occur. It is predicted that New London could be threatened by a serious hurricane in the not so distant future."

Stormwater management, drainage improvements, floodplain management, and public awareness are all addressed with great detail in the POCD. In particular, the POCD recommends that "*The City should continue to revise the Flood Plain Management Ordinance when necessary and discourage development in areas that are subject to flooding. These measures will help to insure that New London qualifies for federal aid should flooding occur.*"

Section 12.24 of the POCD discusses the need to adopt a systematic maintenance program for catch basin maintenance and street sweeping to improve storm drainage system functionality, while Section 12.31 requires that all new development proposals submit a plan to address stormwater management and Section 12.32 suggests the implementation of recommendations from the comprehensive stormwater management plan and the implementation of improvements.

Therefore, the New London POCD is considered consistent with the current goals and actions of the hazard mitigation plan. While it addressed flooding and hurricanes thoroughly, it did not directly address several of the hazards such as wind damage and winter storm hazards.

The next update to the POCD is currently underway, scheduled for completion in 2017. Based on a review of the Draft POCD as of 6/15/2017, this document will continue to incorporate the elements of the hazard mitigation plan. For example, the "Protect Natural Resources" chapter includes the following strategies and goals as part of its strategic plan:

- Protect New London's important natural resources including floodplains, inland and tidal wetlands and coastal areas.
- Preserve significant open space and urban forests.
- Implement coastal resilience policies.
- Adopt a standardized maintenance program for catch basins and street sweeping throughout the City to minimize the transport of silt, sediments and road pollutants into inland and tidal wetland systems, the Thames River and Long Island Sound.
- Support the City's Shade Tree Commission in the implementation of a Tree Removal and Replacement program including creating a tree inventory and placing new trees where appropriate. (relevant to wind and snow load hazards)
- Encourage the use of Low Impact Development (LID) policies and practices.

- Implement best management practices for snow and ice removal to mitigate potential impacts to water quality. (relevant to winter storm hazards)
- Identify the most significant inland and tidal resources in the community and prioritize them for conservation efforts.
- Encourage alternatives to impervious surfaces and storm water management techniques that direct water to point discharges.
- Continue the strict enforcement of floodplain regulations to minimize potential flood hazards and property damage during flood events.

Additionally, the "Protect Coastal Resources" chapter includes the following strategies and goals:

- Investigate the extent and severity of sand and silt deposition and erosion from the Riverside Park area to Ocean Beach Park to determine appropriate action.
- Evaluate the long term implications of sea-level rise.

Therefore, the draft New London POCD Update is considered consistent with the current goals and actions of the hazard mitigation plan.

Fort Trumbull Vision

This Concept Plan for Fort Trumbull, prepared by the Yale Urban Design Workshop in 2011 in collaboration with the City of New London, the New London Development Corporation and a diverse group of New London citizens and stakeholders, aims to build upon, update and add concrete detail to the previous plans for the area. The plan seeks to help position Fort Trumbull as a unique regional destination, development opportunity and mixed-use neighborhood linking to and complementing, but not directly competing with, Downtown New London and the Bank Street corridor.

Most of the Fort Trumbull area is within coastal flood zones and hurricane surge zones. The plan notes that "Parcel 4B" could be developed as a marina-related waterfront residential mid-rise tower. Because of the low elevation, the ground floor would be in the floodplain, so residential units could not be constructed unless on the second or third floor. The City must take care to develop resilient structures at Fort Trumbull.

Code of Ordinances

Chapter 6 (Buildings and Structural Appurtenances) Article III (Construction in Floodprone Areas) is the City's basic articulation of the NFIP Regulations. The code focuses on the A8 and V8 zones that were in place as of 1976.

Zoning Regulations

The Zoning Regulations of the City of New London, Connecticut are amended to March 7, 2017. The section dealing with flood damage prevention (Section 830: Flood Plain Management) was

last updated in February, 2011. They include a variety of preventative regulations pertinent to mitigating flooding hazards. An amendment in July 2013 redefined Flood Hazard Areas according to the most recent Flood Insurance Rate Maps (FIRMS) and Flood Insurance Study (FIS), either August 5, 2013 or July 18, 2011, depending on the location.

New London requires that new construction or substantial improvement be elevated or floodproofed to more than two feet above the Base Flood Elevation. Substantial improvement is defined cumulatively over a ten year period.

These regulations are applied during the permitting process for new construction and during substantial improvement of existing structures. Section 830 essentially contains additional provisions from the NFIP regulations that are not listed in the code of ordinances.

Section 840 of the Zoning Regulations and, to a lesser extent, Section 560 of the Subdivision Regulations, details the Coastal Area Management regulations, outlining measures to protect the coastal area of the City in a matter consistent with the Connecticut Coastal Management Act.

The Zoning Regulations also contain a number of provisions for ensuring safety and the ability of the Fire Department to access sites and new developments.

Subdivision Regulations

The City of New London Subdivision Regulations were last amended in June 2011. Section 550 of the Subdivision Regulations addresses drainage system design and consistency with the NFIP regulations articulated in the municipal code and the Zoning Regulations. The amendment date of the Subdivision Regulations coincides with the adoption of the DFIRM for the City in 2011. Section 540.2 of the Subdivision Regulations discusses stormwater system adequacy. The regulations also contain numerous provisions regarding road lengths and widths, restrictions for developing dead-end streets, and the like. These help ensure public safety and egress.

Inland Wetland and Watercourses Regulations

The Regulations for the Preservation of Inland Wetlands and Watercourses in the City of New London were last amended January 23, 2012. The regulations require a permit for certain regulated activities which take place within 100 feet of 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.

Arboricultural Specifications and Standards of Practice

This document guides maintenance of municipal trees (specifically street trees) in New London.

2.6 Critical Facilities, Sheltering Capacity, and Evacuation

The City of New London considers several facilities to be critical to ensure that emergencies are addressed while day-to-day management of the City continues. In addition, locations with populations that may be at additional risk during an emergency are also considered to be critical. Critical facilities are summarized in Table 2-1.

City Hall and the Stanton Building

The City Hall at 181 State Street has no standby power supply. It is undergoing a Historic Renovation Project in 2017. The City considers the City Hall to be a critical facility due to its many functions such as City Clerk, Probate Judge, the Office of Planning and Development, and other offices.

The Stanton Building (City Hall Annex) at 111 Union Street is partially powered by a generator during outages and houses the City's radio transmission capabilities. It is therefore a critical facility and is located outside of any flood or hurricane surge zones.

Public Works Complex

The Public Works Department and sub-departments operates mainly out of the Public Works complex at 189 Crystal Avenue. This complex includes a garage, fueling station, dry sand or salt storage, a transfer station, and offices. It is located near but outside of an AE zone of the Thames River.

Shelters

The Connecticut Hurricane Evacuation Study and Technical Data Report reports that three shelters were available as of 1994: the Martin Center (capacity 750), New London High School (capacity 1,500), and New London Junior High School (now the Middle School with a capacity 1,500). The ARC had agreed to operate all three shelters. The Martin Center (120 Broad Street) was most recently used as a shelter during Hurricane Irene, and up to 60 people took advantage of shelter services at that location. The New London High School and Middle School (Bernie Dover Jackson Middle School) are no longer emergency shelters.

Fire and Police Department Facilities

There are a total of three fire stations, and all are critical facilities. The Emergency Operations Center (EOC) is the Fire Headquarters. The fire headquarters is located at 289 Bank Street. It is in a Category Two surge zone and is protected by levee from the 1% annual chance flood event. Since the previous HMP the Fire Headquarters has updated its conference room capabilities.

In the long term, the City desires a new Fire Headquarters that is located in a more flood-resilient location. SCCOG completed an assessment of critical facilities in the region in 2017, fulfilling an action listed in the 2012 edition of the multi-jurisdiction hazard mitigation plan. The

Fire Headquarters was addressed in this study. The assessment determined that the City should undertake stormwater improvements and backflow prevention in the short term, and pursue dry floodproofing of the utility room and wet floodproofing of remaining lower areas in the long term. These recommendations are incorporated into the list of actions in Chapter 11 of this annex. The assessment did not recommend that the Fire Headquarters should be relocated in the short-term, but this hazard mitigation plan absolutely supports relocation of the Fire Headquarters outside the SFHA if the opportunity arises for some other reason such as the availability of land.

Outlying fire stations are located at 240 Broad Street (North Station) and 25 Lower Boulevard (South Station-Station 3). Neither fire station is located in hurricane surge zones or flood zones.

The police department headquarters is a separate building and is a critical facility. The northeast portion of the building is located within a Category Four hurricane surge zone. The police department headquarters has emergency power.

TABLE 2-1
Critical Facilities

Facility	Address or Location	Emergency Power Supply	Shelter	In Floodplain or Coastal Flood Hazard Area	In Surge Zones
<i>Emergency Services</i>					
Fire Headquarters (EOC)	289 Bank Street	✓		*	✓
North Fire Station	Broad Street	✓			
South Fire Station	Lower Boulevard	✓			
Police Department Headquarters	5 Gov. Winthrop Blvd.	✓			✓
<i>Municipal Facilities</i>					
City Hall	181 State Street				
Stanton Building	111 Union Street	✓			
Public Works Complex	189 Crystal Avenue				
Water Pollution Control Facility	Trumbull Street	✓		✓	✓
Martin Center/Senior Center	120 Broad Street	✓	✓		
New London High School	490 Jefferson Avenue				
Bernie Dover Jackson Middle School	36 Waller Street				
Jennings Elementary School					
Nathan Hale Elementary School					
Harbor Elementary School					
<i>Health Care and Senior Living Facilities</i>					
Lawrence and Memorial Hospital	365 Montauk Avenue				
Community Health Center	1 Shaws Cove			✓	✓
Beechwood Manor	31 Vauxhall Street				
Harbor Village Rehabilitation & Nursing Center South	89 Viets Street				
Harbor Village Rehabilitation &	78 Viets Street				

Facility	Address or Location	Emergency Power Supply	Shelter	In Floodplain or Coastal Flood Hazard Area	In Surge Zones
Nursing Center South					
Bacon and Hinkley Home	581 Pequot Avenue				
Briarcliff Manor	179 Colman Street				
Sunny Lodge (Cedar Grove Manor)	47 Cedar Grove Avenue				

*Zone X/Protected by Levee.

Wastewater Utilities

The Water Pollution Control Facility (WPCF) located along the Thames River is a critical facility, along with the sewer pumping stations located throughout the City. These facilities are a high priority for power restoration following any outage to prevent sewer backups. Since the previous HMP, the WPCF has made improvements to its reservoir and removed fuel tanks.

Health Care Facilities

The 1994 hurricane study report notes seven medical and institutional facilities in New London (one hospital and six nursing homes): Lawrence & Memorial Hospital, Beechwood Manor, Camelot Nursing Home, Nutmeg Pavilion Health Care, Bacon and Hinkley Home, Briarcliff Manor, and Cedar Grove Manor. In particular, Lawrence & Memorial Hospital is a major provider of advanced healthcare services in the SCCOG region. None of the facilities are located in either a flood zone or a hurricane surge zone.

Communication Capabilities

New London has upgraded its emergency radio communication system to operate on an ultra-high frequency (800 megahertz) digital system.

Evacuation Routes

The Police Chief has an evacuation plan on file that considers an evacuation required because of an emergency at the Millstone Nuclear Power Plant in Waterford, a coastal flooding emergency, or a hurricane. Evacuation routes should not include roads that can become submerged during coastal storms and riverine flooding (See Section 4). Any changes in shelter status or shelter locations will necessarily require modifications to the evacuation map. In addition, any changes in routing will necessarily require modifications to the evacuation map.

3.0 INLAND FLOODING

3.1 Setting / Historic Record

There are no notable inland flooding problems in the City due to overflow of watercourses. The primary inland flooding problem is believed due to the configurations and capacities of drainage systems. Such flooding occurs several times per year and is associated with heavy rainfall.

Recent examples include:

- March 2010 and March 2011 heavy rainfall and associated flooding.
- September 10, 2015: a strong storm brought heavy rain to the city, flooding Water Street and Bank Street.
- Heavy rain on September 2, 2013 overwhelmed the City's drainage systems. Flooding led to the closure of Eugene O'Neill and Governor Winthrop Boulevard, Water Street, Broad Street and Connecticut Avenue, Truman and Blackhall Streets, Bank and Tilley Streets, Pequot Avenue near Green Harbor Beach Park, and Garfield Avenue at Elm Street. The city activated pumps to remove water. Some buildings experienced flooding.
- A heavy downpour in March of 2014 caused flooding.
- A heavy downpour on August 13, 2014 caused flash flooding and power outages across the region.
- Thunderstorms on September 10, 2015 led to flash flooding that trapped numerous people in cars, requiring emergency rescues. The New London High School gym floor was damaged by the waters. Repair costs were estimated between \$50,000 and \$250,000.
- A heavy downpour on September 19, 2016 closed Ledyard Street and Connecticut Avenue.

3.2 Existing Capabilities

The City attempts to mitigate inland flood damage and flood hazards by utilizing a wide range of measures including restricting activities in floodprone areas, replacing culverts, promoting flood insurance, acquiring floodprone structures, maintaining drainage systems, through education and outreach, and by utilizing warning systems.

As noted in Section 2.5, the Zoning and Subdivision Regulations of the City of New London restrict development and require mitigation for projects constructed within the 1% annual chance floodplains as defined by FEMA. Such Special Flood Hazard Areas are delineated on the DFIRM published with the Flood Insurance Study for New London County that was released on either August 5, 2013 or July 18, 2011, depending on the location. These areas are presented on Figure 3-1. Most of the SFHAs mapped by FEMA in the City of New London do not appear to be associated with a watercourse and thus are more closely related to coastal flooding (Section 4). Bates Woods Brook and Fenger Brook are the only exceptions.

As noted in Section 2.5, New London requires two feet of freeboard for renovation or new construction in all AE and VE zones.

Public Works cleans and inspects catch basins and culverts at least annually or more often if problems are noted. When inland flooding occurs, the Public Works department and the Fire Department handle the complaints depending on the location.

Previously, Stuart Avenue near the Ocean Beach parking lot, as well as Parkway South, have experienced frequent storm flooding. Drainage studies commissioned by the City in March 2008 and January 2008, respectively, characterized the problems and developed potential solutions. Three alternatives were developed for the Stuart Avenue property, which previously relied on catch basins and an outfall across Ocean Beach property to Alewife Cove. Several other alternatives were evaluated for the Parkway South property, such as modifying the drainage system, reducing the watershed to the system, and reducing the potential for water to overflow from the system to the property. New London officials report that appropriate alternatives as recommended in both the Stuart Avenue and Parkway South studies have been implemented.

The Shaw's Cove Hurricane Protection System is one of the cornerstones of New London's structural flood mitigation activities. The 2007 POCD describes the system as follows:

"As a means to protect all areas in the Shaw's Cove urban renewal area from high tides caused by coastal storms and hurricanes and from interior flooding caused by Truman Brook, a barrier system running from Howard Street to Bank Street along the shoreline of Shaw's Cove was constructed in conjunction with the Army Corps of Engineers and the Federal Railroad Administration. In addition, a 96" diameter pressure conduit was constructed to carry the Truman Brook and a pumping station was constructed to handle this drainage system during storm events. This work also included the construction of a new docking facility for unloading oil tankers, an abutment for a new railroad swing bridge, the reconstruction of the Bank Street Connector, the Coast Guard dock frontage road/crossing and the end of Sparyard Street. This construction was divided into six phases the first of which was initiated in August of 1978 and the last of which was not completed until May of 1986."

The barrier consists of 715 feet of earth dike and 800 feet of concrete flood wall situated along Shaw's Cove and New London Harbor. New London officials indicate that the Shaw's Cove pumping system is routinely utilized to pump stormwater during heavy rainfall. Modifications to this system may be possible to increase the City's ability to pump stormwater from behind the barrier and thus further reduce the flood hazards in the downtown area. Although improvements are desired and federal funds would be helpful to achieve improvements, the City has not dedicated its share (the 25% match) at the present time.

Since the previous HMP, the City has participated in the acquisition of a regional sand bag machine, allowing for rapid filling and deployment of flood-protection sandbags prior to a predicted event. The City has a plan and procedure for stockpiling and deploying sandbags.

New London has the capability to implement roadway-specific warning systems to alert motorists about dangerous or flooded roads.

Education and Outreach

New London promotes education and awareness about flood hazards and mitigation measures. The importance and availability of flood insurance is incorporated into all hazard-related public education workshop, and FEMA-provided flood insurance brochures are available at municipal buildings and the City website. Residents are encouraged to purchase flood insurance if they are in a SFHA, and to submit insurance claims following damage events. City personnel are able to provide technical assistance to property owners regarding flood proofing techniques.

Summary

In general, municipal capabilities to mitigate flood damage have increased since the 2012 edition of the hazard mitigation plan was adopted. This is likely because the City increased its capabilities in response to continued flash flooding; and the flooding of 2011 and 2012 associated with Tropical Storm Irene and Hurricane Sandy, which are discussed in later chapters. City personnel have participated in events of the Connecticut Association of Flood Managers in recent years, and should continue to do so when time allows.

3.3 Vulnerabilities and Risk Assessment

This section discusses specific areas at risk to inland flooding within the City. Areas at risk from coastal flooding are discussed in Section 4 of this annex. Inland flooding due to poor drainage is the most common type of non-coastal flooding experienced by the City.

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

3.3.1 Vulnerability Analysis of Areas along Watercourses

Areas of potential flooding of roads and structures that border the Thames River include Water Street, Hamilton Street, East Street, Howard Street, Smith Street, Nameaug Street, Pequot Avenue, Shaw Street, the northern side of Trumbull Street, the southern part of the City, Rockbourne Lane, Parkway South and sections of Admiral Drive. Additionally, residential neighborhoods along Alewife Cove especially in the areas of Alewife Parkway are at risk of flooding.

Roadway flooding could result in delays in emergency response. Roads near Shaw's Cove such as Hamilton Street, East Street, and Howard Street, and the Glenwood Avenue Bridge that crosses Alewife Cove are in potential flood zones which may impede emergency egress as well as emergency response.

In addition to the areas studied by the City and described above, several other notable areas of flooding have been problematic in recent years:

- Pequot Avenue experiences flooding along many sections of its length, including the section near Parkway South referenced above. The road lies at a very low elevation.
- Green Harbor Beach experiences flooding at Pequot Avenue. Water flows down the hill and over the road, and cannot drain into the sound. Frequent removal of sand from the road is necessary.
- Bank Street flooding in the downtown is believed to be caused by poor drainage, a result of both limited drainage system capacity and a lack of maintenance for many years.

3.3.2 Vulnerability Analysis of Private Properties

In terms of inland flooding, numerous structures are regularly affected in the City due to drainage problems. Many of these are not located in special flood hazard areas, and those located in flood hazard areas are typically in the coastal flood zones. Thus, it is not possible to tally the number of private properties affected by inland flooding through a review of the DFIRM for the City (155 properties are located in the AE zone and 43 are located in the VE zone). However, the City understands that properties located along the roads listed in Section 3.3.1 are most vulnerable to drainage-related flooding. In particular, properties in the Stuart Avenue, Parkway South, and Pequot Avenue areas are floodprone.

The City had eight repetitive loss properties in 2012 and currently has 16. They appear to suffer flooding from different causes. Some of them are flooded as a result of poor drainage, others are flooded by coastal floods, and some are vulnerable to a combination of the two. Flooding at some of the properties (located on Pequot Avenue) has been studied as noted above.

TABLE 3-1
Repetitive Loss Properties

Type	Street	Flooding Source	Number of Properties
Residential home	Admiral Drive	Long Island Sound	1
Residential home	Lower Blvd	Long Island Sound	2
Residential home	Mott Avenue	Long Island Sound	5
Residential home	Ocean Avenue	Long Island Sound	2
Residential home	Pequot Avenue	Long Island Sound	4
Residential home	Rockbourne Lane	Long Island Sound	2

The doubling of the number of properties is likely due to claims made after the floods associated with storms Irene and Sandy. Interestingly, the six roads listed in Table 3-1 are the same six roads listed in the 2012 edition of this plan, indicating that the new RL properties were neighbors of the existing RL properties. This should help the City focus on the areas that are truly problematic and require mitigation.

Three repetitive loss properties reportedly wished to pursue HMGP funds for structure elevations when the 2012 edition of this plan was developed. These are located on Lower

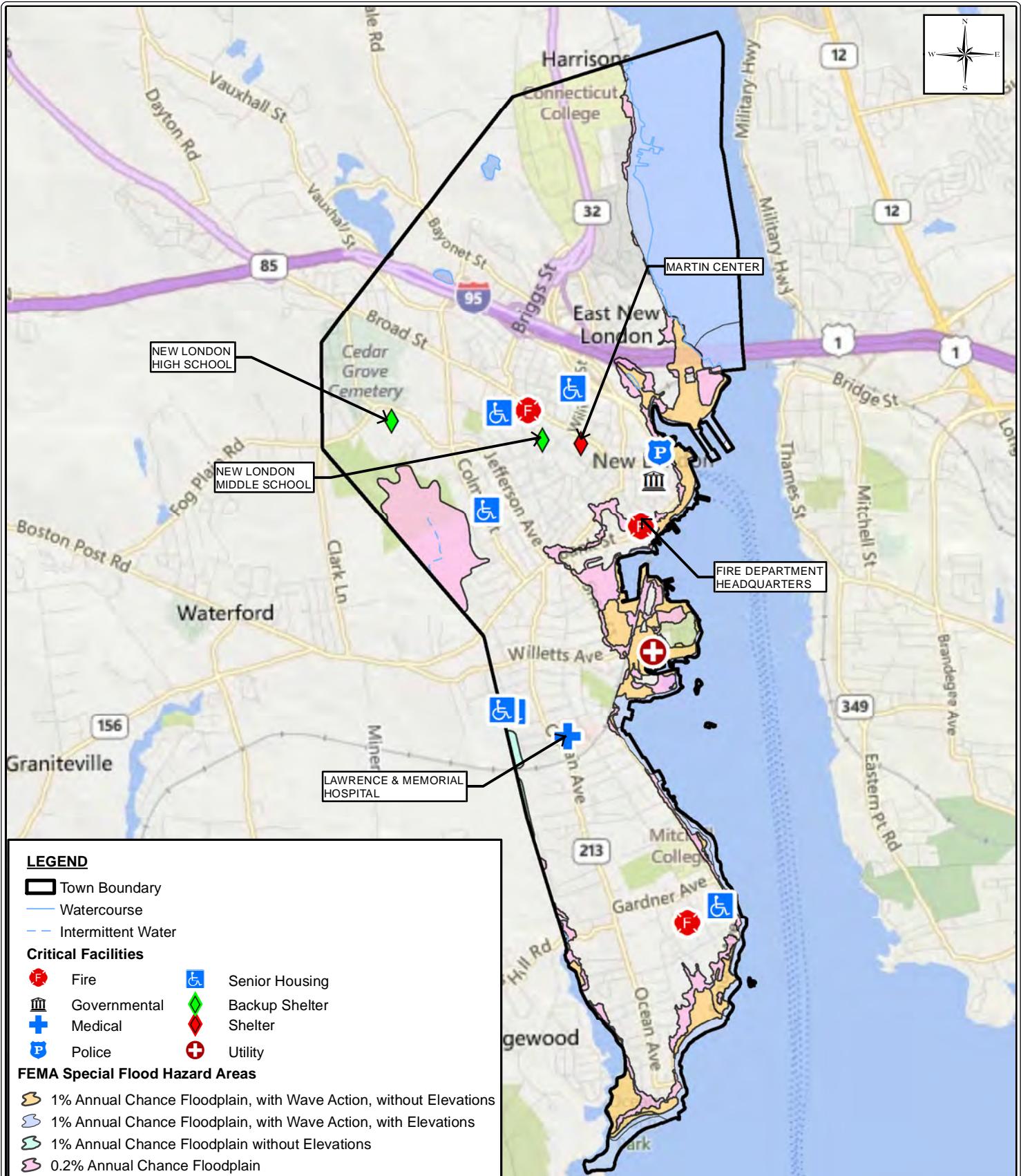
Boulevard, Pequot Avenue, and Rockbourne Lane. However, it is not certain that the City can support the local match at the present time.

3.3.3 Vulnerability Analysis of Critical Facilities

As noted in Section 2.6, the only critical facilities located within flood zones are the water pollution control facility and the Fire Department headquarters. Refer to Section 4.3.3, as these are affected by coastal flooding.

3.4 Potential Mitigation Strategies and Actions

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 City of New London.

**LEGEND**

- Town Boundary
- Watercourse
- Intermittent Water

Critical Facilities

- | | | | |
|--|--------------|--|----------------|
| | Fire | | Senior Housing |
| | Governmental | | Backup Shelter |
| | Medical | | Shelter |
| | Police | | Utility |

FEMA Special Flood Hazard Areas

- 1% Annual Chance Floodplain, with Wave Action, without Elevation
- 1% Annual Chance Floodplain, with Wave Action, with Elevation
- 1% Annual Chance Floodplain without Elevation
- 0.2% Annual Chance Floodplain

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FEMA SPECIAL FLOOD HAZARD AREAS**SCCOG HAZARD MITIGATION UPDATE
CITY OF NEW LONDON ANNEX**

NEW LONDON, CONNECTICUT

SOURCE: NATIONAL FLOOD HAZARD LAYER, FEMA, 2017

DATE: JULY 26, 2017		
SCALE: 1"=3,500'		
PROJ. NO.: 3570-09		
DESIGNED <input type="checkbox"/> DRAWN <input type="checkbox"/> CHECKED <input type="checkbox"/>		
SB PS DM		
DRAWING NAME:		

FIG. 3-1

4.0 COASTAL FLOODING & SHORELINE CHANGE

4.1 Setting / Historic Record

The shorefront of the City of New London contains developed shorefront along the Thames River. Areas of rocky shorefront, coastal bluffs and escarpments, modified bluffs and escarpments, beaches and dunes, and intertidal flats are found along New London Harbor and Long Island Sound. The coastal resources found in Connecticut and described by DEEP can be found in the Multi-Jurisdictional HMP.

Homes, businesses, and industry are located in close proximity to the coastline along the Thames River and Long Island Sound. Structures and infrastructure along the Thames River, the harbor, and Long Island Sound are closer to sea level than in northern areas and are therefore more susceptible to coastal flooding. Hurricanes and tropical storms have the potential to induce coastal flooding and storm surge that can impact structures. Only a few structures are known to have received damage directly from coastal floodwaters; for the most part, only roadway closures have occurred due to coastal flooding since 2012.

Floodwaters due to Hurricane Sandy in October 2012 damaged a relatively small number of coastal properties in New London, with the main damages caused by coastal flooding being beached boats and debris piled along the shoreline. The New London Harbor Lighthouse sustained serious damage, and the city received nearly \$700,000 in federal public assistance funds.

New London is also concerned with the potential long-term effects of sea level rise and its potential to exacerbate flooding conditions in the future.

4.2 Existing Capabilities

The City primarily attempts to mitigate coastal flood damage and flood hazards by controlling and restricting activities in flood-prone areas, encouraging the elevation of homes and roadways, maintaining hard structures in good condition, and providing signage and warning systems. Many of the Existing Capabilities utilized in the City 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 City 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) as presented on Figure 3-1. 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 Planning and Zoning Commission and OPD are required to review and approve portions of applications that involve structures within FEMA Special Flood Hazard Areas.

The City has conducted outreach to residents about flood mitigation and a number of residents are interested in structure elevations. The recommendations from the Plan of Conservation and

Development described in Section 2.0 and regarding flood damage prevention are pertinent to coastal flood mitigation.

Although New London lacks inland flood control structures such as dams and channelized sections of rivers, the shoreline of New London contains many coastal flood control structures. Seawalls and bulkheads can be found in many of the residentially developed coastal neighborhoods. Additionally, the City conducts beach nourishment and vegetation replacement along any affected beaches to keep up with erosion.

To address tidal flooding and hurricane surge damage in the Shaw's Cove and downtown area, the United States Army Corps of Engineers constructed a hurricane barrier as described in Section 3.2. The barrier protects the downtown area from tidal flooding. The U.S. Army Corps of Engineers' Connecticut Hurricane Evacuation Study and Technical Data Report from 1994 noted that this hurricane barrier was designed to protect against flooding events up to the 100-year frequency flood. Study results indicated that worst case surges generated by Categories 3 and 4 hurricanes in combination with astronomical tides were higher than the design height of the barrier. Potentially vulnerable land areas located behind this barrier should be evacuated for hurricanes of these intensities.

The hurricane barrier system is classified as a levee and as such, it requires continued accreditation. The appropriate paperwork was submitted to FEMA on December 22, 2011. Minor recommendations related to clearing sediment were returned to the City, and compliance is anticipated.

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 City of New London utilizes these warnings and forecasts to prepare emergency responders for flooding events.

Like many communities, the City lacks existing policies and mitigation measures that are specifically designed to address sea level rise. The City participated in a resiliency planning initiative with SCCOG and TNC in 2016-2017¹. However, the City has not yet embarked on detailed coastal hazard planning to the degree that nearby communities like Waterford and the Town of Groton have done. Although the City of New London 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. Together, the policies of the draft POCD (2017) and the existing regulations and codes will build a foundation for addressing coastal resilience and adaptation.

As explained in Section 2.13 of the regional part of this multi-jurisdiction hazard mitigation plan, the State Historic Preservation Office (SHPO) embarked on a resiliency planning study for

¹ <https://tnc.app.box.com/s/8nne60yjk2g3m1mgzkfa86rndxyjiawf>

historic and cultural resources beginning in 2016. During winter 2016-2017, individual meetings were held with the shoreline SCCOG communities. Reports were issued to these communities in DECEMBER 2017. The City of New London report outlines eight strategies that can be employed to make historic and cultural resources more resilient:

- Identify Historic Resources
- Revisit Historic District Zoning Regulations
- Strengthen Recovery Planning
- Incorporate Historic Preservation into Planning Documents
- Revisit Floodplain Regulations and Ordinances
- Coordinate Regionally and with the State
- Structural Adaptation Measures
- Educate

Subsequently, a best practices guide for planning techniques to make historic resources more resilient was distributed in September 2017.

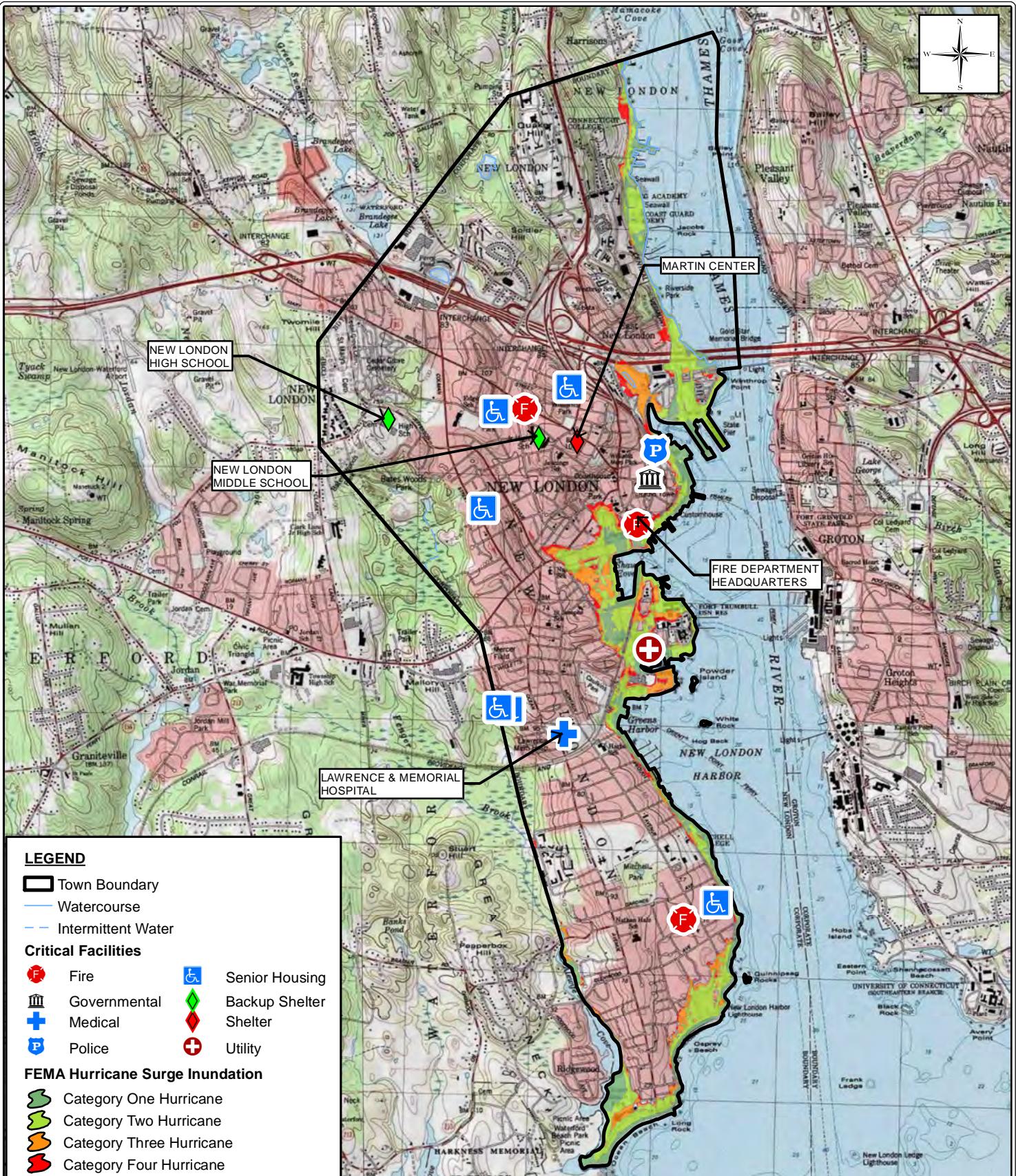
Summary

Municipal capabilities to mitigate coastal flood damage have increased sharply since the 2012 edition of the hazard mitigation plan was adopted. This is because the City updated its POCD, participated in the historic resources resiliency planning, and generally increased its capabilities in response to the flooding associated with storms Irene and Sandy in 2011 and 2012, respectively.

4.3 Vulnerabilities and Risk Assessment

This section discusses specific areas at risk to coastal flooding within the City. This flooding can be the result of astronomical high tides, hurricanes, nor'easters, or storm surge. Coastal flooding can impact many roads and neighborhoods, potentially cause severe damage, and impede transportation in the City. Refer to 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 City of New London from a combined 1% annual chance riverine and coastal flood. Results were presented in Section 3.5.2 of the Multi-Jurisdictional HMP.



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POTENTIAL HURRICANE STORM SURGE

SCCOG HAZARD MITIGATION UPDATE CITY OF NEW LONDON ANNEX

NEW LONDON, CONNECTICUT

SOURCE: HURRICANE SURGE INUNDATION LAYER; CTDEEP, 2012

DATE: JULY 26, 2017		
SCALE: 1"=3,500'		
PROJ. NO.: 3570-09		
DESIGNED SB	DRAWN PS	CHECKED DM
DRAWING NAME:		

FIG. 4-1

4.3.1 Vulnerability Analysis of Areas along Coastal Waters

The low-lying shoreline areas of the city are subject to periodic flooding. Tidally-influenced flooding also occurs along lower Fenger Brook/Alewife Cove and the Thames 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 City.

As noted in Section 3.3.1, Stuart Avenue near the Ocean Beach parking lot experiences frequent flooding. Town personnel report that alternatives to reduce the contributing watershed and help alleviate flooding from rainfall have been implemented, but flooding from tidal waters is expected to continue to occur in this area. The other specific areas discussed in Section 3.3.1 have varying connectivity to tidal and coastal flooding, although the low elevations certainly imply at least indirect connections to coastal flooding.

Also as noted in Section 3.3.1, areas of potential flooding of roads that border the Thames River include Water Street, Hamilton Street, East Street, Howard Street, Smith Street, Nameaug Street, Pequot Avenue, Shaw Street, the northern side of Trumbull Street, the southern part of the City, Rockbourne Lane, Parkway South and sections of Admiral Drive. The retaining wall on Pequot Avenue has been noted as a vulnerable piece of coastal infrastructure.

Residential neighborhoods along Alewife Cove especially in the areas of Alewife Parkway are at risk of flooding. Roadway flooding could result in delays in emergency response. Roads near Shaw's Cove such as Hamilton Street, East Street, and Howard Street, and the Glenwood Avenue Bridge that crosses Alewife Cove are in potential flood zones which may impede emergency egress as well as emergency response.

Areas of storm surge are generally coincident with the areas of coastal flooding described above. However, the areas affected by storm surge are predicted to be more widespread than the 0.2% annual chance floodplain for Category Two hurricanes, with stronger hurricanes pushing storm surge further inland. Areas along the Thames River such as the State Pier, downtown, Shaw's Cove, and Fort Trumbull appear to be at particular risk. The neighborhoods adjacent to Osprey Beach and Ocean Beach are quite vulnerable to storm surge, as well. The timing of evacuations from the southern part of the City and downtown prior to a hurricane event are therefore very important as the majority of the roads in this area will be flooded or washed out by a major hurricane.

In general, it is assumed that as sea level rises, the frequency and magnitude of coastal flooding in the City will increase, with structures and roadways closest to existing sea level being affected more quickly. In addition, tidal marsh areas along Alewife Cove will either migrate inland or be eroded by constant inundation.

Coastal erosion is generally not an issue in the City of New London since the majority of the shoreline is either developed, rocky shorefronts consisting of stones and boulders, or modified bluffs and escarpments consisting of seawalls, bulkheads, or revetments. Several notable beaches are located within coastal flood zones including Ocean Beach Park, Osprey Beach, Guthrie Beach, and Green Harbor Beach. These beaches become flooded and attacked by wave

velocity during storms. This is a concern for the City, as the beaches are important municipal facilities. As sea level rises, the effectiveness of erosion control structure will be undermined.

City officials have expressed concern regarding a retaining wall that was built near Alewife Cove on Highland Avenue. The retaining wall is experiencing erosion problems and city officials have shown interest in repairing this retaining wall.

Green Harbor Beach has been specifically noted as vulnerable to coastal flooding, and is often inundated during high tide.

4.3.2 Vulnerability Analysis of Private Properties

The coastal areas of the City of New London include properties that are inhabited year-round. This intensifies risk to life and property in coastal areas. Beachfront properties are very susceptible to damage, not only as a result of flooding but also due to the velocity zones located along the City of New London's shoreline. Although shoreline erosion is a relatively minor concern for private property owners at this point in time since most have seawalls or rocky storefront protecting their structures, flooding and wave action remain concerns.

A review of the DFIRM for the City shows that 155 properties are located in coastal AE zones and 43 are located in VE zones. Buildings located in flood hazard areas are primarily residential but also include some commercial, industrial, and critical facility structures. 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. Properties located more inland or behind protective seawalls are only subject to coastal flooding without wave action

As noted in Section 3.3.2, 16 repetitive loss properties are located in New London, which represents an increase from the eight in 2012. Most are believed to be influenced, to some degree, by coastal flooding. Either direct flooding of coastal waters can occur, or tidal influences can cause drainage systems to fail.

The City of New London 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. City planners should use the DFIRM to identify the 148 structures in the City 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 City 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

The only critical facilities located within coastal flood zones are the WPCF and the Fire Department headquarters. Critical facilities in the City do not normally experience flooding, although it is possible even with the Fire Department protected by the levee system. Municipal staff are also concerned about flooding of the Police Department Headquarters at the eastern

end of Governor Winthrop Boulevard, and coastal wastewater pumping stations. The risk of flooding to critical facilities is considered to be moderate.

In the long term, the City desires a new Fire Headquarters that is located in a more flood-resilient location. SCCOG completed an assessment of critical facilities in the region in 2017, fulfilling an action listed in the 2012 edition of the multi-jurisdiction hazard mitigation plan. The Fire Headquarters was addressed in this study. The assessment determined that the City should undertake stormwater improvements and backflow prevention in the short term, and pursue dry floodproofing of the utility room and wet floodproofing of remaining lower areas in the long term. These recommendations are incorporated into the list of actions in Chapter 11 of this annex. The assessment did not recommend that the Fire Headquarters should be relocated in the short-term, but this hazard mitigation plan absolutely supports relocation of the Fire Headquarters outside the SFHA if the opportunity arises for some other reason such as the availability of land.

4.4 Potential Mitigation Strategies and Actions

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 borough are listed in Section 11 of this annex, as are specific measures pertinent to reducing inland flooding in the City of New London.

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 City. However, some buildings in the City are more susceptible to wind damage than others.

- ❑ Hurricane Irene impacted the city in August 2011. The storm surge was only moderate, but the waves broke over the seawalls and a number of coastal streets were flooded. Trees fell throughout the City and power outages ranged from one day to one week.
- ❑ In 2012, Hurricane Sandy, a hybrid storm with both tropical and extra-tropical characteristics, brought high winds and coastal flooding to southern New England. Record breaking high tides and wave action combined with sustained winds of 40 to 60 mph and wind gusts of 80 to 90 mph. Widespread significant statewide power outages of 667,598 lasted up to 8 days.

5.2 Existing Capabilities

Wind loading requirements are addressed through the state building code. The Connecticut State Building Code was most recently adopted with an effective date of October 1, 2016. The code specifies the design wind speed for construction in all the Connecticut municipalities. The ultimate design wind speed for New London ranges from 125 to 145 miles per hour depending on the building use (for example, hospitals must be designed to the higher wind speed). Note that changes in design wind speed figures since the previous HMP are largely the result of a shift from "nominal" to "ultimate" wind speeds, for compatibility purposes; see the Connecticut Building Code or the American Society of Civil Engineers website for more information. New London has adopted the Connecticut Building Code as its building code.

Parts of trees (limbs) or entire tall and older trees may fall during heavy wind events, potentially damaging structures, utility lines, and vehicles. Utility lines are located underground in a few areas of the City such as State Street and Bank Street, both located downtown. The City has a tree warden who can post notification and schedule tree removal. The Public Works staff also monitors trees as part of their normal rounds and includes a budget for minor tree maintenance.

Historically, the City of New London received electrical service from CL&P. Since the previous HMP, CL&P has been acquired by Eversource. In response to the major power-outages caused by Tropical Storm Irene and Hurricane Sandy, as well as significant winter storm events, Eversource has taken an aggressive approach to tree maintenance and has improved communication and coordination with municipalities. Municipal staff report that Eversource has improved its tree clearing efforts by implementing "Enhanced Tree Trimming," has updated its

facilities, and has been working to strengthen the power grid and build in redundancies. Communication and coordination has improved due to Eversource's liaison program. The utility maintains a tree pruning program.

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 City 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 City to activate its EOP and encourage residents to take protective or evacuation measures if appropriate.

Prior to severe storm events, the City ensures that warning/notification systems and communication equipment are working properly and prepares for the possible evacuation of impacted areas. 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 New London have historically passed in a day's time, additional shelters could be outfitted following a storm with the assistance of the American Red Cross on an as-needed basis for long-term evacuees.

Other municipal capabilities related to tropical storm mitigation include:

- A protocol for removing personal watercraft from marinas prior to a storm event
- Providing information on wind-resistant construction techniques to building permit applicants upon request
- A location has been identified for brush-disposal to help manage debris following a storm
- Agreements with landowners and companies to chop/chip to assist with debris removal have been developed
- Evacuation routes have been marked with street signs

Summary

In general, municipal capabilities to mitigate hurricane damage have increased slightly since the 2012 edition of the hazard mitigation plan was adopted. This is likely because the City increased its capabilities slightly in response to the damage from Tropical Storm Irene in 2011 and Hurricane Sandy in 2012.

5.3 Vulnerabilities and Risk Assessment

The entire City is vulnerable to hurricane and tropical storm wind damage and from any tornadoes (Section 5) 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 City experienced a range of outages during and after Hurricane Irene.

Direct wind damage to newer buildings from hurricane or tropical storm-level winds is rare in the City since the new buildings were constructed to meet or exceed current building codes.

Many buildings in the City were built under prior codes and do not meet current building codes. Older buildings in the City 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.

The strength of a large hurricane could cause a significant economic impact to the City. 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 City of New London.

5.4 Potential Mitigation Strategies and Actions

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 borough are listed in Section 11 of this annex, as are specific measures pertinent to reducing wind damage in the City of New London.

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 City. 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 City without harming another. Such storms occur in the City each year, although hail and direct lightning strikes to the City are rarer.

A funnel cloud was spotted on August 5, 2010 in the Thames River closer to Groton, as reported to the NCDC. No tornadoes have occurred in the City since the last HMP.

6.2 Existing Capabilities

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 City 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 City 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 City 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.

Summary

In general, municipal capabilities to mitigate thunderstorm and tornado damage have not increased significantly since the 2012 edition of the hazard mitigation plan was adopted.

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 City are equally likely to experience the effects of summer storms. The density of damage is expected to be greater near the more densely populated area of the City.

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 City's strong fire response.

Lightning and hail are generally associated with severe thunderstorms and can produce damaging effects. All areas of the City 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 City. Older buildings are most susceptible to lightning and hail damage since many are renter occupied and 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 City exists, it is considered to be an event with a very low probability of occurrence.

6.4 Potential Mitigation Strategies and Actions

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 City. 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 City.

Winter storms and nor'easters have repeatedly affected the City since the last HMP Notable events include:

- The storms during the winter of 2010-2011 had a significant impact on the region. The roof of the building at 575 Bank Street collapsed in early 2011. It was a mixed-use commercial/residential building. A total of 17 people had to be relocated. Other buildings in the city were checked, and the roof of City Hall was cleared.
- Winter Storm Alfred struck later in 2011, but damage was minimal as compared to much of Connecticut.
- 2013 featured exceptional snow events that severely taxed snow removal abilities of towns in the region. The blizzard of 2013 in early February dumped one to two feet of snow on the region. Another snowstorm struck the region in mid-March, 2013 dumping upwards of one to two feet of snow in some parts of the county. Although New London country escaped the 3 foot + totals of some areas in the mid-Atlantic, the vast quantity of snow was still a major disruption to the town. New London received over \$60,000 in federal aid from FEMA to cover storm cleanup costs.
- A nor'easter in December 2014 caused significant damage and disruption in New London.
- In January 2015 winter storm Juno created blizzard conditions across southeastern Connecticut. The region received 20 to 28 inches of snow, or more.
- In February 2017 a blizzard brought snow and high winds to New London.

7.2 Existing Capabilities

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 City staff, as parking lots and roadways need constant maintenance during storms. The Public Works Department oversees snow removal in the City. The City has established plowing routes that prioritize access to and from critical facilities. These routes have been updated since the previous HMP based on lessons learned from the exceptionally snowy winters on 2013 and 2015. The DPW also pretreats roads when

winter storms are predicted. The Connecticut Department of Transportation plows Interstate 95 and other State roads.

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. As noted above, snow loads were problematic in early 2011 and a roof collapsed downtown. The DPW has updated its snow removal protocols and equipment, and maintains a plan for inspecting and prioritizing removal of snow from Town owned structures.

Information for protecting residents during cold weather, including mitigating icing and insulating pipes at residences, is available seasonally through the City website.

Summary

In general, municipal capabilities to mitigate snowstorm damage have increased slightly since the 2012 edition of the hazard mitigation plan was adopted. This is because the City continues to experience heavy snow each winter.

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. 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.

Many City buildings are of older construction and are therefore susceptible to damage from heavy snow. While some City buildings could be susceptible to heavy snow loads, they will be cleared quickly if safety is a concern. Many buildings in the City have flat roofs which are more susceptible to damage from heavy snow than sloped roofs.

Icing is not a common issue in the City. 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 Strategies and Actions

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 City. However, it is very unlikely that the City would be at the epicenter of such a damaging earthquake. No major earthquakes have affected the City since the last HMP.

8.2 Existing Capabilities

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 City. The City has adopted these codes for new construction, and they are enforced by the Zoning and Building Department.

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

In general, municipal capabilities to mitigate earthquake damage have not increased since the 2012 edition of the hazard mitigation plan was adopted. This is because the hazard continues to pose a low risk of damage to the City.

8.3 Vulnerabilities and Risk Assessment

No fault lines exist within or near the City of New London. Unlike seismic activity in California, earthquakes in Connecticut are not associated with specific known active faults. In addition, 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.

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, several areas of the City are underlain by stratified drift and fill material, including portions of the downtown area, Fort Trumbull, and the State Pier. These areas are potentially more at risk of earthquake damage than the areas of the City underlain by glacial till. The likelihood of soil subsidence and liquefaction is relatively higher in areas of fill. 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 City deems necessary, the possible prohibition of new construction.

The built environment in the City primarily includes older construction that is not seismically designed. Thus, it is believed that most buildings would be at least moderately damaged by a significant earthquake. Those City 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. Fortunately, the City has relatively limited areas of steep slopes and the majority of developed areas have been reinforced. Thus, landslides are not a concern in the City.

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. Several types of utility infrastructure in the City is located above ground. A quick and coordinated response by the City's Utilities Department will be necessary to inspect damaged water and sewer utilities following an earthquake, to isolate damaged areas, and to bring backup systems online. This is covered in the City's EOP.

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 Strategies and Actions

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 City. Structural fires in higher density areas of the City are not directly addressed herein. No wildfires have occurred in the City since the last HMP.

9.2 Existing Capabilities

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 City can access this information over the internet. The City 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 Fire Department goes to fires as quickly as possible in the City. The City's Utilities Department provides fire protection water. Fire pumps are tested and are considered to provide excellent pressure. Each hydrant is banded such that the Fire Department knows how much pressure is available. The City does not have any dry hydrants since public water service is available throughout the City.

The Connecticut DEEP has recently changed its Open Burning Program. It now requires individuals to be nominated and designated by the Chief Executive Officer in each municipality that allows open burning and to take an online training course and exam to become certified as an "Open Burning Official." Permit template forms were also revised that provide permit requirements so that the applicant/permittee is made aware of the requirements prior to, during, and after burn activity. The regulated activity is then overseen by the Town.

Summary

In general, municipal capabilities to mitigate wildfire damage have remained consistent since the 2012 edition of the hazard mitigation plan was adopted.

9.3 Vulnerabilities and Risk Assessment

The risk for wildfire in the City is very low for several reasons. First, the City is mostly developed such that there are few outlying areas where a wildfire could advance undetected. As such, there have been no major fires in recent history. Secondly, all developed areas of the City have public water service provided by the Utilities Department. This public water service provides sufficient water volume and pressure to fight nearly any fire. Third, the Thames River and

Fishers Island Sound are nearby if additional firefighting water was necessary. Fourth, there are few notable dead ends or one-way roads that are difficult to access in the City. Thus, if a wildfire did occur, it would likely be contained to within only a few acres. Bates Woods Park and Connecticut College are the only areas in the city with forestland that would be susceptible to wildfires. The city responds to fires at Connecticut College.

9.4 Potential Mitigation Strategies and Actions

The City of New London 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 the City of New London is considered a possible event each year although the damage would likely be minimal. No dam failures affected the City since the time of the last HMP.

10.2 Existing Capabilities

Dams in the region 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 Emergency Action Plans (EAPs) for such dams.

Summary

In general, municipal capabilities to mitigate dam failure damage have not increased since the 2012 edition of the hazard mitigation plan was adopted. However, changes in the State's regulation of dams have increased Statewide capabilities.

10.3 Vulnerabilities and Risk Assessment

The Connecticut DEEP administers the Dam Safety Section and designates a classification to each state-registered dam based on its potential hazard as detailed in the regional plan. The City of New London has only two dams known to be inventoried with the Connecticut DEEP. One is the unclassified Bates Woods Pond dam at the headwaters of Fenger Brook. The dam is adjacent to the Waterford town line. The other is the class BB Perry Pond dam located on Green Swamp Brook in the northwest section of the city. The impoundment is adjacent to I-95. Failure of either dam is not believed to of great risk to the City.

College pond at Connecticut College was drained and the dam no longer impounds water. Thus, there is no risk associated with this former dam.

Slightly upstream of the Perry Pond dam on Green Swamp Brook is the class B Brandagee Lake Dam in Waterford. This dam is of a higher hazard class and is somewhat of a concern to the City

of New London, as its failure would overwhelm Perry Pond and flood the commercial corridor along I-95 and then neighborhoods downtown.

While dams upstream in the Thames River basin on the Shetucket and Quinebaug Rivers could potentially cause a rise in water levels in the Thames River if they failed, their failure is expected to have a minimal effect on the City of New London due to the distance involved and the significant ability of Long Island Sound and the Thames River to absorb flood waters.

10.4 Potential Mitigation Strategies and Actions

Given the fact that the City of New London is unlikely to be affected by flooding from failure of dams in the city there are no mitigation measures recommended at this time. Recommendations regarding the Brandagee Lake Dam in Waterford can be found in the Waterford plan.

11.0 MITIGATION STRATEGIES AND ACTIONS

11.1 Status of Mitigation Strategies and Actions

The previous edition of the SCCOG Multi-Jurisdictional HMP and City of New London annex listed a suite of hazard mitigation actions applicable both locally and region-wide. These actions, along with commentary regarding the status of each, are listed in the tables in this section. Additionally, new actions were developed in the process of developing this HMP update. These are listed at the end of each hazard section below.

11.1.1 Actions Applicable to All Hazards

Action	Status	Notes
Regional Coordination		
Continue to promote inter-jurisdictional coordination efforts for emergency response.	Capability	<i>This is a capability and can be removed from the list of actions.</i>
Continue to promote local and regional planning exercises that increase readiness to respond to disasters.	Capability	<i>This is a capability and can be removed from the list of actions.</i>
Continue to evaluate communication capabilities and pursue upgrades to communication ensuring redundant layers of communication are in place within the town and with other SCCOG communities, New London County, and the State of Connecticut.	Capability	<i>This is a capability and can be removed from the list of actions.</i>
Continue to promote regional transportation planning through SCCOG to balance general transportation, shipping, and potential evacuation needs.	Capability	<i>This is a capability and can be removed from the list of actions.</i>
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.	Complete	<i>This action is the responsibility of, and was performed by, SCCOG in 2017. The Town Hall and Groton Long Point Police/Fire facility were included in the study due to their positions near or in flood zones. Recommendations from the study are incorporated into this HMP.</i>
Work with SCCOG to develop regional evacuation scenarios that include but build upon the Millstone evacuation plan.	Capability	<i>The City participates in regional hazard mitigation projects. Completion of this action is the responsibility of, and is being performed by, SCCOG. This action is redefined as a regional capability, and can be removed from the list of actions.</i>
Local Emergency Response		
Continue to review and update the town EOP at least once annually.	Capability	<i>This is a capability and can be removed from the list of actions.</i>
Continue to maintain emergency response training and equipment and upgrade equipment when possible.	Capability	<i>This is a capability and can be removed from the list of actions.</i>
Encourage local officials to attend FEMA-sponsored training seminars at the Emergency Management Institute (EMI) in Emmitsburg, Maryland.	Capability	<i>This is a capability and can be removed from the list of actions. City personnel attend events and conferences of the Connecticut Association of Flood Managers.</i>
Continue to evaluate emergency shelters, update supplies, and check communication equipment.	Capability	<i>This is a capability and can be removed from the list of actions.</i>
Continue to promote dissemination of public information regarding natural hazard effects and mitigation measures into local governmental and community buildings.	Capability	<i>This is a capability and can be removed from the list of actions.</i>

Action	Status	Notes
Utilize the CT "Everbridge" Reverse 9-1-1 system to telephone warnings into potentially affected areas. Incorporate the 1% annual chance and the 0.2% annual chance inland and coastal floodplains based on the recent DFIRM.	Capability	<i>This is a capability and can be removed from the list of actions.</i>
Prevention		
Integrate elements of this HMP into the <i>Plan of Conservation and Development</i> during the 2013 update and beyond.	Complete	<i>The 2017 update considers additional mitigation concepts such as coastal resiliency.</i>
Require the underground installation of utilities for all new development where possible.	Capability	<i>This is a capability and can be removed from the list of actions.</i>
Continue reviewing building plans to ensure proper access for emergency vehicles.	Capability	<i>This is a capability and can be removed from the list of actions.</i>
In the event of an expansion / redevelopment of the industrial Thames River area, promote such redevelopment so that non-water dependent uses are located further inland, and public access and attractions along the waterfront are encouraged and supported.	Capability	<i>This is a capability and can be removed from the list of actions.</i>
Continue to enforce the appropriate building code for new building projects.	Capability	<i>This is a capability and can be removed from the list of actions.</i>
Consider expanding street tree planting programs and recommend trees appropriate for each area (since tall-growing trees are not appropriate under overhead wires and flowering or fruit-bearing trees may not be appropriate in some locations). Encourage maintenance of street-side areas.	Complete/Capability	<i>The City has a Shade Tree Commission that supervises tree removal and replacement programs and placement of new trees where appropriate. Expansion of this program is an action in the POCD.</i>
Encourage residents to install and maintain lightning rods on their buildings.	Delisted	<i>Lightning strikes on buildings has not been an issue in New London. Additionally, the City has not seen strong evidence that installation of lightning rods on private residential property will be helpful.</i>
Natural Resource Protection		
Continue to regulate development in protected and sensitive areas including steep slopes, wetlands, and floodplains.	Capability	<i>This is a capability and can be removed from the list of actions.</i>
Consider requiring the deduction of wetlands, watercourses, steep slopes greater than 20%, and floodplains from parcel area when determining residential density for multi-family developments.	Capability	<i>This is a capability and can be removed from the list of actions.</i>

Mitigation actions performed in the City since the previous HMP include:

- Implementation of a "long term disturbance recovery" ordinance.

A new mitigation action pertaining to flooding but affecting response to all hazards is:

- From the SCCOG Critical Facilities Assessment: undertake stormwater improvements and backflow prevention to reduce the frequency of flooding during heavy or intense rain events.

11.1.2 Actions Applicable to Inland and Coastal Flooding

Action	Status	Notes
Prevention		
Continue to regulate new development activities within SFHAs to the greatest extent possible within town land use regulations	Capability	<i>This is a capability and can be removed from the list of actions.</i>
Require developers to demonstrate whether detention or retention of stormwater is the best option for reducing peak flows downstream	Carry Forward	<i>Subdivision regulations include stormwater management requirements, but do not require determining the benefits of detention versus retention.</i>
Conduct an annual inspection of floodprone areas that are publically accessible and recommend drainage improvements as appropriate	Capability	<i>This is a capability and can be removed from the list of actions.</i>
Consider prohibiting development activities within potential storm surge areas as mapped by FEMA	Capability	<i>SFHAs are used for this purpose. This is a capability and can be removed from the list of actions.</i>
Work with State and Federal agencies to ensure that flood protection regulations reflect current standards regarding sea level rise	Capability	<i>Freeboard of two feet will achieve this goal while the City continues to plan for coastal resiliency. This is a capability and can be removed from the list of actions.</i>
Compile a list of addresses of structures within the 1% annual chance floodplain and storm surge areas, and track repair costs	Carry Forward	<i>This has not yet been completed due to limitation in city staffing and finances.</i>
Ensure that development at Fort Trumbull is resilient to flooding, hurricane surges, and sea level rise	Carry Forward	<i>Development has not yet begun at this site. City will carry this action forward as development moves forward.</i>
Property Protection		
Incorporate information on the availability of flood insurance into all hazard-related public education workshops	Capability	<i>This is a capability and can be removed from the list of actions.</i>
Make available FEMA-provided flood insurance brochures and encourage residents to purchase insurance if they are in a SFHA	Capability	<i>This is a capability and can be removed from the list of actions.</i>
Provide technical assistance to owners of non-residential structures regarding floodproofing techniques	Capability	<i>This is a capability and can be removed from the list of actions.</i>
Encourage residents to submit flood insurance claims following damage events	Capability	<i>This is a capability and can be removed from the list of actions.</i>
Pursue elevation or acquisition of properties that suffer flood damage	Delisted	<i>The City does not wish to implement a formal policy or regulation following this action, and prefers instead to provide assistance and protect properties through other activities.</i>
Apply freeboard standards of one foot or more for structure elevations for renovation or new construction in coastal A and V zones	Complete	<i>New London has updated its regulations to require two feet of freeboard in all SFHAs.</i>
Emergency Services		
Ensure that the EOP provides current, detailed instructions regarding the timing of evacuations	Complete	<i>Complete</i>
Investigate locations and necessary labor involvement for the pre-event stockpiling of sandbags	Complete	<i>A sandbagging machine has been acquired to assist with this.</i>
Pursue mutual aid agreements with non-profits to provide volunteer labor for response activities	Complete	<i>Such agreements are in place</i>
Include structures within the 1% annual chance floodplain and storm surge areas within the Reverse 9-1-1 contact database	Carry Forward	<i>City has not yet compiled list of structures in these zones.</i>
Implement a roadway-specific warning system to alert motorists to dangers during flooding	Complete	<i>Complete</i>

Action	Status	Notes
Public Education and Awareness		
Consider an annual "Flood Fair" to familiarize the public with floodplains, flooding, flood insurance, and floodproofing	Carry Forward	<i>City has not had the interest or capacity for running such a fair. Officials are interested in exploring the possibility of doing this in the future.</i>
Visit schools and educate children about the risks of flooding and how to prepare	Carry Forward	<i>There has not had the interest or capacity for running such programs. Officials are interested in exploring the possibility of doing this in the future.</i>
Distribute an annual brochure regarding the risks of floodprone areas, mitigation strategies, and contacts	Carry Forward	<i>Not yet completed due to funding limitations. Suggested new action below is targeted to RL areas.</i>
Encourage builders, developers, and architects to become familiar with NFIP land use and building standards at annual workshops	Capability	<i>This is an ongoing capability and can be removed from this list of actions.</i>
Natural Resource Protection		
Conduct beach nourishment and vegetation replacement along any affected beaches to keep up with erosion	Completed	<i>Beach nourishment and vegetation activities have taken place.</i>
Structural Projects		
Encourage the use of floodplain storage and other flood control methods in new developments and at existing properties where appropriate	Complete	<i>Completed with update of zoning regulations and existing subdivision regulations.</i>
Utilize the recently available extreme rainfall data to determine existing culvert sizing and encourage upgrades where undersized	Delisted	<i>Extreme rainfall data is used for some projects, but the procedure has not been formalized. This action is dropped and replaced with that listed below this table.</i>
Continue to perform catch basin and culvert surveys to prioritize upgrades and perform maintenance and cleaning	Capability	<i>This is a capability and can be removed from the list of actions.</i>
Investigate funding sources and the feasibility of improvements to mitigate repeated flooding problems	Capability	<i>This is an ongoing need and is completed through the DPW and Planning Departments.</i>
Enact the recommendations of the Stuart Avenue Drainage Study	Complete	<i>Complete</i>
Enact the recommendations of the Parkway South Drainage Study	Complete	<i>Complete</i>
Pursue drainage improvements at Pequot Avenue near Green Harbor Beach	Carry Forward	<i>Not yet completed due to funding limitations.</i>
Pursue improvements to the Shaw's Cove pumping system to allow greater flood control through stormwater pumping	Carry Forward	<i>Not yet completed due to funding limitations.</i>
Consider elevating portions of Pequot Avenue and other coastal roads to keep ahead of rising sea level and increased inundation	Delisted	<i>City does not feel this is feasible due to its impacts on private properties, and will pursue other mitigation activities.</i>
Upgrade stormwater collection and discharge systems to keep up with rising sea level	Carry Forward	<i>City is working on large scale stormwater management system upgrades. This action will be incorporated into those activities.</i>
Maintain existing hard structures along the coast in good condition	Capability	<i>This is a capability and can be removed from the list of actions.</i>
Ensure that the City's wastewater treatment facility is adequately protected from coastal flooding and storm surge	Carry Forward	<i>The WWTF has been protected to the 10-year storm flood elevation only. City continues to pursue funding opportunities.</i>

New actions or strategies developed during the HMP update include:

- Develop formalized guidance for culvert and bridge construction and replacement that requires utilization of the most up-to-date extreme rainfall data from <http://precip.eas.cornell.edu>.
- In accordance with the recommendations of the historic and cultural resources resiliency planning effort in 2016-2017:
 - Determine if any at-risk structures that are not yet eligible for historic designation will be eligible in the future. This may take the form of a historic resources survey.
 - Using the GIS data of historic resources in New London, conduct a tabletop exercise or drill among different departments to practice coordination relative to historic resources after a severe flood event.
- Conduct a one-time mailing to all properties in the repetitive loss areas to inform them of options to reduce flood damage.

11.1.3 Actions Applicable to Wind Damage from Hurricanes, Tropical Storms, Summer Storms, Tornadoes, and Winter Storms

Action	Status	Notes
<i>Prevention</i>		
Work with the State to locate NOAA weather radios in commercial buildings with large population clusters	Carry Forward	<i>This action has not been a high priority, but the City is interested in revisiting it.</i>
Work with marinas to ensure personal watercraft can be removed in a timely manner prior to a hurricane or tropical storm event	Complete	
Work with SCCOG to implement a regional Marina Management Plan for wind damage, and encourage local clubs to develop plans	Capability	<i>This action is the responsibility of, and is being performed by, SCCOG. This action is redefined as a regional capability.</i>
<i>Property Protection</i>		
Promote the use of functional shutters for older buildings	Delisted	<i>The City does not feel this action addresses a need.</i>
Make information on wind-resistant construction techniques available to all building permit applicants	Complete	
Encourage commercial building owners or managers of large population clusters to develop response plans and mitigation opportunities	Capability	<i>City performs this as needed.</i>
<i>Emergency Services</i>		
Identify a location for a brush-disposal operation for dealing with debris following wind storms and determine potential reuse	Complete	
Consider surveying all City-owned buildings to determine their ability to withstand wind loading	Carry Forward	<i>This action has not yet been completed due to budget constraints.</i>
Develop agreements with landowners and companies to chop/chip to ensure backup plans are in place for debris removal	Complete	
Prioritize wind-related retrofitting for the City's shelters over other critical facilities, or relocate shelters if necessary	Delisted	<i>Improvements to the City's shelters are prioritized as appropriate.</i>
<i>Public Education and Awareness</i>		
Consider an annual "Wind Fair" to familiarize the public with wind hazards and potential mitigation measures	Carry Forward	<i>There has not been the interest or capacity for running such a fair. Officials are interested in exploring the possibility of doing this in the future.</i>

Action	Status	Notes
<u>Prevention</u>		
Work with the State to locate NOAA weather radios in commercial buildings with large population clusters	Carry Forward	<i>This action has not been a high priority, but the City is interested in revisiting it.</i>
Work with marinas to ensure personal watercraft can be removed in a timely manner prior to a hurricane or tropical storm event	Complete	
Work with SCCOG to implement a regional Marina Management Plan for wind damage, and encourage local clubs to develop plans	Capability	<i>This action is the responsibility of, and is being performed by, SCCOG. This action is redefined as a regional capability.</i>
Visit schools and educate children about the risks of wind events and how to prepare for them	Carry Forward	<i>There has not been the interest or capacity for running such programs. Officials are interested in exploring the possibility of doing this in the future.</i>
Post and maintain signs signifying evacuation routes from coastal areas	Complete	
Develop working relationships with local community organizations and encourage them to promote wise landscaping techniques	Complete	

11.1.4 Actions Applicable to Other Damage from Winter Storms

Action	Status	Notes
Consider drafting a written plan for inspecting and prioritizing the removal of snow from City-owned structures	Complete	
Continue making funding available to the Public Works Department each year for clearing snow from roads and parking lots	Capability	
Provide information for protecting City residents during cold weather and for mitigating icing and insulating pipes at residences	Complete	
Continue to identify areas that are difficult to access during winter storm events and develop contingency plans to access such areas	Capability	

11.1.5 Actions Applicable to Earthquakes

Action	Status	Notes
Ensure that City departments have adequate backup supplies and facilities for continued functionality following an earthquake	Capability	<i>The City feels they are sufficiently prepared with backup supplies and facilities.</i>
Consider preventing residential development in areas prone to collapse such as below steep slopes or areas prone to liquefaction	Capability	<i>Zoning and Subdivision Regulations address, and development applications are assessed on a case-by-case basis.</i>

11.1.6 Actions Applicable to Wildfires

Action	Status	Notes
Continue to evaluate fire flows, available water supply, and areas at risk of wildfire in the city	<i>Capability</i>	
Continue to support public outreach programs to increase awareness of forest fire danger, equipment usage, and protecting homes	<i>Capability</i>	
Ensure that provisions of City regulations regarding fire protection facilities and infrastructure are being enforced	<i>Capability</i>	

11.1.7 Actions Applicable to Dam Failure

None.

11.2 Prioritization of Specific Actions

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

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Action or Strategy #	Table 11-1: Mitigation Actions and Strategies for New London 2016 - 2021	Status	Responsible Department ¹	Fiscal Year					Cost	Potential Funding Sources ²	Weighted STAPLE Criteria ³										Priority for Community							
											Benefits					Costs												
				7/2018-6/2019	7/2019-6/2020	7/2020-6/2021	7/2021-6/2022	7/2022-6/2023			Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	STAPLE Subtotal	Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	STAPLE Subtotal		
1	Undertake stormwater improvements and install backflow prevention at the Fire Department Headquarters to reduce the frequency of poor drainage flooding during heavy or intense rain events	New	DPW	x	x	x	x	x	High	CIB	1	0.5	1	1	1	0.5	0.5	6.5	0	0	0	0	-1	0	-2.0	4.5	Low	
2	Require developers to demonstrate whether detention or retention of stormwater is the best option for reducing peak flows downstream	Carried Forward	PL		x				Minimal	OB	1	1	1	1	1	0.5	0	7.0	0	0	0	0	0	0	0	0.0	7.0	High
3	Compile a list of addresses of structures within the 1% annual chance floodplain and storm surge areas, and track repair costs	Carried Forward	PL		x				Low	OB	1	1	1	1	1	0	0	6.0	0	0	0	0	0	0	0	0.0	6.0	Medium
4	Ensure that development at Fort Trumbull is resilient to flooding, hurricane surges, and sea level rise	Carried Forward	PL	x	x	x	x	x	Minimal	OB	1	1	1	1	1	0	0.5	6.5	0	0	0	0	0	0	0	0.0	6.5	High
5	Include structures within the 1% annual chance floodplain and storm surge areas within the Reverse 9-1-1 contact database	Carried Forward	EM		x				Low	OB	1	1	1	1	1	0	0	6.0	0	0	0	0	0	0	0	0.0	6.0	Medium
6	Consider an annual "Flood Fair" to familiarize the public with floodplains, flooding, flood insurance, and floodproofing	Carried Forward	PL	x	x	x	x	x	Low	OB	1	1	1	1	1	0	0	6.0	0	0	0	0	0	0	0	0.0	6.0	Medium
7	Visit schools and educate children about the risks of flooding and how to prepare	Carried Forward	EM	x	x	x	x	x	Minimal	OB	1	1	1	1	1	0	0	6.0	0	0	0	0	0	0	0	0.0	6.0	Medium
8	Pursue drainage improvements at Pequot Avenue near Green Harbor Beach	Carried Forward	DPW	x					High	CIB	1	1	1	1	1	0.5	0.5	7.5	0	0	0	0	-1	0	-2.0	5.5	Low	
9	Pursue improvements to the Shaw's Cove pumping system to allow greater flood control through stormwater pumping	Carried Forward	DPW		x				High	CIB	1	1	1	1	1	0.5	0	7.0	0	0	0	0	-1	0	-2.0	5.0	Low	
10	Upgrade stormwater collection and discharge systems to keep up with rising sea level	Carried Forward	DPW	x	x	x	x	x	High	CIB	1	0.5	1	1	1	0.5	0	6.0	0	0	0	0	-1	0	-2.0	4.0	Low	
11	Ensure that the City's wastewater treatment facility is adequately protected from coastal flooding and storm surge	Carried Forward	DPW			x			High	CIB, HMA	1	1	1	1	1	1	9.0	0	0	0	0	0	-1	0	-2.0	7.0	High	
12	Develop formalized guidance for culvert and bridge construction and replacement that requires utilization of the most up-to-date extreme rainfall data from http://precip.eas.cornell.edu .	New	DPW		x				Low	OB	1	1	1	1	1	0	0	6.0	0	0	0	0	0	0	0	0.0	6.0	Medium
13	Determine if any at-risk structures that are not yet eligible for historic designation will be eligible in the future. This may take the form of a historic resources survey.	New	PL			x			Low	OB	1	1	1	1	1	0	0	6.0	0	0	0	0	0	0	0	0.0	6.0	Medium
14	Conduct a tabletop exercise or drill among different departments to practice coordination relative to historic resources after a severe flood event	New	EM				x		Low	OB	1	1	1	1	1	0	0	6.0	0	0	0	0	0	0	0	0.0	6.0	Medium
15	Conduct a one-time mailing to all properties in repetitive loss areas to inform them of options to reduce flood damage	New	PL	x					Low	OB	1	1	1	1	1	0.5	0	7.0	0	0	0	0	0	0	0	0.0	7.0	High
16	Work with the State to locate NOAA weather radios in commercial buildings with large population clusters	Carried Forward	EM		x				Low	OB	1	1	1	1	1	0.5	0	7.0	0	0	0	0	0	0	0	0.0	7.0	High
17	Consider surveying all City-owned buildings to determine their ability to withstand wind loading	Carried Forward	DPW			x			Low	OB	1	1	1	1	1	0	0	6.0	0	0	0	0	0	0	0	0.0	6.0	Medium
18	Consider an annual "Wind Fair" to familiarize the public with wind hazards and potential mitigation measures	Carried Forward	EM	x	x	x	x	x	Low	OB	1	1	1	1	1	0	0	6.0	0	0	0	0	0	0	0.0	6.0	Medium	
19	Visit schools and educate children about the risks of wind events and how to prepare for them	Carried Forward	EM	x	x	x	x	x	Minimal	OB	1	1	1	1	1	0	0	6.0	0	0	0	0	0	0	0.0	6.0	Medium	

¹Notes
DPW = Department of Public Works & Engineering
EM = Emergency Management
PL = Planning Department

²Notes
CIB = Capital Improvement Budget
EOC = EOC Grants
HMA = FEMA Grant Programs
OB = Operating Budget

³Notes
Beneficial or favorable ranking = 1
Neutral or Not Applicable ranking = 0
Unfavorable ranking = -1

Technical and Economic Factors have twice the weight of the remaining categories (i.e. their values are counted twice in each subtotal).

APPENDIX A

ADOPTION RESOLUTION

CERTIFICATE OF ADOPTION
CITY OF NEW LONDON CITY COUNCIL

A RESOLUTION ADOPTING THE HAZARD MITIGATION PLAN UPDATE, 2017

WHEREAS, the City of New London has historically experienced severe damage from natural hazards and it continues to be vulnerable to the effects of those natural hazards profiled in the plan (e.g. *flooding, high wind, thunderstorms, winter storms, earthquakes, dam failure, and wildfires*), resulting in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS, the New London City Council approved the previous version of the Plan in 2012; and

WHEREAS, the Southeastern Connecticut Council of Governments, of whom the City of New London is a member, has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its Hazard Mitigation Plan Update, 2017 under the requirements of 44 CFR 201.6; and

WHEREAS, committee meetings were held and public input was sought in 2016 and 2017 regarding the development and review of the Hazard Mitigation Plan Update, 2017; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedures for the City of New London; and

WHEREAS, the Plan recommends several hazard mitigation actions that will provide mitigation for specific natural hazards that impact the City of New London, with the effect of protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the City of New London eligible for funding to alleviate the impacts of future hazards; now therefore be it

RESOLVED by the City Council:

1. The Plan is hereby adopted as an official plan of the City of New London;
2. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;
3. Future revisions and Plan maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as a 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 City Council.

Adopted this _____ day of _____, 201_____ by the City Council of New London, Connecticut

Mayor

IN WITNESS WHEREOF, the undersigned has affixed his/her signature and the corporate seal of the City of New London this _____ day of _____, 201_____.

City Clerk

