HAZARD MITIGATION PLAN UPDATE
ANNEX FOR THE TOWN OF SPRAGUE

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

December 12, 2012

MMI #3570-05

Prepared for:

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ACKNOWLEDGEMENTS

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

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1.0 INTRODUCTION

1.1 Purpose of Annex

The purpose of this HMP annex is to provide an update to the natural hazard risk assessment and capability assessment provided in the previous HMP, and to evaluate potential hazard mitigation measures and prioritize hazard mitigation projects specific to mitigating the effects of natural hazards on the Town of Sprague. 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 Franklin and is not to be considered a standalone document.

The primary goal of this hazard mitigation plan annex is to identify particular vulnerability to natural hazards and potential mitigation measures for such natural hazards in order to ***reduce the loss of or damage to life, property, infrastructure, and natural, cultural, and economic resources.*** This includes the reduction of public and private damage costs. Limiting losses of and damage to life and property will also reduce the social, emotional, and economic disruption associated with a natural disaster. Sprague, with an approved Mitigation Plan, may apply for assistance from FEMA directly as a subgrantee through the state of Connecticut under the various grant programs.

1.2 Setting

Sprague consists of the three villages of Baltic, Hanover, and Versailles. Sprague is a town of 13.8 square miles that lies in north-central New London County and is bordered by Scotland and Canterbury to the north (both part of Windham County), Lisbon to the east, Norwich to the south and Franklin to the west. The most significant surface water bodies include the Shetucket River which traverses through the center of town and the Little River which includes the Hancock Reservoir near the northeast corner of town, Papermill Pond, and Versailles Pond. Little River joins the Shetucket River at the southeastern tip of Sprague where Sprague borders the Town of Lisbon and the City of Norwich. The three major transportation routes through town include Route 97 which runs north-south through the center of town and Routes 138 and 207 which run east-west across the southern portion of Sprague.

1.3 Plan Development

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

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

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

- A data collection meeting was held with the First Selectman, the Grant Writer, and the Executive Assistant on January 19, 2012 to discuss the scope and process for updating the plan and to collect information. The First Selectman coordinated the local planning team. The meeting focused on reviewing each section of the existing hazard mitigation plan and annex, critical facilities, and various types of hazards that have affected Sprague and that should be addressed in the update.

- The draft that is sent for State review will be posted on the Town of Sprague's website (http://www.ctsprague.org) as well as the SCCOG website (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 Town of Sprague will be coordinated by SCCOG and the First Selectman. The HMP update must be adopted within one year of conditional approval by FEMA, or Sprague 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 Selectman's Office will continue to administer this HMP (as it has since 2005) under the authority of the Town of Sprague Board of Selectmen and will be the local coordinator of the HMP. The Selectman's Office will coordinate with responsible departments as listed in Table 11-1 and ensure that the recommendations of this HMP are considered or enacted. Refer to Section 1.8 of the Multi-Jurisdictional HMP for a description of how the local coordinator will perform progress monitoring. The majority of recommendations in this annex can be accomplished within or with only a slight increase in the operating budgets of the various departments. Projects that require capital improvements or additional funding will need to be approved by the Board of Selectmen.

The HMP will be on file in Town Hall at the Selectman's Office, available to all departments, to assist in guiding growth decisions. See Section 2.5 for recommendations related to integrating the findings of this HMP into additional town planning documents. Sprague will continue to encourage town residents to contact the Public Works Department or the Emergency Management Office with concerns related to natural hazards or emergency response via the town's website.

The Town of Sprague will review the status of Plan recommendations each year. The First Selectman 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 First Selectman's Office 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.

Sprague 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 SCCOG. The Selectman's Office will coordinate with SCCOG for the next HMP update which is expected to occur in 2016-2017.

2.0 COMMUNITY PROFILE

2.1 Physical Setting

The Town of Sprague is a cross between a suburban and rural community that is approximately 13.8 square miles in area. Although the town has extensive undeveloped land, it has three villages: Baltic, Versailles, and Hanover. Sprague is located in north-central New London County approximately 6 miles north of Norwich, Connecticut. The town is bordered by the Town of Scotland to the north (Windham County), the Town of Canterbury to the northeast, the Town of Sprague to the east, the City of Norwich to the south, the Town of Franklin to the west and the Town of Windham to the northwest.

Sprague had a 2010 U.S. Census population of 2,984, almost identical to its 2000 U.S. Census population of 2,971. Each village within Sprague has its own post office. In Baltic, residential, commercial, and industrial development is generally concentrated along the Shetucket River and Beaver Brook, near Routes 97 and 207. In Versailles, development is generally concentrated in the vicinity of Versailles Road, Papermill Road, Inland Road and other areas along the banks of the Little River. The Village of Hanover is located north of Baltic on Baltic-Hanover Road and includes development in the vicinity of the Little River, Adams Brook, and the Hanover Reservoir.

Elevations in the community range from 460 feet NGVD88 along the northern corporate limits, 1.5 miles east of the Shetucket River, to 70 feet NGVD88 at the southern tip of the community, where the Shetucket River flows out of Sprague.

Sprague is covered primarily by glacial till. Till contains an unsorted mixture of clay, silt, sand, gravel, and boulders deposited by glaciers as a ground moraine. The amount of stratified drift present in Sprague 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. Even the smaller glacial till watercourses throughout Sprague can cause flooding. In Sprague, the areas underlain by stratified drift are mostly associated with Old River Farm Brook, the Shetucket River, tributaries to the Shetucket River including Waldo Brook, Beaver Brook, Adams Brook, Little River, and some smaller tributaries. The amount of stratified drift also has bearing on the relative intensity of earthquakes and the likelihood of soil subsidence in areas of fill.

Sprague is characterized by four bedrock formations which are oriented in a northeast-southwest direction through town. There is one geologic fault that is oriented from northwest to southeast that crosses just above the Sprague-Norwich town line. This fault extends southeast from south-central Sprague southeast into North Stonington. This is the lone fault in town.

The four bedrock formations in Sprague are briefly discussed below.

- The *Scotland Schist Formation* is a grey to silvery, locally rusty, fine to medium-grained schist.

- The *Hebron Gneiss Formation* consists of interlayered dark grey and greenish gray schist with fine to medium grained calc-silicate gneiss.

- ⇨ The *Canterbury Gneiss Formation* is comprised of a light-grey, medium grained, locally strongly lineated gneiss.

- ⇨ The *Tatnic Hill Formation* consists of three variations in Sprague: the Yantic Member, the Fly Pond (calc-silicate) Member, and the pure Tatnic Hill Formation. Each are subdivided below.

  - ❑ *Tatnic Hill Formation* is a grey to dark grey, medium-grained gneiss or schist.

  - ❑ *Yantic Member of Tatnic Hill Formation* consists of a grey to dark grey, fine to medium-grained schist.

  - ❑ *Fly Pond (calc-silicate) Member of Tatnic Hill Formation* is comprised of a light grey, medium-grained calc-silicate gneiss.

The three variations of the Tatnic Hill Formation cover approximately 77% of Sprague stretching from central Sprague east to the town line with Lisbon from north to south covering all of town from the northern town line to the southern town line.

2.2 Land Use and Development Trends

The Town of Sprague is approximately 90% undeveloped according to the University of Connecticut Center for Land Use Education and Research (CLEAR). According to the CLEAR database, land use in Sprague includes but is not limited to agriculture, deciduous and coniferous forests, forested and non-forested wetland, turf and grass, barren land, agriculture, open water, and developed land cover. Sprague's 2006 CLEAR land cover data, which was derived from satellite imagery, explains that over half of the town's approximately 13.8 square miles is either deciduous forest or agricultural land.

As earlier described, Sprague is a cross between a suburban and rural town which has been relatively stable in population of around 3,000 residents for the past 50 years. The town includes the three villages with concentrated development. Both residential and commercial development increased slightly following the establishment of Interstate 395.

According to the 2006 *Plan of Conservation and Development* (POCD), Sprague hopes to focus the majority of its growth in and around its village centers, while exploring the possibility of modest expansion of business in its industrial zone while allowing the opportunity for lightly developed land uses along its major roadways outside of the village centers. The document also stated that new residential construction was taking place along Scotland Road as well as Baltic-Hanover Road near the reservoir. Additionally, the document states that the Village of Baltic in many ways acts as the center of Sprague, mostly because Town Hall is within the village along with the fact that it is the most densely-developed area of Sprague. The document also states that the development patterns in Baltic have led to the establishment of two distinct districts: a mixed use district and a commercial and industrial strip of development. The majority of the language regarding undeveloped land discussed in the POCD discusses the intent of the town to hold the undeveloped land as such for the future.

Town officials state that a 20 unit subdivision is currently being built on Noah's Way with 17 units currently completed. Additionally, four properties in town were purchased and could soon

be developed with homes, while an Active Adult development is proposed off Riverside Drive in the village of Versailles. The Baltic Mills property has also undergone redevelopment and may be subject to additional work. Lastly, a former packaging mill which is currently vacant may be purchased and redeveloped. Aside from these potential development projects, very little development is underway in Sprague.

2.3 Drainage Basins and Hydrology

Sprague is divided among three sub-regional watersheds: Beaver Brook, Shetucket River and the Little River from west to east. The town lies entirely within the Shetucket River regional watershed. The Shetucket River is formed by the confluence of the Willimantic and Natchaug Rivers south of Willimantic, Connecticut. The Shetucket flows south to Norwich, where its confluence with the Yantic River forms the Thames River. The Shetucket River has a drainage area of approximately 1,264 square miles and is approximately 18 miles in length. Primary tributaries to the Shetucket River are the Quinebaug, Natchaug, and Willimantic Rivers.

The Little River originates in Hampton, and flows through Hanover Reservoir, Paper Mill Pond, and Versailles Pond along the east side of Sprague, eventually discharging into the Shetucket River in the Village of Occum. The Little River has a drainage area of approximately 46 square miles.

The Beaver Brook Watershed is the smallest watershed in Sprague. Beaver Brook originates at Gager's Pond in Franklin, and flows southeast to its confluence with the Shetucket River in the Village of Baltic.

There are several man-made water bodies in Sprague. Paper Mill Pond and the Hanover Reservoir are located on the Little River. The Hanover Reservoir has not been used as a water supply for Hanover since the mid 1970s when the storage capacity for the system was destroyed in a mill fire. Since this time, the eastern shore of the water body has been developed with residences, and the remainder of the western shore has been subdivided recently so that it would be difficult to utilize this as a water supply in the future.

The Baltic Reservoir is located in the central portion of the town. The reservoir is approximately 23 acres in area and the watershed totals 0.29 square miles. The reservoir was historically used as a water supply source, but is now primarily used for recreation.

2.4 Governmental Structure

Sprague is governed by a Town Meeting and Board of Selectmen form of government. The Town Meeting is the legislative body of the town and the Board of Selectmen is responsible for the administration of town policies. The authority of town officials is granted by the Connecticut General Statutes. Various Boards and Commissions are composed of elected and appointed officials who supervise, manage and organize the diverse functions of local government. Many municipal departments, commissions, and boards are involved with natural hazard mitigation.

Sprague has several departments which provide municipal services. Departments pertinent to natural hazard mitigation include the First Selectman, Public Works, Fire Department/Fire Marshal, Resident State Trooper, Emergency Management, Tree Warden, and Building Inspector/Wetlands Officer. In addition boards and commissions can take an active role in hazard

mitigation, including the Inland Wetlands & Watercourses Commission, the Planning & Zoning Commission, the Economic Development Commission, and the board of Selectmen. 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. The roles of town departments, boards, and commissions have not changed since the time of the previous HMP. Thus, the Sprague is technically, financially, and legally capable of implementing mitigation projects for natural hazards. More specific information for certain departments and commissions of the Town of Sprague is noted below:

- Among other items, the First Selectman and the Executive Assistant are responsible for the town's public safety (specifically the town's performance pertinent to police, fire, and emergency services in the event of natural disasters), overseeing Public Works operations including tree trimming and road repairs, and overseeing Community Services and Economic Development in an effort to enhance the town's residential and commercial market value.

- The Emergency Management Director (EMD) is responsible to, among other duties, prepare and maintain the town's EOP, recommend mitigation measures to reduce disaster effects, participate in all tests, drills and exercises, including remedial drills and exercises that pertain to Sprague, as scheduled by the town, state or the Federal government, participate in the integrated flood warning systems program as applicable, and provide warning to the town regarding fallen trees and ice jams along the Shetucket River and Beaver Brook.

- The Baltic Volunteer Fire Department has one fire station which is staffed by one hundred percent volunteer firefighters. The department is comprised of 39 volunteer firefighters. The Fire Department is the secondary shelter and has a generator with a 240 hours per tank capacity and seven portable limited use generators and four vehicle mounted generators. The facility was used as a warming, charging, and showering station during Tropical Storm Irene and Winter Storm Alfred. In addition to hazard mitigation and firefighting, the Department also provides emergency medical service, hazardous material response, vehicle rescue and extraction and search and rescue services.

- The Planning & Zoning Commission (PZC) is charged with the civic duty of preparing, adopting or amending the POCD. The PZC is also responsible for establishing, changing, or repealing zoning and subdivision regulations and zoning districts and review and make recommendations on proposed municipal improvements such as streets, utilities and sidewalks.

- The Town of Sprague does not have its own police force, but rather relies on the services of a Resident State Trooper who operates out of the Town Hall building and is on the same radio network as the town. The Resident State Trooper has an All-Terrain (ATV) to patrol open space areas.

- The Public Works Department is responsible for maintaining and enhancing the community infrastructure assets which include the road network, sidewalks, roadway signs, stormwater management system, parks, land preserves, recreation fields, and some of the historic structures and cemeteries in the three villages of Sprague. Additionally, the Public Works Department is charged with immediately responding to natural and/or man-made disasters when called upon by the First Selectman to clear the roadways during and after winter storms, tropical storms, and hurricanes.

- The Tree Warden is appointed by the Board of Selectmen. The Tree Warden has jurisdiction over the care and control of all trees within the town's right-of-ways and municipal properties. The powers include: hazardous tree removal, tree removal for road improvement and drainage work, utility line clearing, line of site improvement, and pruning.

2.5 Review of Existing Plans and Regulations

Sprague has two primary Plans which act to address elements of hazard mitigation and disaster preparedness.

Plan of Conservation and Development (2007)

The POCD was adopted on April 4, 2007 and became effective on May 5, 2007 with contributions from local boards and commissions, citizens, and citizen groups. The purpose of the plan is to record the best thinking of the town as to its future growth and to give direction to both public and private development. The plan does not directly address pre-disaster mitigation or natural hazards; however it does include descriptive sections entitled "Floodplains", "FEMA Flood Hazard Areas", "Steeply Sloped Soils" and "Wetland Soils".

Emergency Plans

The Town has an Emergency Operations Plan (EOP) which is updated annually, an Emergency Response Plan (ERP) for Sayles School, and a Local Emergency Medical Services Plan outlying the capabilities of Sprague during emergencies.

Sprague has an EOP in place signed by the First Selectman, approved by the Board of Selectmen, and extending the duties and powers of the First Selectman and/or his designee in the event of a declared emergency. The EOP explains that Sprague is exposed to a number of natural hazards that may require the implementation of the EOP. These hazards include major snow fall, ice storms, blizzards, tornadoes, hurricanes, flooding, electrical storms, major fires, forest fires, dam failure, water contamination, earthquakes, and major highway accidents as a result of many of these.

Sections I through VII of the EOP provide its purpose, concept of operations, organization of responsibilities, administration/logistics, plan development and maintenance, and authority and references. Annexes A through L deal specifically with emergency response procedures for various incidents.

Hazard prevention includes identification of risks and the use of land-use regulatory and other available management tools to prevent future damage. The town of Sprague has *Subdivision Regulations* (Rev. June, 2011), *Zoning Regulations* (Rev. June, 2011), *Inland Wetland and Watercourses Regulations* (Eff. August, 2009) and ordinances in place that flood damage prevention. Section 15.13 Special Flood Hazard Area (SFHA) Requirements of the *Zoning Regulations*, Sections 6.2 "Subdivision Plan" b) 25, 7.18 "Floodway Encroachments" and 7.19 "Flooding Considerations" in the Subdivision Regulations are the Town's articulation of the NFIP regulations. Activities that are regulated within 100 feet of a wetland or watercourse are outlined in Sections 2 and 4 of the *Inland Wetlands and Watercourses Regulations.*

Stormwater requirements are enumerated in Section 17.3 of the Zoning Regulations, Section 6.2 of the Subdivision Regulations and in Section 3.4 of the "Design and Construction Specifications" in the *An Ordinance Regulating the Addition of Any New Street to the Highway System of the Town of Sprague* (Rev. August, 1991). The regulations provide required design practices and technical standards, and require conformance with the state's *Stormwater Quality Manual*.

Additionally, the town regulates street widths, snow shelves, and steep slopes in Section 3 and drainage rights and/or easements in Section 4 of the *An Ordinance Regulating the Addition of Any New Street to the Highway System of the Town of Sprague*. Street systems and continuity is discussed in Section 7.5 of the Subdivision Regulations, while underground utility requirements are discussed in Section 7.20 and private, common and/or shared driveway and street regulations are discussed in Section 6.4.6.

Finally, the town's Building Inspector enforces the Connecticut State Building Code. The design wind speed for Sprague is 105 miles per hour.

2.6 Critical Facilities, Sheltering Capacity, and Evacuation

The Town of Sprague considers that several categories of facilities are critical for these are needed to ensure that emergencies are addressed while day-to-day management of the community continues. Critical facilities are presented on figures throughout this annex and summarized in Table 2-1. These facilities are described in more detail below.

TABLE 2-1
Critical Facilities

Facility	Address or Location	Emergency Power Supply?	Shelter?	In Floodplain?
Emergency Services				
Baltic Fire Department (EOC)	22 Bushnell Hollow Rd	Yes	Yes	No
Municipal Facilities				
Town Hall	1 Main Street, Baltic	Yes	No	Yes
Public Works Garage	1 Main Street, Baltic	Yes	No	Yes
Shelter: Sayles Elementary School	25 Scotland Road	Yes	Yes	No
Health Care & Senior Living				
Shetucket Village (senior living)	8 Wall Street	No[1]	No	No
Other Infrastructure / Facilities				
Hanover Nursery School	40 Potash Hill Road	No	No	No
Daycare (private home)	Parkwood Road	No	No	No
Hanover Rd sewer pumping station	Hanover Rd, Baltic	No	No	Yes
Water filtration plant		Yes	No	Yes
Sewer Treatment Plant	45 Bushnell Hollow Rd	Yes	No	Yes
Sewer pumping stations[1]	Various	Yes	No	Yes
Water supply wells	River Rd, Hanover Versailles Rd	Yes	No	Yes

[1] The town is seeking funds for a generator.

Fire Department

Sprague's Fire Company, Baltic Fire Engine Company No. 1, is located on Bushnell Hollow Road (Route 138). The Fire Department consists of 100 percent volunteer membership. Although the station is located near the Shetucket River, it is not located in a flood zone. The Fire Department is currently the primary Emergency Operations Center (EOC), but it lacks sufficient size and the town would like to designate Town Hall as the EOC. The Fire Department does have a 240-hour per tank generator and was used during Tropical Storm Irene and Winter Storm Alfred as a warming, charging, and showering station. The Fire Department also has seven portable limited use generators and four vehicle-mounted generators.

The Fire Department has gained access to portable, vehicular and base radios since the town's recent communications system upgrade. Firefighters played an instrumental role in hand-delivering informational flyers to homes lacking power to continue information flow regarding shelters and major road issues throughout Tropical Storm Irene and Winter Storm Alfred.

Municipal Facilities

As mentioned above, the town wishes to designate Town Hall as the primary EOC. Town Hall is equipped with a generator which was used during Tropical Storm Irene. During Tropical Storm Irene and Winter Storm Alfred, many EOC operations were directed from the Court Room in the Town Hall. In addition, Town Hall is the office location for the town's Resident State Trooper who is on the same radio network as the town and has access to an ATV to patrol open space areas.

The Department of Public Works Garage and its crew have access to portable, vehicular and base radios as a result of the town's recently upgraded radios and interdepartmental and inter-municipal communication capability. The Public Works Garage houses the town's snow and salt stockpile and equipment used to plow roadways and perform tree maintenance and trimming.

Sprague's water and sewer facilities include the Sprague WPCF, the Sprague Water Filtration Plant, the Sewer Pump Stations 1, 3, and 4, and the well houses:

- Sprague's Sewer Plant is reportedly in need of an upgrade as it is in excess of 40 years of age and is located within the floodplain. Additionally, the town's pumping stations are believed to each be in a floodplain. The Hanover Sewer Pump Station serves 60 homes and does not have a generator. During the power outages associated with Tropical Storm Irene and Winter Storm Alfred, Sprague was forced to pump the system out every two days.

- The Sprague Water & Sewer wellfield located next to the park between the Shetucket River and River Street is situated in the floodway of the Shetucket River, and Sprague's three water supply wells are located in the SFHA.

Sheltering Capacity

Sayles Elementary School is the primary shelter due to the fact that it has showering capability and can hold more people than Baltic Fire Engine Company No. 1. The building is not ARC

certified, however it has a generator. The generator can run for 72 hours per tank of gas. As a shelter, Sayles Elementary School is designed to hold 600 people with a bedding capacity of 300.

Baltic Fire Engine Company No. 1 is the secondary shelter and has a generator with a running duration of 240 hours per tank of gas. However, the facility can only house a small number of people. It was used as a warming / charging / showering station during Irene and Alfred. The Fire Department also has seven portable limited use generators and four vehicle mounted generators.

The town maintains a list of people who may need additional help during an emergency and maintains a list of property and road information, including the number of residential and commercial structures on each street. The Senior Center Director maintains this list. Additionally, the town has buses and wheelchair-accessible vans to transport seniors during weekdays.

Other Infrastructure / Facilities

Warning the residents of the town of a disaster is accomplished by an existing siren (single tone) long wailing tone. The siren is activated/controlled by Baltic Fire Engine Company No. 1. Radio stations WICH (Norwich) and WCTY (Norwich) are the local emergency broadcast stations in the area.

The town recently upgraded its radio system. Portable, vehicular, and base radios, located at the Town Hall, Baltic Fire Engine Company No. 1, and the DPW Garage, are now included in the town's stockpile. In addition to inter-departmental communication, the town can also communicate with several of its neighbors (Griswold, Lisbon, Franklin, and Lebanon) on the system. The town has one cell tower and one repeater. In addition to the Emergency Management Director, the Community Emergency Response Team (CERT) provides warning to Sprague regarding natural hazards, such as fallen trees and ice jams along the Shetucket River and Beaver Brook.

Connecticut Light & Power maintains emergency operation centers which become operational in the event of any emergency that could impact the utilities. The communication between the town and independent utilities requires continued coordination to assure understanding. The previous HMP identified a need for improved and continued coordination. Such action is likely imperative towards the success of mitigating damages resulting from natural disasters.

There are two daycare centers which are located in private homes in Sprague. One center is located on Potash Hill Road and the other is located on Parkwood Road.

Evacuation Routes

Annex E of the EOP addresses evacuation procedures. The annex describes the responsibilities of each of the key players in emergency management including the Town Selectman, Evacuation Coordinator, Emergency Management Director, Police Department, Highway Department, Public Information Officer, Shelter Coordinator, Health and Medical Coordinator, and Superintendent of Schools.

Sprague does not have a published evacuation map, but rather utilizes state roads or local roads to exit the town. The SCCOG Long Range Regional Transportation Plan (FY 2011-2040) addresses the adequacy of the existing transportation system in southeast Connecticut to move large numbers of people in the event of some type of disaster. Higher capacity egress routes from Sprague include Route 138, Route 97, and Route 207. Route 97 is the highest capacity egress route that leads directly to Interstate 395 from Sprague. The plan recommends increasing the capacity of Interstate 395.

The evacuation of "special needs" populations is specified in the facilities' own emergency plans. These would include day care centers (two located at Potash Hill Road and Parkwood Road) and public (Sayles School) and private (Holy Family and St. Joseph's) schools. The disabled population (hearing/sight/mentally/mobility impaired) should be monitored by the Town Health, Medical Department, and the area Visiting Nurses Association.

2.7 Status of 2005 Plan Recommendations

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

- Flooding of Route 97 in Downtown Baltic – The State of Connecticut completed some road work in this area. The town completes catch basin maintenance on local and state roads since the catch basins located on the state route roads are often at the end of municipal drainage systems. Drainage upgrades are proposed on River Street and 1st, 2nd, and 3rd Street. The town also installed collector catch basins in front of the Town Hall to mitigate ponding in the area. These catch basins infiltrate to groundwater and do not have outfalls.

- Ice-Dam Induced Flooding Along Shetucket River and Beaver Brook – This issue was primarily related to falling trees leading to ice dam build-up with the eventual flooding of low-lying areas. The town's Community Emergency Response Team conducts weekly windshield surveys of trees and ice along the river and reports to the town if a tree needs to be removed. The proactive removal of trees has greatly mitigated ice jam flooding.

- Private Dams in Baltic, Hanover, and Versailles – The town took over Hanover Reservoir Dam. There are ongoing evaluations of the prior mill dams on the Little River for potential brownfields cleanup. The dam behind the old MS Chambers building in Baltic has been removed and no longer presents a public danger.

- Hazardous Materials Spills on Major Roadways / Railroads – The State of Connecticut widened Route 97 in 2007-2008, providing additional turning radius for trucks. Improvements to Route 207 are proposed in 2013. There are some railroad spurs; however, these spurs lead to private industries and commercial buildings and are therefore not a concern to the town. This recommendation is not carried forward in this HMP update.

- Evaluate the Hazard Resistant Nature of Critical Facilities – The town has completed a generator survey and identified necessary upgrades. Sprague also has identified its critical facilities and is aware of those that are potentially floodprone. None are believed to have been

constructed to have special resilience to natural hazards. Sewer Pump Stations 1 and 2 are proposed to be replaced which will provide added resilience

- Comprehensive Evaluation of Emergency Communication Capabilities Throughout Town – A comprehensive evaluation of emergency communication capabilities throughout Sprague is ongoing along with the annual EOP update. The town recently upgraded its portable radio communication system and now has interdepartmental and inter-municipal communication capability.

- Develop a Flood Audit Program – The town's flood ordinance is located within its zoning regulations. Areas with poor drainage have been identified and are being upgraded as the capital improvement budget allows. Few structures in town actually experience overbank flooding damage.

- Review of Town Transportation Facilities to Identify Critical Risks – The review of town transportation facilities to identify critical risks is ongoing annually as part of the Emergency Operations Plan update.

- Implement a Reverse 9-1-1 System to Relay Important Information During an Emergency – Sprague is not currently participating in the Statewide CT Alerts "Everbridge" emergency alerting and notification system, nor any other Reverse-911 type communication system. Currently, the town looks to SCCOG for regional guidance.

- Distribute or Post Public Information Regarding Hazards in the Town Hall – Public information is posted in the Town Hall prior to and during emergencies. The town also utilizes social media (particularly Facebook) and signs to notify the public about hazard areas. During Tropical Storm Irene and Winter Storm Alfred, town staff and volunteer firefighters delivered informational flyers to homes without power to keep those residents informed of shelters and major road issues.

- Evaluate Emergency Shelters, Update Supplies, and Check Communication Equipment – The evaluation of emergency shelters, supplies and communication equipment is conducted at least annually or following any use of the facilities and/or equipment.

- Maintain Emergency Personnel Training as Well as Maintaining and Updating Emergency Equipment and Response Protocols – The maintenance of emergency personnel as well as maintaining and updating emergency equipment and response protocols is done regularly, with equipment upgrades occurring to the extent the town budget allows.

- Evaluate and Consider Burying Power Lines Underground and Away from Possible Tree Damage – The town has no plans for burying power lines underground and away from possible tree damage as it is simply too expensive given the town's limited budget. New subdivisions are required to place utilities underground if possible. As a result of the ledge and glacial till found throughout Sprague, burying utilities can be difficult.

- Complete an Earthquake Survey of all Critical Facilities and Infrastructures – Sprague has not performed a specific survey of its critical facilities and infrastructures in respect to earthquakes.

- Complete Catch Basin and Culvert Surveys to Identify Structures in Need of Maintenance or Replacement – Surveys of catch basins and culverts to identify structures in need of maintenance and/or replacement takes place annually as part of regularly scheduled cleaning activities.

- Complete a Survey of Fire Hydrants to Assess Vulnerabilities and Capabilities for Fire Protection – The town has nine dry hydrants in outlying areas and the locations are believed to be sufficient for fire coverage. However, the town has plans to install an additional five. Many fire hydrants associated with the water system in Baltic are located in private backyards where roads were nearly 100 years ago. The town is removing or relocating these hydrants to current streets to prevent losses from the water system.

3.0 INLAND FLOODING

3.1 Setting / Historical Record

In general, the Town of Sprague experiences flooding, and a significant potential for flooding in Sprague is concentrated in areas along established SFHAs. The areas impacted by overflow of river systems are generally limited to river corridors and floodplains. Indirect flooding that occurs outside floodplains and localized nuisance flooding along tributaries is also a common problem in various parts of Sprague.

3.2 Existing Programs, Policies, and Mitigation Measures

The town attempts to mitigate flood damage and flood hazards by utilizing a wide range of measures: restricting activities in floodprone areas, replacing bridges, promoting flood insurance, acquiring floodprone structures, maintaining drainage systems, through education and outreach, and utilizing warming systems. As noted in Section 2.5, Section 15.13 Special Flood Hazard Area (SFHA) Requirements of the *Zoning Regulations*, Sections 6.2 "Subdivision Plan" b) 25, 7.18 "Floodway Encroachments" and 7.19 "Flooding Considerations" in the Subdivision Regulations are the town's articulation of the NFIP regulations.

SFHAs in Sprague are delineated on a Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS). The FIRM delineates areas within Sprague that are vulnerable to flooding and was most recently published on July 18, 2011 combined with the remainder of New London County. The majority of the inland watercourses and water bodies in Sprague are mapped as Zone A, while Beaver Brook, the Shetucket River downstream of the Baltic Dam, and the Little River downstream of the Paper Mill Dam are mapped as Zone AE.

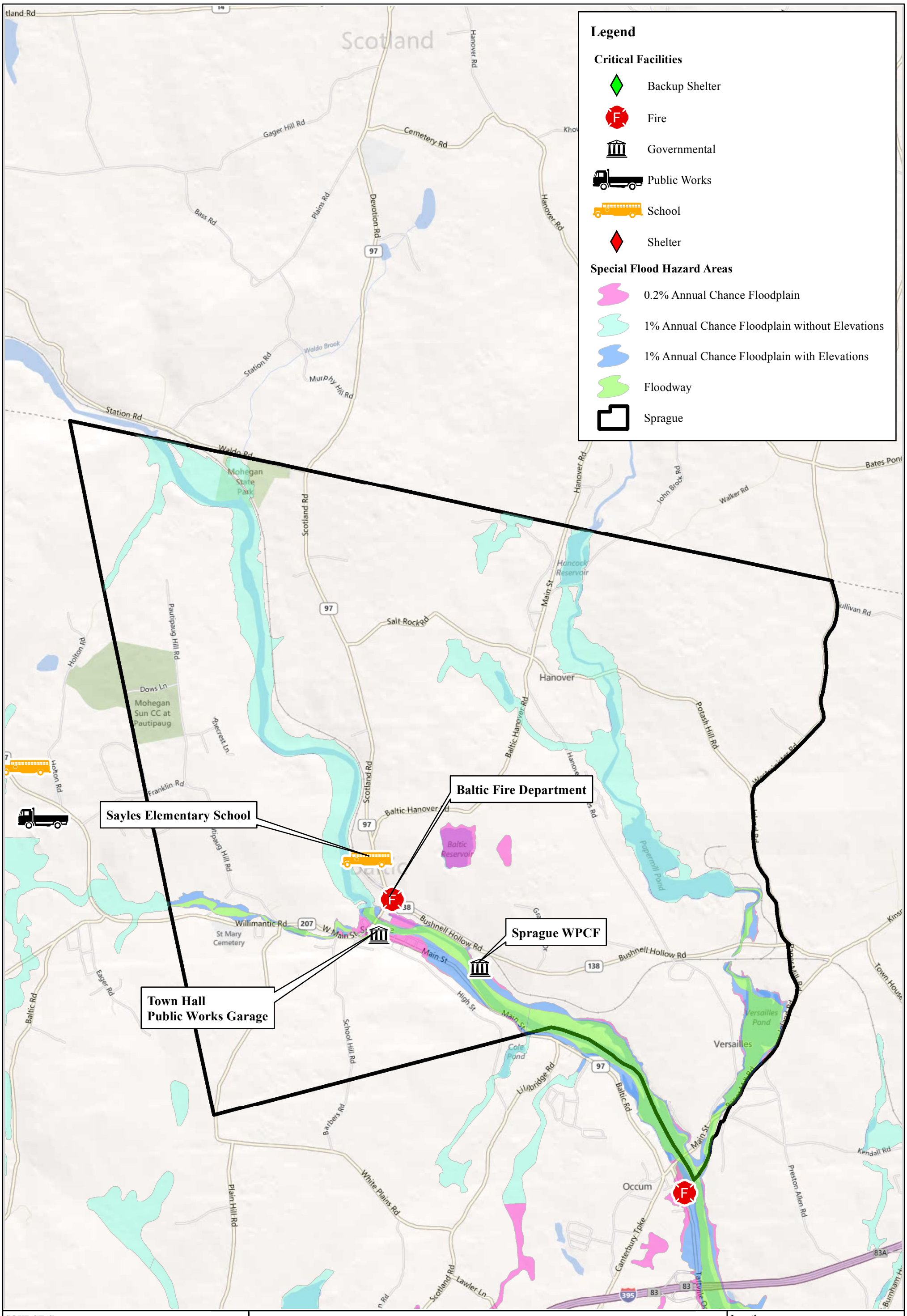
The Public Works Department cleans and inspects catch basins and culverts at least annually or more often if problems are noted. The Emergency Management Director and Fire Department accesses weather reports through the National Weather Service. When inland flooding occurs, typically the Emergency Management Director, First Selectman's Office, or the Public Works Department handle the complaints.

The town does not participate in the Community Rating System (CRS) because it has not been cost-effective for the town to retain staff to maintain the CRS program.

3.3 Vulnerabilities and Risk Assessment

This section discusses specific areas at risk to flooding within Sprague. Flooding largely due to poor drainage is a persistent hazard in the town and can cause minor infrastructure damage, expedite maintenance, and create nuisance flooding of yards and basements. According to the 2010 FEMA FIRM GIS data layers, a total of 1,111 acres of land in Sprague is located within the SFHA, while an additional 77 acres of land is located within the 500-year flood boundary. Figure 3-1 shows these areas in Sprague.

As noted above, the Town of Sprague experiences flooding. Below are some of the historically problematic areas in town.



SOURCE(S):
Base Map:
"Bing Maps Road" Datalayer
(c) 2010 Microsoft Corporation and its data suppliers

"Critical Facilities" Datalayer
Town of Franklin, 2012

Special Flood Hazard Areas
FEMA, 2011

Figure 3-1: FEMA Special Flood Hazard Areas

Location:
Sprague, Connecticut

SCCOG HMP Update
Town of Sprague Annex

Map By: SMG
MMI#: 3570-05
MXD: H:\3570-05\GIS\Maps\Sprague\Figure3-1.mxd
1st Version: 06/27/2012
Revision: 8/1/2012
Scale: 1 in = 2,750 ft

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- Along the Shetucket River and Beaver Brook, fallen trees have historically produced ice jam build-ups which have led to flooding of low-lying areas. As a result, it has been the Emergency Management Director and CERT's responsibility to perform regular inspection of both river bodies to identify when river channel maintenance is needed to prevent ice jam events.

- Poor drainage has caused nuisance flooding along the Shetucket River on River Street, Elm Street , Pautipaug Hill Road and other riverfront areas and along Sunrise Drive and Grandview Drive. The drainage systems on Pautipaug Hill Road are either poorly installed or inadequate systems and can become overwhelmed, which sometimes contribute to flooding along a one mile stretch of the road. The town has identified these areas as a high priority for drainage upgrades. In addition, River Street, Elm Street and other highly developed riverfront areas would likely benefit from the installation of pavers like High Street and Upper High Street have instead of typical asphalt.

- Nuisance flooding occurs along the private roads of Alice Street, Thomas Street, and Amie Street.

- Roadways and residences closest to Little River were most affected by the large-scale rain event of March 2010.

Of note, the 2005 HMP Annex stated that Lillibridge Road experienced flooding issues. This road is in the village of Occum in the City of Norwich, however, and should be removed from Sprague HMP records.

3.3.1 Vulnerability Analysis of Areas along Watercourses

Town officials raised several concerns regarding flooding in Sprague. The rivers that cause the greatest flood hazard are the Shetucket River and Little River. The Little River area was most affected in the March 2010 storm. Flooding problems on Beaver Brook have been reduced in recent years due to the removal of a dam behind the old MS Chambers. Some damage to driveways which span Beaver Brook has occurred in the upstream reaches, but not to homes.

The Shetucket River corridor is the primary area of vulnerability from inland flooding in Sprague. Flooding of the Shetucket River watershed within Sprague has long been a serious concern. The flood of record for the Shetucket River occurred in September 1938 as the result of a hurricane. Severe flooding also occurred along the Shetucket River as the result of Hurricane Diane which occurred on August 19, 1955. Damage from the 1955 flood was reduced by the flood control dam at Mansfield Hollow Lake which was completed in March 1952. Two major floods occurred in Sprague in March 1936 as the result of tropical storms. During the winter, sections of the town along the Shetucket River have flooded due to "ice-damming." Town officials have expressed concern regarding trees and brush that have fallen into the river and may be contributing to the "ice-damming" effect.

Several roads through Sprague have sections that cross floodplains and have a potential to flood during severe storms. A long stretch of Route 97-Main Street/Baltic Road between Second Avenue and Lillibridge Road (in Norwich) is located in the SFHA zone partly located in the floodway. An additional group of other roads are located in flood zone areas in town. Parkwood

Road, below the Hanover Reservoir is part of the SFHA as well. Potash Hill Road near Little River and Main Street and Hanover-Versailles Road along Adams Brook also are located in the SFHA and have experienced historical flooding. During flooding events, these flood areas can negatively impact emergency vehicle travel and thus the town's ability to respond to emergencies. Adams Brook on Hanover-Versailles Road had a history of flooding the roadway. Nevertheless, the recently installed drainage appears to have resolved this issue.

The March 2010 large scale rain events and the ensuing flood is the most recent flood of record for southeastern Connecticut. Damage in town included a collapsed culvert on Inland Road in Versailles. The culvert has since been repaired and the issue resolved.

There have been many historical drainage problems in Hanover. The Town of Sprague has directed a significant amount of funding to drainage upgrades in the village. Nuisance flooding occurs along Pautipaug Hill Road, and along private roads such as Alice Street, Thomas Street, and Amie Street. The private roads do not have any drainage and are in poor condition. Drainage systems on Pautipaug Hill Road are overwhelmed by an existing drainage that performs as though the system was either poorly installed or is inadequate to handle the flow. Homes are occasionally affected by nuisance flooding along a one mile stretch of Pautipaug Hill Road. Sunrise Drive and Grandview Drive are also affected by insufficient drainage-induced flooding.

3.3.2 Vulnerability Analysis of Private Properties

Based on a review of the Flood Insurance Rate Maps, topographic maps, and aerial photographs, residential structures that are subject to flooding during significant flood events are primarily situated along the Shetucket River. Residential structures along the Shetucket River in the area of Brookside Avenue, River Street, First Avenue, and the section of Route 97-Main Street/Baltic Road from Second Avenue to approximately Lillibridge Road (in Norwich) are in SFHAs.

There are areas of concern for commercial and industrial properties located within the SFHA. One area is located in the downtown area of Sprague where Beaver Brook flows into the Shetucket River. This area has historically had flooding issues and could potentially be impacted by future flooding. Flooding in this area exposes many commercial structures to the possibility of significant damage.

Historically, the majority of the town's industry was located along the banks of the waterways which flow through the town. Currently, the town is less industrialized and thus less exposed to hazards affecting the manufacturing sector. However, Sprague Paper Company still operates several paper mill facilities within the town limits that could be affected by significant flooding.

Based on correspondence with the State of Connecticut NFIP Coordinator, there are no repetitive loss properties (RLPs) located in Sprague. The town recognizes that many private properties may suffer flood damage that is not reported because the structures are not insured under the NFIP. These residents and business owners are likely repairing structures on their own. Flood mitigation as recommended in this plan will likely help many of these properties owners.

The software platform *ArcGIS* was utilized along with 2010 Bing Maps aerial photography to determine the number of properties located within the various SFHAs within the town. A number of structures in Sprague are located within the 500-year floodplain, the SFHA, and the floodway delineated by FEMA. There are approximately 42 structures with at least a portion located within

the mapped 100-year floodplain of the Shetucket River, and 47 structures in the 500-year floodplain. There are an additional eight structures in the 100-year flood plain of Beaver Brook and 27 within the 500-year floodplain. Approximately three structures are located in the 100-year floodplain of Little River. One structure is partially located in the floodway of Beaver Brook and seven structures are in the Shetucket River floodway.

3.3.3 Vulnerability Analysis of Critical Facilities

A review of the critical public facilities in Sprague shows some public facilities located in SFHAs. Blanchette Field, one of the town's parks is located in the SFHA along with the Sprague Water and Sewer Authority's wellfield. The Sprague Ice Skating Rink is also located in the same SFHA. Sprague constructed a flood control berm adjacent to the Shetucket River to help prohibit the fields from being flooded.

Flooding of the Sprague Water and Sewer Authority's wellfield is a concern to the town. As mentioned above, the wellfield is situated in the Shetucket River's SFHA. The well house is fitted with a generator. The system is considered marginal for the town's demand. The former Baltic Reservoir remains "inactive" because it requires structural upgrading including repairs to the dam. The Baltic Reservoir could once again be utilized as a water supply source.

The list of critical facilities provided by the town was used with Bing Maps aerial photography to locate each critical facility throughout Sprague. Two critical facilities were found to be associated with either a SFHA or 500-year inland floodplains in addition to the various sewer pumping stations and water supply wells. Table 3-1 below lists these critical facilities. These facilities are not believed to have significantly flooded in recent years, although the potential exists for severe flooding.

TABLE 3-1
Critical Facilities Located Within or Adjacent to Floodplains

Name or Type	Address/Location	Flooding Source
Town Hall/DPW Garage	1 Main Street	Shetucket River
Water & Sewer Treatment Plant	45 Bushnell Hollow Rd	Shetucket River

3.4 Potential Mitigation Measures, Strategies, and Alternatives

A number of measures can be taken to reduce the impact of a flood event. These are listed in Section 11 under the categories of prevention, property protection, structural projects, public education and awareness, natural resource protection, and emergency services.

4.0 COASTAL FLOODING & STORM SURGE

4.1 Setting / Local Historic Record

Sprague is not located along the coastline or along any tidally-influenced river. It is also not located in a potential hurricane surge zone. No coastal flooding or storm surge has affected the town since the last HMP. Therefore, Sprague is considered to be immune to the direct effects of coastal flooding and storm surge.

4.2 Existing Programs, Policies, and Mitigation Measures

Sprague does not have any regulations in affect to restrict development due to coastal flooding hazards.

4.3 Vulnerabilities and Risk Assessment

No areas of Sprague are vulnerable to coastal flooding or storm surge.

4.4 Potential Mitigation Measures, Strategies, and Alternatives

No mitigation measures for reducing the impact of coastal flooding or storm surge are necessary or are proposed at this time within Sprague.

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. These hazards are widespread and can affect any part of Sprague. However, some buildings within town are more susceptible to wind or flooding damage than others.

The last major hurricane or tropical storm wind event to affect Sprague was in the form of Tropical Storm Irene in August 2011. Branches, trees, utility lines, and other items fell throughout town, causing power outages were reportedly up to one week and areas along roads and near residences were hardest hit.

5.2 Existing Programs, Policies, and Mitigation Measures

Existing mitigation measures appropriate for flooding have been discussed in Chapter 2. Wind loading requirements are addressed through the state building code. Effective December 31, 2005, the design wind speed for Sprague is 105 miles per hour. Sprague has adopted the Connecticut Building Code as its building code.

Connecticut is located in FEMA Zone II regarding maximum expected wind speed. The maximum expected wind speed for a three-second gust is 160 miles per hour. This wind speed could occur as a result of either a hurricane or a tornado in south-central and southeastern Connecticut. The American Society of Civil Engineers recommends that new buildings be designed to withstand this peak three-second gust.

Parts of trees (limbs) or entire tall and older trees may fall during heavy wind events, potentially damaging structures, utility lines, and vehicles. CL&P, the local electric utility, provides tree maintenance near its power lines. The town has a tree warden, who along with the public works staff is constantly looking for dangerous trees. The tree warden and the public works staff has a tree trimming budget of approximately $12,000 per year. The group tries to be proactive with aggressive monitoring and prioritizing roads to perform tree maintenance each year. The staff can trim smaller trees, but contracts larger trees out to private trimmers. Additionally, all utilities in new subdivisions must be located underground whenever possible in order to mitigate storm-related damages.

During emergencies, the town utilizes the Sayles Elementary School as its primary shelter as described in Section 2.6. The Baltic Fire Department is the secondary shelter and has a 240 hour tank generator. The Fire Department has a small sheltering capacity, but was used as a warming, charging, and showering station during Tropical Storm Irene and Winter Storm Alfred.

The town has not reviewed structures per their susceptibility to wind damage. This should be done moving forward, especially to the large number of homes that pre-date the 1995 building code.

Sprague currently determines sheltering need based upon areas damaged or needing to be evacuated within the town. Under limited emergency conditions, a high percentage of evacuees will seek shelter with friends or relatives rather than go to established shelters. During extended

power outages, it is believed that only 10% to 20% of the affected population of town will relocate while most will stay in their homes until power is restored. In the case of a major (Category Three or above) hurricane, it is likely that the town will depend on state and federal aid to assist in sheltering displaced populations until normalcy is restored.

5.3 Vulnerabilities and Risk Assessment

Sprague is located well away from the shoreline; however the town is still vulnerable to riverine flooding during a hurricane and is as vulnerable as coastal areas to hurricane wind damage. Of particular concern are the blockage of roads and the damage to the electrical power supply from falling trees and tree limbs. Many of the roads are narrow and bordered by private forest land, which is not cleared back from the right-of-way to prevent serious problems resulting from high winds.

5.4 Potential Mitigation Measures, Strategies, and Alternatives

Many potential mitigation measures for hurricanes and tropical storms include those appropriate for inland and coastal flooding. These were presented in Section 5.7 and in Section 11.2.3 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. However, hurricane and tropical storm mitigation measures must also address the effects of heavy winds that are inherently caused by hurricanes. Such recommendations are presented in Section 11.

6.0 SUMMER STORMS AND TORNADOES

6.1 Setting / Historic Record

Similar to hurricanes, tropical storms and winter storms, wind damage associated with summer storms and tornadoes has the potential to affect any area of Sprague. 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 town without harming another. Such storms occur in Sprague each year, although hail and direct lightning strikes to areas within Sprague are infrequent. No tornadoes have occurred within the town since the last HMP.

The following is an excerpt from the NCDC database for recent summer storms that impacted Sprague:

- On June 26, 2009, supercell thunderstorms formed and tracked across southern Connecticut. Penny size hail was reported in neighboring Lisbon.

- On July 24, 2010, an isolated severe thunderstorm spurred from an approaching cold front and upper level trough. As a result of the intense storm, a tree reportedly fell across Route 97 in Sprague.

6.2 Existing Programs, Policies, and Mitigation Measures

Warning is the most viable and therefore the primary method of existing mitigation for tornadoes and thunderstorm-related hazards in Connecticut. The NOAA National Weather Service issues watches and warnings when severe weather is likely to develop or has developed, respectively. Previous sections outline the need for the town to join the CT Alert's Everbridge emergency notification system to send geographically specific telephone warnings into areas at risk for hazard damage. Section 5.2 explains wind regulations and procedures to limit damages associated with wind events in town.

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 Sprague are equally likely to experience the effects of summer storms. Tornadoes are far less frequent than less powerful summer storms and, although they can cross all areas of town, Sprague is not likely to experience a tornado in any given year.

Most thunderstorm damage is caused by straight-line winds exceeding 100 mph. Experience has shown generally 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 cable 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. Most downed power lines in Sprague are detected quickly and any associated fires are quickly extinguished. Such fires can be extremely dangerous during the summer months during dry and drought conditions.

The town shall continue to look for funding to implement a Reverse 911 system such as the state's Alerts "Everbridge" emergency notification system like other SCCOG municipalities. The town would then have a warning system for all its residents and businessmen and women.

6.4 Potential Mitigation Measures, Strategies, and Alternatives

Many potential mitigation measures for summer storms and tornadoes include those appropriate for inland flooding, hurricanes, and tropical storms as presented in Section 11 of this annex.

7.0 WINTER STORMS AND NOR'EASTERS

7.1 Setting / Historic Record

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

Winter storms and nor'easters have affected Sprague since the last HMP, but storms during the winter of 2010-2011 had the most significant effect. Winter storm Alfred in October 2011 led to downed trees and electrical outages in different areas of town, which is attributed to wind damage rather than snow load damage. One of the major problems the town faced was the Hanover Sewer Pumping Station which had to be manually pumped by the town every two days. The system serves 60 homes and is not outfitted with a generator.

During the repeated storms of January and February of 2011, Sprague officials monitored buildings and cleared roofs when necessary. Town officials are unaware of any private structure collapses.

7.2 Existing Programs, Policies, and Mitigation Measures

Existing regulations, codes, ordinances and mitigation measures associated with flooding, wind, and warnings are discussed in Chapters 2, 5, and 6 respectively. Please refer back to these chapters to review those regulations, codes, ordinances, and mitigation measures applicable to winter storms and nor'easters.

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. Sprague has historically dealt with the issue of fallen trees contributing to the formation of ice jams along the Shetucket River and Beaver Brook. This occurrence has lead to a number of ice jams throughout Sprague's past. As a result, the Emergency Management Director (CERT) continuously monitors the two rivers throughout the winter, most closely during winter storms.

7.4 Potential Mitigation Measures, Strategies, and Alternatives

Several potential mitigation measures for reducing the impact of winter storms are presented in Section 11.

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

8.2 Regulations, Codes, and Ordinances

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

Due to the infrequent nature of damaging earthquakes, land use policies in Lisbon do not directly address earthquake hazards. A specific survey regarding all critical facilities and infrastructures has not been performed.

8.3 Vulnerabilities and Risk Assessment

Unlike seismic activity in California, earthquakes in Connecticut are not associated with specific known active faults. Bedrock in Connecticut and New England in general is highly capable of transmitting seismic energy.

The built environment in Connecticut includes old, non-reinforced masonry that is not seismically designed. Those who live or work in non-reinforced masonry buildings, especially those built on filled land or unstable soils are at the highest risk for injury due to the occurrence of an earthquake.

Approximately 28% or 2,493 acres of the town is underlain by stratified drift which includes alluvium, sand, gravel, fines, swam, and surficial materials beneath water. The remaining approximately 6,348 acres of the 8,841 acres (approximately 72%) are underlain by till. Structures in the areas of stratified drift are at an increased risk from earthquakes due to amplification of seismic energy and/or collapse. The areas underlain by stratified drift are typically associated with water bodies. In Sprague, the areas underlain by stratified drift are mostly the areas surrounding Beaver Brook, the Shetucket River, Little River, Adams Brook, and their tributaries.

The best mitigation for future development in areas of sandy material is the application of the most stringent building codes such as those in the Connecticut Building Codes or, wherever the town deems necessary, the prohibition of new construction. The areas that are not at increased

risk during an earthquake due to unstable soils are the majority of Sprague underlain by glacial till.

Areas of steep slopes can collapse during an earthquake, creating landslides. Areas of steep slopes in Sprague are typically near the major waterways including the Shetucket River, Beaver Brook, and Little River. However, officials do not report any historical issues with landslides or slumping soils along the face of hillsides in town.

Seismic activity can also break utility lines, such as water mains and 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.

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

8.4 Potential Mitigation Measures, Strategies, and Alternatives

Due to the low probability of occurrence, potential mitigation measures related to earthquake damage primarily include adherence to building codes, emergency response services, and the placement of utility infrastructure underground to the furthest extent possible. 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 which are also presented 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. According to Sprague officials, there are no areas in town at a high risk for wildfires, however some areas are more difficult to access than others.

9.2 Existing Programs, Policies, and Mitigation Measures

Monitoring of potential fire conditions is an important part of mitigation. The DEEP Forestry Division uses the rainfall data recorded by the Automated Flood Warning system to compile forest fire probability forecasts. This allows the DEEP and Sprague to monitor the drier areas of Connecticut to be prepared for forest fire conditions. The town can access this information on the internet.

Existing mitigation for wildland fire control is typically focused on Fire Department (entirely volunteer) training and maintaining an adequate supply of equipment. The Department moves to the location of the fire as quick as possible. The town is in the midst of moving old fire hydrants from private backyards to the street sides. This is primarily being done in the village of Baltic where hydrants were originally installed and associated with mill housing approximately a century ago. The moving process is expected to reduce the potential for unnoticed leaks in the water system. In response to areas difficult to reach, the Fire Department has an off-road truck and an ATV which make access possible in the ample amount of forested land in town.

9.3 Vulnerabilities and Risk Assessment

As discussed above, the town is in the middle of relocating fire hydrants in the village of Baltic to reduce the potential for leaks in the water system and the town has an off-road truck and an ATV which allow Sprague the ability to access otherwise inaccessible areas. These vehicles improve access to the few areas which are inaccessible to standard firefighting vehicles.

There are some dead-end and private roads in town which present difficult access for fire trucks. However, in most cases, trucks are able to turn around in private driveways. In terms of the built areas of Sprague, the highest risk to town is the areas in the village of Baltic, particularly the lower end of High Street, where residences are close together. In some instances, homes can be as little as six inches apart in the village.

However, the Baltic Fire Department, comprised entirely of volunteers, aims to reach fires as fast as possible, even in outlying areas where nine dry hydrants are located. The Fire Department tries to extinguish fires as fast as possible.

9.4 Potential Mitigation Measures, Strategies, and Alternatives

Potential mitigation measures for wildfires include a combination of prevention, education, and emergency planning 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. According to town officials, the Flood of 1955 washed out the Shetucket River Dam, which caused damage in town.

The risk of a dam failure affecting Sprague is considered to be moderate as six major dams exist within town along water bodies flowing throughout. The Baltic Reservoir East Dam (Class B) is in poor condition and the CT DEEP has required that the town maintain low water levels in the Baltic Reservoir to not further exacerbate deterioration of the dam. Additionally, the Paper Mill Pond Dam and the Versailles Pond Dam on the Little River may have structural integrity issues, which are being reviewed by the CT DEEP. This all being said, no dam failures have affected the town since the time of the last HMP.

10.2 Existing Programs, Policies, and Mitigation Measures

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.

Dam Inspection Regulations require that nearly 700 dams in Connecticut be inspected annually. The DEEP currently prioritizes inspections of those dams that pose the greatest potential threat to downstream persons and properties.

Dams found to be unsafe under the inspection program must be repaired by the owner. Depending on the severity of the identified deficiency, an owner is allowed reasonable time to make the required repairs or remove the dam. If a dam owner fails to make necessary repairs to the subject structure, the DEEP may issue an administrative order requiring the owner to restore the structure to a safe condition and may refer noncompliance with such an order to the Attorney General's Office for enforcement. As a means of last resort, the DEEP Commissioner is empowered by statute to remove or correct, at the expense of the owner, any unsafe structures that present a clear and present danger to public safety.

In Connecticut, the owners of Class C dams are required to maintain EOPs. According to Connecticut DEEP Dam Safety files, a DFA was performed on the Hanover Reservoir Dam, the Paper Mill Pond Dam, and the Versailles Pond Dam. None of the high hazard dams in Sprague currently have EOP's on file, however the town plans to prepare an EOP for both the Baltic Reservoir East and West Dams. In the absence of DFA mapping, the 500-year floodplains downstream of a Class BB or Class B dam could be used to delineate potential dam failure areas.

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. According to the "Connecticut Dams" data file that was published in 1996, there were 11 CT DEEP-registered dams within Sprague, of which three were Class A, and five were Class B. The MS Chambers Mill Dam on Beaver Brook was removed around 1996. While remnants may still remain of the old mill race, the town believes that the dam has been removed from the stream bed. The updated 2006-2007 dam safety list includes a Class B dam upgraded to a Class C. High and significant hazard dams in Sprague are listed in Table 8-1. This HMP section primarily discusses the possible effects of failure of both high potential hazard (Class C) dams and significant hazard (Class B) dams.

TABLE 10-1
Dams Registered With the CT DEEP in the Town of Sprague

Number	Name	Owner	Class
13301	Baltic Reservoir (West)	Town Of Sprague	B
13302	Hanover Reservoir Dam	Ray Armstrong	C
13303	Paper Mill Pond	C/O Cascades USA, Inc.	B
13304	Versailles Pond	C/O Cascades USA, Inc.	B
13306	Harrington Apartments Dam	Noela & Samantha Harrington	B
13312	Baltic Reservoir (East)	Town Of Sprague	B

Failure of a Class C dam would result in any of the following: loss of life; major damage to habitable structures, residences, hospitals, convalescent homes, schools, and main highways; and a significant economic loss. Failure of a Class B dam failure would result in any of the following: possible loss of life; minor damage to habitable structures, residences, hospitals, convalescent homes, and schools; damage or interruption of the use of service of utilities; damage to primary roadways and railroads; and a significant economic loss. Both hazard classes of dams are regarded as significant in the state of Connecticut.

Town officials raised concerns with several dams in town, some of which are privately owned. In the past, many dams were built to produce power to serve the industrial facilities situated along the town's rivers. The remaining dams include several State of Connecticut-owned dams, and the Paper Mill Pond Dam and Versailles Pond Dam on the Little River, which are owned by the Sprague Paper Company. These dams may have structural integrity issues which are being reviewed by the CT DEEP. The town believes that the owners are investigating rehabilitating these dams as part of potential brownfields cleanup of the mills. The 1955 flood washed out the Shetucket River Dam in, causing damage in Sprague. The risk associated with each of these structures needs to be evaluated in order to ascertain the degree of hazards posed during a significant storm event. The town now owns Hanover Reservoir Dam which is believed to be in good condition.

The impacts related to the Class C and Class B dams in town are described below. The description below is based on information available at the Connecticut DEEP Dam Safety Section. It is noted that the failure of any of the other classes of dams in town could also have

impacts on life and property within Sprague, although these are not discussed in favor of the more hazardous classes.

Baltic Reservoir (West) (No. 13301) and Baltic Reservoir (East) (No. 13312) are two Class B dams located on an unnamed tributary to the Shetucket River, approximately 2,800 feet upstream of the confluence. The reservoir has a maximum storage of 250 acre-feet.

There is no information in the CT DEEP file regarding the dimensions of the west dam. However, the USACE National Inventory of Dams (NID) notes that the west dam has a length of 120 feet and a height of 23 feet. The NID notes that the west dam was constructed in 1900. The west dam on the Baltic Reservoir is in poor repair. The CT DEEP is requiring that the town keep the water levels in Baltic Reservoir low in order to not exacerbate further deterioration of the dam.

The eastern dam is also known as the "south" or "southernmost" dam. According to the 1989 Inspection Report by Lenard Engineering, Inc., the east dam was constructed in 1908 from reinforced concrete and of a concrete buttress design to create a water supply reservoir. The 1989 report notes that the dam has an approximate length of 163 feet between abutments and a height ranging from 10 to 25 feet. The NID notes that the east dam has a length of 370 feet and a height of 13 feet. An agreement from April 2009 between the Sprague and Wright-Pierce regards the development of an alternative water supply source. The document recommends the preparation of a final design for the rehabilitation of the Baltic reservoir "south" dam. The south dam on the Baltic Reservoir was recently repaired.

Hanover Reservoir (No. 13302) is a Class C dam located on Little River at the southern end of the reservoir. According to the 1980 USACE Phase I Inspection Report, the dam was built in 1900 and is an earthen embankment approximately 26.5 feet in height and 750 feet in length, including a 147-foot masonry spillway. With water level at the top of the impoundment, the dam impounds 400 ac-ft. The top of the embankment is 6.6 feet above the spillway crest and approximately 30 feet wide with a paved road on it. The 1980 inspection noted that the dam was in poor condition and included a DFA. The structure was visually inspected in March 2010 along with Paper Mill Pond & Versailles Pond after a significant storm event. The inspection noted heavy flows within the channel, a road bridge over the spillway, and approximately four feet of clearance between the water level and bottom of the low chord over the bridge. The town now owns Hanover Reservoir Dam. It is believed to be in good condition.

Paper Mill Pond (No. 13303) is a Class B dam located on Little River at the eastern end of the L-shaped reservoir. According to the 1979USACE Phase I Inspection Report, the dam is a 573-foot long composite rubble masonry, concrete and earth embankment consisting of a 124.5-foot long gravity masonry overflow section, an 84-foot long earth embankment to the right of the overflow section and a 365-foot long earth embankment to the left of the overflow section. The DFA utilized a ½ PMF (test flood) of 11, 200 cfs. The most recent inspection occurred in March 2010 after a large rain event. The CT DEEP inspected this dam along with the Hanover Reservoir and Versailles Pond Dams. This dam may have structural integrity issues. The town believes that the owners are investigating rehabilitating the dam as part of potential redevelopment of the mills.

Versailles Pond (No. 13304) is a Class B dam located on Little River at the southern end of the reservoir. The dam was originally constructed in 1865. According to the 1980 USACE Phase I Inspection Report, the dam was modified in 1920 to have a total length of 400 feet consisting of a

184-foot long broad-crested masonry spillway, a 190-foot long earthen embankment and a 27-long sluiceway. The top of the embankment is approximately 20 feet wide, 8.7 feet above the spillway crest, and 23 feet above the streambed of Little River. The flow is directed into a diversion canal under typical flow conditions. The spillway into the canal has a fixed elevation and a total length of 30 feet. The downstream spillway channel is 185 feet long. A concrete fish ladder connects the downstream Little River channel to the spillway channel. The dam was judged to be in poor condition in June 1980. A DFA utilized a ½ PMF of 12,000 cfs. The most recent inspection on file is from March 2010, which was completed by the CT DEEP after a significant storm. The CT DEEP file includes a Long-Term Monitoring and Management Plan. This dam may have structural integrity issues. The town believes that the owners are investigating rehabilitating the dam as part of potential redevelopment of the mills.

Harrington Apartments Dam (No. 13306) was a Class B dam located on Beaver Brook approximately 350 feet upstream of the West Main Street crossing of the brook. The most recent inspection was completed in April 1989, which noted that the dam was an earth embankment with upstream concrete armor and a downstream vertical masonry wall. It was a run-of-the-river dam, with no significant impoundment upstream. Town officials indicate that this dam was removed around 1996. While remnants may still remain of the old mill race, the Town believes that the dam has been removed from the stream.

10.4 Potential Mitigation Measures, Strategies, and Alternatives

Several mitigation measures for reducing potential damage from dam failure are presented in Section 11.

11.0 RECOMMENDATIONS

11.1 Summary of Specific Recommendations

All recommendations presented in this plan for each hazard are summarized below:

11.1.1 Recommendations Applicable to All Hazards

Regional Coordination

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

Local Emergency Response & Public Information

- Continue to review and update the town's EOP at least once annually.
- Continue to review and update the ERP for the Sayles Elementary School and the town's LEMSP.
- Ensure that Sayles Elementary School is ARC-certified.
- Continue to maintain the list of persons who may need additional assistance during an emergency.
- Continue to include the town's handicapped-accessible vans in the town's emergency planning respective to persons who may need the service.
- Continue to maintain the town-wide list of property and road information.
- Continue to pursue funding sources for the addition of a generator for the Shetucket Village Elderly/Disabled Housing Complex.

- Work to make the Town Hall Sprague's primary EOC while making the Baltic Fire Department the back-up EOC.

- Pursue funding sources for the upgrade to the Sprague WPCF.

- Pursue funding sources for the addition of a generator for the village of Hanover Sewer Pumping Station.

- Consider options available to elevate wells in the Sprague Water and Sewer Authority wellfield above the Shetucket River SFHA elevation.

- Continue to maintain emergency response training and equipment and upgrade equipment when financially possible.

- Encourage town officials to attend FEMA-sponsored training seminars at the Emergency Management Institute (EMI) in Emmitsburg, Maryland. All of these workshops are free of charge. Tuition, travel and lodging are provided by FEMA for the EMI training. Annual training sessions include emergency management, environmental reviews, the FEMA grant programs, the NFIP and CRS and others related to other hazards.

- Continue to evaluate emergency shelters, update supplies, and check communication equipment.

- Continue to promote dissemination of public information regarding natural hazard effects and mitigation measures into local governmental and community buildings. Specifically,

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

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

  - ⇨ Post hazard preparedness information on the town's website and the website of Groton Utilities. Include links to established sources at the State of Connecticut and FEMA.

- Pursue funding to incorporate the town in the CT "Everbridge" Reverse 9-1-1 Emergency Notification System to telephone warnings into potentially affected areas. Incorporate the SFHAs based on the recent DFIRM.

Prevention

- Integrate additional elements of this HMP into the *Plan of Conservation and Development* during the next update of the POCD.

- Continue to require the underground installation of utilities for all new development to the greatest extent possible and, whenever possible, place existing overhead utilities underground.

- ❑ In the event of an expansion / redevelopment of the mill properties in the industrial Providence-Worcester Railroad section of town, promote sound redevelopment so as not to disrupt and prevent planned emergency operations and procedures in the area.

- ❑ Continue to ensure that the Emergency Management Director and CERT perform regular inspections of the Shetucket River and Beaver Brook for blockage potential throughout the winter.

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

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

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

Natural Resource Protection & Open Space

- ❑ Look for funding opportunities to acquire an additional approximately 230 acres of open space.

- ❑ Continue to protect watercourses, tidal and inland wetlands, steep slopes, and inland floodplains.

- ❑ Strive to ensure that any open space acquired be preserved as open space in perpetuity.

- ❑ Seek to identify and preserve any areas which are potentially high in passive recreational potential as open space and as part of a pathway network.

11.1.2 Recommendations Applicable to Inland Flooding

Prevention

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

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

- ❑ Review local Subdivision Regulations and evaluate the possibility of incorporating changes to place further limitations on areas of impermeable surfaces in new subdivision developments in flood prone areas. If warranted, make necessary changes to the Subdivision Regulations.

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

- ❑ Utilize the recently released DFIRM to compile a list of addresses with structures within the SFHA. Track the cost of repairs to these properties following major storm events through outreach or building permits to develop a database of information for potential future grant funding.

Property Protection

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

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

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

- If property owners become interested, pursue elevation or acquisition of residential properties that suffer flood damage.

- Remind residents that their flood insurance rates will not increase if they make a claim since the insurance is federally subsidized and encourage them to submit claims following damage events.

Emergency Services

- Review the EOP to ensure language regarding evacuation procedures is included.

- Pursue mutual aid agreements with such organizations as the American Red Cross and the Boy Scouts of America to provide volunteer labor prior to or during flood events to fill sand bags and assist with other response activities.

- Implement a roadway-specific warning system to alert motorists to the dangers present during times of flooding. Warning may take the form of dedicated signage or traffic control lights.

Public Education and Awareness

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

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

- Expand the annual public outreach projects to include a brochure which will outline the risks of flood prone areas and mitigation and preparedness strategies and contacts. The brochure would be handed out annually.

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

Structural Projects

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

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

- Continue to perform catch basin and culvert surveys to perform maintenance and cleaning and to identify and prioritize structures in need of replacement.

- Investigate funding sources and feasibility of improvements to mitigate frequent and repeated flooding problems. Improvements could include installation of pavers (or other permeable roadway surfaces) and replacement of storm drainage systems. Work with CT DOT to facilitate these actions if State roads are involved.

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

Prevention

- Work through the State to locate NOAA weather radios in commercial buildings with large population clusters. Educate building managers on the proper use of the radios.

- Continue to maintain snow and icing plowing and maintenance routes.

Property Protection

- Promote the use of functional shutters for older buildings in the town to guard against window breakage which can result in structural failure. Investigate funding sources to promote this relatively inexpensive type of retrofitting on a large scale.

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

- Encourage commercial building owners or managers of buildings with large population clusters to not only develop emergency response plans, but also to identify mitigation opportunities for long-range planning.

Emergency Services

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

- Consider surveying all town-owned buildings to determine their ability to withstand wind loading.

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

- Prioritize any wind-related retrofitting for the town's shelters over other critical facilities. If analysis reveals that another town building is a more appropriate shelter space, consider relocating the shelter to that location.

- Ensure that the town's shelters are ARC-certified.

Public Education and Awareness

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

- Post and maintain signs signifying evacuation routes from coastal areas.

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

- Develop working relationships with local community organizations such as garden clubs. Encourage the organizations to sponsor events to educate the public on wise landscaping techniques, how to locate trees away from utilities, and on the types of trees that are most resistant to wind damage.

Natural Resource Protection

- Look to acquire an additional approximate 230 acres to add to its approximate 630 acres of open space.

11.1.4 Recommendations Applicable to Earthquakes

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

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

11.1.5 Recommendations Applicable to Wildfires

- Continue to evaluate fire flows, available water supply, and areas at risk of wildfire in town.
- Continue to support public outreach programs to increase awareness of forest fire danger, equipment usage, and protecting homes from wildfires. Educational materials should be made available at Town Hall.
- Ensure that provisions of town regulations regarding fire protection facilities and infrastructure are being enforced.

11.1.6 Recommendations Applicable to Dam Failure

- Provide technical assistance and outreach to owners of unregistered dams regarding inspections and maintenance.
- Work with the CT DEEP and private owners, where applicable, to ensure that the issues with the Baltic Reservoir, the Paper Mill Pond, and Versailles Pond Dams are resolved.

11.2 Prioritization of Specific Recommendations

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

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

Implementation of Current Recommendations	Existing or New Recommendation?	Responsible Department[1]	Schedule	Cost[2]	Potential Funding Source[3]	Weighted STAPLEE Criteria[4]															Total STAPLEE Score
						Benefits								*Costs*							
						Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	**STAPLEE Subtotal**	Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	**STAPLEE Subtotal**	
ALL HAZARDS																					
Regional Coordination																					
Continue to promote inter-jurisdictional coordination efforts for emergency response	New	BS, FD	2012-2017	Minimal	OB	1	1	1	1	1	1	1	**9.0**								**0.0**	***9.0***
Continue to promote local and regional planning exercises that increase readiness to respond to disasters	New	BS	2012-2017	Low	OB	1	1	1	1	1	0.5	1	**8.0**								**0.0**	***8.0***
Continue to evaluate communication capabilities and pursue upgrades to communication and ensure redundant equipment is available	Existing	FS, FD	2012-2017	Low	OB, CI	1	1	1	1	1	1	1	**9.0**						-0.5		**-1.0**	***8.0***
Continue to promote regional transportation planning through SCCOG	Existing	BS	2012-2017	Low	OB	1	1	1	1	1	0.5		**7.0**								**0.0**	***7.0***
Work with the SCCOG to perform a regional study of the vulnerability of critical facilities to natural hazard damage	New	FS	2012-2017	Low	OB	1	1	1	1	1	0.5		**7.0**								**0.0**	***7.0***
Work with the SCCOG to develop regional evacuation scenarios that include but build upon the Millstone evacuation plan	New	PD, FD	2012-2017	Low	OB	1	1	1	1	1	1		**8.0**		-0.5				-0.5		**-2.0**	***6.0***
Local Emergency Response & Public Information																					
Continue to review and update the City EOP at least once annually	Existing	BS, FD	2012-2017	Low	OB	1	1	1	1	1	1	1	**9.0**								**0.0**	***9.0***
Continue to maintain emergency response training and equipment and upgrade equipment when possible	Existing	BS, FD	2012-2017	Moderate	OB, CI	1	1	1	1	1	0.5	1	**8.0**						-0.5		**-1.0**	***7.0***
Encourage City officials to attend FEMA-sponsored training seminars at EMI	New	FS	2012-2017	Minimal	OB	0.5	0.5	1	1	1	1	0.5	**7.0**								**0.0**	***7.0***
Continue to evaluate emergency shelters, update supplies, and check communication equipment	Existing	FS, FD	2012-2017	Low	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***
Continue to promote dissemination of public information regarding natural hazard effects into Government buildings, with additions	Existing	FS, ZE	2012-2017	Minimal	OB	1	1	1	1	1	1	1	**9.0**								**0.0**	***9.0***
Resolve and utilize the Reverse 9-1-1 system to telephone warnings into affected areas, and add DFIRM floodplain areas to the database	Existing	FS	2012-2017	Minimal	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***
Prevention																					
Develop a checklist for land development applicants that cross-references the specific regulations and codes related to disaster resilience	New	ZE	2012-2017	Minimal	OB	1	1	1	1	1	1		**8.0**			-0.5					**-0.5**	***7.5***
Integrate additional elements of this HMP into the Plan of Conservation and Development during the next update	New	PZ, ZE	2012-2017	Low	OB	1	1	1	1	1	1	1	**9.0**			-1	-0.5				**-1.5**	***7.5***
Continue reviewing building plans to ensure proper access for emergency vehicles	New	FD	2012-2017	Minimal	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***
Continue to require the underground installation of utilities for all new development where possible	Existing	PZ	2012-2017	Minimal	OB	1	1	1	1	1	0.5		**7.0**	-0.5			-0.5				**-1.0**	***6.0***
Continue to enforce the appropriate building code for new building projects	New	ZE	2012-2017	Minimal	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***
Encourage residents to install and maintain lightning rods on their structures	New	FD, ZE	2012-2017	Minimal	OB	1	0.5	1	1	1	1	0.5	**7.5**								**0.0**	***7.5***
Natural Resource Protection & Open Space																					
Continue to regulate development in protected and sensitive areas including steep slopes, wetlands, and floodplains	New	PZ	2012-2017	Minimal	OB	1	1	1	1	1	1	1	**9.0**								**0.0**	***9.0***
FLOODING RECOMMENDATIONS																					
Prevention																					
Continue to prohibit new development activities within SFHAs to the greatest extent possible within town land use regulations	New	PZ	2012-2017	Minimal	OB	1	1	1	1	1	1	1	**9.0**								**0.0**	***9.0***
Require developers to demonstrate whether detention or retention of stormwater is the best option for reducing peak flows downstream	New	PZ	2012-2017	Minimal	OB	0.5	1	1	1	1	1	0.5	**8.0**								**0.0**	***8.0***
Conduct an annual inspection of floodprone areas that are publically accessible. Recommend drainage improvements as appropriate.	New	PW	2012-2017	Low	OB	1	1	1	0.5	1	0.5	0.5	**7.0**								**0.0**	***7.0***
Property Protection																					
Incorporate information on the availability of flood insurance into all hazard-related public education workshops	New	ZE, FS	2012-2017	Low	OB	1	1	0.5	0.5	1	1		**7.0**	-0.5							**-0.5**	***6.5***
Make available FEMA-provided flood insurance brochures and encourage residents to purchase insurance if they are in a SFHA	New	ZE, FS	2012-2017	Minimal	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***
Make necessary changes to floodplain regulations so that all insured residents are eligible for increased cost of compliance coverage	New	ZEO	2012-2017	Low	OB	1	0.5	0.5	1	1	1	0.5	**7.0**								**0.0**	***7.0***
Encourage residents to submit flood insurance claims following damage events	New	All	2012-2017	Minimal	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***
Emergency Services																					
Pursue mutual aid agreements with non-profits to provide volunteer labor for response activities	New	FS, FD	2012-2017	Low	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***

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

Implementation of Current Recommendations	Existing or New Recommendation?	Responsible Department[1]	Schedule	Cost[2]	Potential Funding Source[3]	Weighted STAPLEE Criteria[4]															Total STAPLEE Score
						Benefits								*Costs*							
						Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	**STAPLEE Subtotal**	Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	**STAPLEE Subtotal**	
Public Education and Awareness																					
Conduct a "Natural Hazards Fair" so that interested parties can familiarize themselves with natural hazard mitigation options	New	FS, FD	2012-2017	Moderate	OB	1	1	0.5	0.5	1	1		**7.0**			-0.5	-0.5				**-1.0**	***6.0***
Visit schools and educate children about the risks of flooding and how to prepare	New	FD	2012-2017	Low	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***
Annually distribute a brochure outlining the risks of floodprone areas, mitigation strategies, and contacts	New	PL	2012-2017	Low	OB	1	1	1	1	1	1		**8.0**	-0.5							**-0.5**	***7.5***
Encourage builders, developers, and architects to become familiar with NFIP land use and building standards at annual workshops	New	PL, ZEO	2012-2017	Low	OB	1	1	1	1	1	1		**8.0**			-0.5					**-0.5**	***7.5***
Natural Resource Protection																					
Pursue the acquisition of additional open space in SFHAs	New	BS	2012-2017	High	OB	1	1	1	1	1	1	1	**9.0**						-1		**-2.0**	***7.0***
Continue to aggressively pursue wetlands protection and incorporate performance standards into subdivision reviews	New	PZ	2012-2017	Low	OB	1	1	1	1	1	1	1	**9.0**	-0.5		-0.5					**-1.0**	***8.0***
Structural Projects																					
Encourage the use of floodplain storage and other flood control methods in new developments and at existing properties where appropriate	New	PZ, ZE	2012-2017	Minimal	OB	1	1	0.5	1	0.5	1		**7.0**		-0.5					-1	**-2.0**	***5.0***
Utilize the recently available extreme rainfall data to determine existing culvert sizing and encourage upgrades where undersized	New	PW	2012-2017	Moderate	CI	0.5	1	1	0.5	1	1		**7.0**						-1		**-2.0**	***5.0***
Continue to perform catch basin and culvert surveys to prioritize upgrades and perform maintenance and cleaning	Existing	PW	2012-2017	Moderate	OB	1	1	1	1	1	0.5	0.5	**7.5**								**0.0**	***7.5***
Investigate funding and feasibility of mitigating frequent drainage problems	Existing	PW, FD, FS	2012-2017	Low	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***
WIND DAMAGE RELATED TO HURRICANES, SUMMER STORMS, TORNADOES, AND WINTER STORMS																					
Prevention																					
Encourage CL&P to also cut down trees as opposed to just trimming trees near power lines	New	FS	2012-2017	Minimal	OB	1	1	1	1	1	1	1	**9.0**							-0.5	**-0.5**	***8.5***
Continue to perform appropriate tree maintenance to the greatest extent possible	Existing	PW	2012-2017	Minimal	OB	1	1	1	1	1	1	1	**9.0**							-0.5	**-0.5**	***8.5***
Property Protection																					
Promote the use of functional shutters for older buildings in the town and investigate funding sources	New	ZE, PZ	2012-2017	Minimal	OB, CI	1	0.5	1	1	1	0.5		**6.0**								**0.0**	***6.0***
Make information on wind-resistant construction techniques available to all building permit applicants	New	ZE, PZ	2012-2017	Low	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***
Encourage commercial building owners to develop emergency response plans and identify mitigation opportunities	New	PL, FD	2012-2017	Low	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***
Emergency Services																					
Identify a location for a brush-disposal operation for dealing with debris following wind storms and determine potential reuse	New	PW	2012-2017	Minimal	CI	0.5	1	1	1	1	1		**7.5**								**0.0**	***7.5***
Consider surveying all town-owned buildings, particularly historic buildings, to determine their ability to withstand wind loading	New	ZE, BD	2012-2017	Low	OB	1	0.5	1	0.5	1	0.5		**5.5**								**0.0**	***5.5***
Develop agreements with landowners and companies to chop/chip to ensure backup plans are in place for debris removal	New	PW, FS	2012-2017	Low	OB	0.5	0.5	1	0.5	1	0.5		**5.0**								**0.0**	***5.0***
Prioritize wind-related retrofitting for the town's shelters over other critical facilities	New	BS	2012-2017	Moderate	CI	0.5	0.5	1	0.5	1	0.5		**5.0**						-0.5		**-1.0**	***4.0***
Public Education and Awareness																					
Visit schools and educate children about the risks of wind events and how to prepare for them	New	FD	2012-2017	Low	OB	1	1	1	1	1	0.5		**7.0**								**0.0**	***7.0***
Conduct an annual workshop so that interested parties can familiarize themselves with wind mitigation	New	PL	2012-2017	Moderate	OB	1	1	0.5	0.5	1	1		**7.0**			-0.5	-0.5				**-1.0**	***6.0***
Work with local homeowners associations and community groups to provide education regarding wise landscaping and proper tree planting	New	PL	2012-2017	Low	OB	0.5	1	1	1	1	1		**7.5**			-0.5					**-0.5**	***7.0***
WINTER STORMS																					
Consider conducting a study to identify buildings vulnerable to roof damage or collapse from heavy snow in the town	New	ZE, PW	2012-2017	Moderate	OB	1	1	1	0.5	0.5	1		**7.0**			-0.5			-1		**-2.5**	***4.5***
Consider drafting a written plan for inspecting and prioritizing the removal of snow from town-owned structures	New	ZE, FS	2012-2017	Low	OB	0.5	1	1	1	1	0.5		**6.5**								**0.0**	***6.5***
Continue making funding available to the Public Works Department each year for clearing snow from roads and parking lots	New	BS	2012-2017	High	OB	1	1	1	1	1	0.5		**7.0**								**0.0**	***7.0***
Provide information for protecting Town residents during cold weather and for mitigating icing and insulating pipes at residences	New	ZE	2012-2017	Low	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***
Continue to identify areas that are difficult to access during winter storm events and develop contingency plans to access such areas	New	FD, PW	2012-2017	Minimal	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***

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

Implementation of Current Recommendations	Existing or New Recommendation?	Responsible Department [1]	Schedule	Cost [2]	Potential Funding Source [3]	Weighted STAPLEE Criteria [4]															Total STAPLEE Score
						Benefits								*Costs*							
						Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	**STAPLEE Subtotal**	Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	**STAPLEE Subtotal**	
EARTHQUAKES																					
Ensure that town departments have adequate backup supplies and facilities for continued functionality following an earthquake	New	BS	2012-2017	Moderate	OB, CI		0.5	1	0.5	0.5			**3.0**		-0.5		-1				**-2.0**	***1.0***
Consider preventing residential development in areas prone to collapse such as below steep slopes or areas prone to liquefaction	New	PZC	2012-2017	Minimal	OB	0.5	1	1	0.5	0.5	1	0.5	**7.0**				-0.5				**-0.5**	***6.5***
Consider conducting an assessment of buildings in town in respect to their susceptibility to earthquakes	New	PZC	2012-2018	Moderate	OB		1	1	0.5	1	1		**6.5**		-1						**-2.0**	***4.5***
WILDFIRES																					
Continue to evaluate fire flows, available water supply, and areas at risk of wildfire in the town	Existing	FD	2012-2017	Minimal	OB	1	1	1	1	1	1	0.5	**8.5**								**0.0**	***8.5***
Continue to support public outreach programs to increase awareness of forest fire danger, equipment usage, and protecting homes	New	FD	2012-2017	Low	OB	1	1	1	1	1	0.5	1	**8.0**								**0.0**	***8.0***
Ensure that provisions of town regulations regarding fire protection facilities and infrastructure are being enforced	New	PD	2012-2017	Low	OB	0.5	0.5	1	0.5	1	0.5		**5.0**								**0.0**	***5.0***
DAM FAILURE																					
Work with CT DEEP to ensure that the owners of high hazard dams have current EOPs and keep local copies	New	FS	2012-2017	Minimal	OB	1	1	1	1	1	1		**8.0**								**0.0**	***8.0***
Provide assistance to the owners of lesser ranked dams regarding resources available for inspections and maintenance	New	ZE	2012-2017	Minimal	OB	0.5	0.5	0.5	0.5	1		0.5	**4.0**								**0.0**	***4.0***

NOTES

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

APPENDIX A

ADOPTION RESOLUTION

Town of Sprague

CATHERINE A. OSTEN
First Selectman

RECEIVED
DEC 21 2012
SCCOG

RESOLUTION
TOWN OF SPRAGUE HAZARD MITIGATION PLAN UPDATE

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

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

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedures for the Town of Sprague;

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

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

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

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

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 First Selectman and Board of Selectmen by October 1 of each calendar year.

PASSED by the Board of Selectmen this 12th day of December, 2012.

Catherine A. Osten First Selectman

Denise M. Dembinski, Selectman

Dennison L. Allen, Selectman