HAZARD MITIGATION PLAN UPDATE
ANNEX FOR THE TOWN OF LISBON

Southeastern Connecticut Council of Governments
Multi-Jurisdictional Hazard Mitigation Plan

DECEMBER 2017

ADOPTED

MMI #3570-09

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1.0 INTRODUCTION

1.1 Purpose of Annex

The purpose of this HMP annex is to provide an update to the 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 hazards to Lisbon. Background information and the regional effects of pertinent 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 Lisbon and is not to be considered a standalone document.

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

1.2 Setting

Lisbon is a rural community in the north-central region of New London County that was settled as early as 1698 and incorporated in 1786. The community has since grown to a population of 4,069 as of the 2000 census. Additional growth over the next decade brought the total population of the town to 4,338 as of the 2010 census. The town is approximately 16.7 square miles in area and includes the village of Newent which is the Town Center. The Town is bordered by Norwich and Sprague to the west, Canterbury to the north, Griswold to the east, and Preston to the south.

Several major transportation corridors traverse the town. Major roads include Interstate 395, Route 12, Route 138, and Route 169. Rail lines that travel through the town include two tracks belonging to the Providence/Worcester line: One runs along the Quinebaug River from Norwich into Jewett City, and the other enters from Versailles (Sprague), travels just south of Newent, and then turns northeast to follow the Quinebaug River into Canterbury. The rail lines allow residents and goods to travel between communities throughout southeastern Connecticut and the eastern seaboard.

Major waterways include the Quinebaug River (which drains from Canterbury and forms the boundary of Lisbon with Griswold to the east and Preston to the south) and the Shetucket River (which drains from Sprague and forms the boundary of Lisbon and Norwich). The Quinebaug River reaches its confluence with the Shetucket River in southwestern Lisbon. Shipping is not conducted on these rivers due to the presence of dams downstream in Norwich.

1.3 Plan Development

The 2012 HMP and its annexes were developed through a series of meetings and the completion of written questionnaires, personal interviews, and workshops as described in the Multi-Jurisdictional HMP update. Since that time, the HMP has been available in local governmental offices and available to emergency personnel. Residents were encouraged to contact the First Selectman with any concerns regarding emergency response or potential projects related to natural hazard damage.

Based on the existing plan, existing information, and hazards that have occurred since 2012, SCCOG determined that the following data collection program would be sufficient to collect data to update the Multi-Jurisdictional plan and each annex.

- The SCCOG issued a press release on November 4th, 2016 announcing two public information meetings on the multi-jurisdictional HMP update. This press release was published in the Norwich Bulletin and The Day, as well as in relevant local "Patch" news websites. This notice was also posted on the SCCOG Facebook page and website. The public information meetings were held on November 28 and December 1, 2016, at the Town of Groton Library and the SCCOG office, respectively.

- A survey soliciting public input was hosted at www.surveymonkey.com/r/SCCOGHazard from October 17, 2017 through March 17, 2017. Topics addressed by the survey included the types of natural hazards that concern participants, the assets, infrastructure, and government services they feel are most at risk, and the types of mitigation measures they support. The survey link was publicized along with the public meetings in The Day, The Norwich Bulletin, and local *Patch* websites, and at all public meetings.

- A data collection meeting was held with the on November 30, 2016 to discuss the scope and process for updating the plan and to collect information. The First Selectman represented 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 the town and that should be addressed in the update.

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

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

1.4 Progress Monitoring

Following adoption, the First Selectman will continue to administer this HMP under the authority of the Board of Selectmen and will be the local coordinator of the HMP. The First Selectman will coordinate with responsible departments as listed in Table 11-1 and ensure that the recommendations of this HMP are considered or enacted. Refer to Section 1.8 of the Multi-Jurisdictional HMP for a description of how the local coordinator will perform progress monitoring. The majority of recommendations in this annex can be accomplished within or with only a slight increase in the operating budgets of the various departments. Projects that require capital improvements or additional funding will need to be approved by the Board of Selectmen.

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

The Town of Lisbon 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 will keep a written record of meeting minutes and the status of the recommendations. These records of progress monitoring will form the basis for the next HMP update.

The Town of Lisbon understands that the multi-jurisdictional HMP and this annex will be effective for five years from the date of FEMA approval of the first SCCOG jurisdiction regardless of the date of adoption by the Town. The First Selectman will coordinate with SCCOG for the next HMP update which is expected to occur in 2022.

2.0 COMMUNITY PROFILE

2.1 Physical Setting

The Town of Lisbon is located in the north-central section of the SCCOG. Elevations range from approximately 30 feet near the confluence of the Quinebaug and Shetucket Rivers to just over 380 feet in north-central Lisbon. Commercial development is concentrated along Route 12 with other commercial areas located sporadically throughout the town with other areas being predominantly rural.

Geology is important to the occurrence and relative effects of natural hazards such as earthquakes. Thus, it is important to understand the geologic setting and variation of bedrock and surficial formations in lands underlying Lisbon. Lisbon contains two bedrock types. The majority of Lisbon is underlain by the Tatnic Hill Formation, while a narrow band parallel to the town's eastern boundary is underlain by the Quinebaug Formation. Each of these formations consists primarily of gneiss and schist which are relatively hard metamorphic rocks. Two inactive faults lie beneath Lisbon. One fault is located in the southern portion of the town and is oriented northwest-southeast, while the second fault is located at the boundary between the two bedrock formations and is defined as a thrust fault that is likely Devonian or Ordovician in origin.

The Town's surficial geologic formations include glacial till and stratified drift. Refer to the Multi-Jurisdictional HMP for a generalized view of surficial materials. The majority of the Town is underlain by glacial till. Till contains an unsorted mixture of clay, silt, sand, gravel, and boulders deposited by glaciers as a ground moraine. Areas adjacent to the Quinebaug River, the Shetucket River, Blissville Brook, and Old Stone Mill Brook have fairly extensive areas underlain by sand, sand and gravel or floodplain alluvium. The amount of stratified drift present is important as areas of stratified materials are generally coincident with floodplains. These materials were deposited at lower elevations by glacial streams, and these valleys were later inherited by the larger of our present day streams and rivers. However, the smaller glacial till watercourses can also cause flooding. The amount of stratified drift also has bearing on the relative intensity of earthquakes and the likelihood of soil subsidence in areas of fill.

2.2 Land Use and Development Trends

According to the 2016 *Plan of Conservation and Development* (POCD), Lisbon was a rural community for most of its history. After World War II, the proliferation of the automobile and regional growth spurred Lisbon to become a bedroom community as the population of Lisbon doubled between 1950 and 1970. While the pace of growth slowed over the next two decades, the completion of Interstate 395 facilitated the creation of major commercial and industrial developments in the town such as a regional waste-to-energy facility and a regional commercial center.

Lisbon continues to be a relatively undeveloped residential community. The town center is located in the area referred to as Newent near the intersection of Routes 138 and 169. Several important buildings including the Town Hall, fire station and senior center are located in this

area. Lisbon is also known for its historical sites such as the Bishop House Museum, Anshei Israel Synagogue, and the first railroad tunnel in America. Lisbon Meadows Park is near the town center with recreational fields for soccer and baseball and many hiking trails. Lisbon developed an Open Space Plan, approved on May 19, 2015, which lays out a strategy to achieve the goal of preserving 15% of all land area in Lisbon as open space.

The"2006 Land Cover by Area" data developed by the University of Connecticut Center for Land Use Education and Research (CLEAR) showed approximately 70% of town covered by deciduous or coniferous forest and forested, non-forested, and tidal wetlands. 11% of the Town was used for turf and grass, other grasses, and agricultural field. Only 12.5% was "developed."

SCCOG data on land use collected in 2011 indicates that approximately 36% of town land is developed, 8% has been dedicated to open space, and 56% remains hypothetically open to development. This reflects an increase in development in recent years. Some of this change may be due to differences in data collection and land use designation between the UConn CLEAR program and SCCOG.

The 2016 Lisbon POCD lists the Town's 2015 land use as 15% residential, 6% business, 1% committed open space, 1% institutional, and 8% agriculture. Based on the POCD, about 69% of the Town is considered undeveloped or underdeveloped. The main changes between the data provided in the 2016 POCD and the 2004 POCD are the conversion of residential land use to commercial, and re-categorization of land based on new land-use definitions (for example, many residential parcels were re-categorized as to "underdeveloped" or agriculture).

The majority of housing units in Lisbon are single family homes (83%). After accounting for zoning and development constraints such as steep slopes, wetlands, and floodplains, the 2004 POCD estimated that an additional 3,000 housing units could be constructed in the future, yielding approximately 8,000 additional residents. Such an increase would require a noticeable increase in municipal services particularly with regard to emergency services. The amount of land available for housing development has not changed significantly since the 2004 POCD.

Local employment in Lisbon is approximately 800 non-agricultural jobs. These include construction and manufacturing, retail and wholesale, and service occupations. The most focused commercial area is located along Route 12 near Jewett City, but small commercial areas are also interspersed throughout the town.

The net gain in housing units between 2005 and 2010 was 40. The most densely developed areas include the Kimball Road area near Canterbury and the area surrounding Blissville Pond which includes densely developed homes and a trailer park. Since the last HMP was written in 2012, development has continued to be relatively slow. Approximately four new subdivisions have been constructed over the past five years. Two commercial developments that were being planned in 2012 were abandoned and remain incomplete. Currently, the Barber Farm Road development, between Mell Road and River Road, is beginning construction on 32 one- to five-acre residential lots.

No new industry has been developed in the past five years.

The Town of Lisbon acquired two tracts of land for open space preservation since the previous HMP:

- ❑ Lisbon Country Club Property: 48 acres of land off of Kendall Road adjacent to Kendall Pond. This property is partially within the floodplain of Blissville Brook.
- ❑ Old Burnham Tavern Property: 98 acres off of North Burnham Highway. This includes the historic Old Burnham Tavern Building.

2.3 Drainage Basins and Hydrology

All land in the town eventually drains to the Shetucket River, although approximately half of the town first drains to the Quinebaug River. The northwestern corner of Lisbon drains to the Little River in Sprague via Old Stone Mill Brook. The Little River is a major tributary of the Shetucket River. The northern section of Lisbon drains via an unnamed stream to Cory Brook in Canterbury. Cory Brook is a tributary of the Quinebaug River. Other notable bodies of water found throughout Lisbon include Aspinook Pond (a major impoundment of the Quinebaug River), Taftville Pond (an impoundment of the Shetucket River), the lower reach of the Little River in western Lisbon near Versailles, Lisbon Brook in the southeastern portion of town, and Blissville Brook, and Blissville Pond in the southwestern portion of Lisbon.

The headwater streams of the Shetucket River are heavily flood controlled such that widespread flooding is no longer an issue along this watercourse. Three significant dams are located on Shetucket River in Norwich at Occum, Taftville, and Greenville, but they do not offer any flood abatement capacities. The eastern edge of the Taftville dam is located in Lisbon, while the Occum dam is located just upstream of Lisbon.

Similar to the Shetucket River, the upper reaches of the Quinebaug River are also heavily flood controlled such that flooding along this watercourse is also not an issue in Lisbon. Aspinook Pond is formed by a significant dam utilized for hydropower that spans from Lisbon into Jewett City.

2.4 Governmental Structure

Lisbon is governed by a Town Meeting and Board of Selectmen form of government. The authority of Town officials is granted by Connecticut General Statutes. The Town Meeting is the legislative body of the Town and the Board of Selectmen is responsible for the administration of Town policies. The First Selectman is the chief elected official and is responsible for the day-to-day administration of the Town. The First Selectman serves as Highway Superintendent overseeing the building and maintenance of all roads including plowing and sanding in the winter. In addition to the First Selectman, the Building Department, Public Works, and the Volunteer Fire Department also have an active role in hazard mitigation.

The Town of Lisbon has several commissions that can take an active role in hazard mitigation, including the Conservation Commission, the Planning and Zoning Commission, and the Zoning

Board of Appeals. Departments and commissions common to all municipalities in SCCOG and were described in Section 2.8 of the Multi-Jurisdictional HMP. More specific information for the departments and commissions of the Town of Lisbon is noted below:

- The Building Official reviews plans for new development and significant redevelopment and inspects the work to ensure it meets current building codes. The Town of Lisbon utilizes the Connecticut Building Code.

- The Conservation Commission is the Inland Wetlands Regulatory Agency for the Town of Lisbon and reviews plans for compliance with said regulations and maintains the Town's inland wetlands map.

- The Planning & Zoning Commission reviews land use applications, zoning regulation amendments, planning and development projects, and grant opportunities to ensure that development and growth in the town is consistent with existing land use, environmental policy, and the objectives of the *Plan of Conservation and Development*. They are assisted by the Zoning Enforcement Officer. SCCOG provides town planning services.

- The Public Works Department consists of a Road Foreman and several staff overseen by the First Selectman. They provide services including safe, efficient and well-maintained infrastructure of roads, bridges, snow removal and deicing on roads; tree and tree limb removal in rights-of-way; and maintain and upgrade storm drainage systems to prevent flooding caused by rainfall.

- The Lisbon Volunteer Fire Department provides fire suppression, fire prevention, rescue, emergency medical services, and hazardous materials response services to the town. Patients are transported to Backus Hospital in Norwich.

- The Zoning Board of Appeals reviews projects that were denied by the Planning & Zoning Commission or were cited by the Zoning Enforcement Officer, as well as those that require variances.

The roles of Town departments have not changed since the time of the previous HMP. Thus, the Town of Lisbon remains technically, financially, and legally capable of implementing mitigation projects for natural hazards to the extent that funding is available.

2.5 Review of Existing Plans and Regulations

The Town has several Plans and regulations that suggest or create policies related to hazard mitigation. These policies and regulations are outlined in the Emergency Operations Plan, *Plan of Conservation and Development,* Zoning Regulations, Subdivision Regulations, and Inland Wetland Regulations. The Zoning and Subdivision Regulations were both recently updated to incorporate new NFIP requirements.

Emergency Operations Plan

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

Plan of Conservation and Development (2016)

The POCD was most recently updated in 2016 with contributions from local boards, commissions, committees, citizens and citizen groups. The Plan seeks to be a statement of policies, goals and standards for the physical and economic development of the City and recommends the most desirable uses types and population densities in various parts of the municipality.

The 2016 Town of Lisbon POCD includes the following items:

- **The POCD states that efforts are underway to acquire more open space in flood hazard zones, referencing the 2012 Hazard Mitigation Plan's recommendation.**
- The town maintains storm drainage systems to prevent flooding during rainfall.
- The POCD acknowledges that the town does not have a backup shelter for the Lisbon Center School shelter. If additional space was needed, the town would have residents seek refuge in a regional Red Cross shelter.
- The Plan outlines areas that cannot be built upon due to natural features that restrict development.
- Future development will seek to strengthen the Newent area, with residential development occurring on large lot sizes outside of this village area.

The Lisbon POCD is considered consistent with the current goals and actions of the hazard mitigation plan, although it does not directly address several of the hazards such as winter storm hazards and wind hazards. The next update to the POCD (scheduled for 2026, beyond the life of the current hazard mitigation plan) will continue to incorporate the elements of the hazard mitigation plan.

Zoning Regulations

The Zoning Regulations of the Town of Lisbon were last revised in August 2013. The most recent updates do not address hazard mitigation. Previous updates include updated NFIP regulations associated with the recent release of the FIS and DFIRM for New London County in July 2011 and include a variety of preventative regulations pertinent to mitigating flooding hazards. These regulations are applied during the permitting process for new construction and during substantial improvement of existing structures. The regulations meet the minimum requirements required under the NFIP.

In addition to the Special Flood Hazard Area Regulations (Section 10.15), the Zoning Regulations contain several other entries applicable to hazard mitigation. For example, flat roofs are not allowed in business village districts for certain commercial facilities. The buildable areas of any lot excludes wetlands, watercourses, water bodies, the 1% annual chance floodplain, wetland buffer areas (50 foot minimum), detention areas, slopes in excess of 20%, rock or ledge outcrops, easements, rights-of-ways, and other setback areas, reducing the potential development density. Certain types of development, such as commercial and industrial areas, must locate utilities underground. Mobile home upgrades must have sloped shingled roofs and meet all Connecticut Building Codes for mobile homes, providing an additional level of protection for these vulnerable structures.

Subdivision Regulations

The Subdivision Regulations of the Town of Lisbon were last updated on June 1, 2012. This most recent update added a requirement in Section 7.5 that "all new utilities necessary for the development of the site shall be installed underground." Several other the design standards are pertinent to hazard mitigation, including encouraging the creation of through streets, avoidance of steep grades for new roads, and that new facilities are designed to minimize flood damage. New developments are also required to set aside open space.

Inland Wetland and Watercourses Regulations

The Inland Wetlands and Watercourses Regulations in the Town of Lisbon were last amended on April 1, 2012. The regulations require a permit for certain regulated activities which take place within 100 feet of a wetland or watercourse or that may impact a wetland or watercourse. These regulations build on the preventative flood mitigation provided by the Zoning and Subdivision regulations by preventing fill and sedimentation that could lead to increased flood stages.

2.6 Critical Facilities, Sheltering Capacity, and Evacuation

The Town of Lisbon considers several facilities to be critical to ensure that emergencies are addressed while day-to-day management of the Town continues. Critical facilities are presented on figures throughout this annex and summarized in Table 2-1. No critical facilities are located within the 1% annual chance floodplain. These facilities are described in more detail below.

TABLE 2-1
Critical Facilities

Facility	Address or Location	Emergency Power?	Shelter?	In 1% Annual Chance Floodplain?
Lisbon Central Elementary School	15 Newent Rd	✓	✓	
Public Works Garage	486 River Road			
Town Hall	1 Newent Rd			
Resident State Trooper	23 Newent Rd			
Volunteer Fire Department*	7 Newent Rd	✓		

*Emergency Operations Center

Emergency Operations Center

The Lisbon Office of Emergency Management operates during times of emergency out of the Lisbon Fire House (the Emergency Operations Center).

Public Works Garage

Since the previous edition of the HMP in 2012, the Town Public Works garage has been relocated to a building that had previously been a Connecticut Department of Transportation facility. This is located at 486 River Road, at the southern end of the Town. Through an agreement between the Town of Lisbon and the CT DOT, Lisbon has assumed use of the property while ownership continues to lie with the State.

The Public Works garage had previously been located in a building behind Lisbon Central School. While that facility was located centrally, space constraints and shared access with Lisbon Central School created a need to relocate. The old site is now used as storage by the Senior Center, the Fire Department, Parks and Recreation, and Town Offices.

The current location has the space and access necessary for all its functions. It is used for vehicle and equipment storage and also houses the Town's salt and sand supply.

Since the previous edition of the HMP, the Public Works department has purchased a new $120,000 work truck.

Resident State Trooper

Lisbon participates in the Connecticut Resident State Trooper program to meet its law enforcement needs. The trooper's office is located in a building behind the Lisbon Central School.

Town Hall

The Lisbon Town Hall houses records, plans, and other documents important for administering the Town. It does not have emergency backup power. The 2016 POCD indicates that the Town Hall does not have sufficient space to meet its needs for meeting spaces, storage, and other typical municipal uses. The Town has begun to use the old Public Works garage for storage. That POCD also indicates the building's HVAC system requires replacement.

Lisbon Volunteer Fire Department

The Lisbon Fire Department provides fire suppression, rescue, and emergency medical services. The Fire Department operates out of a station in Newent this is part of the municipal complex. This building also includes the Town's Emergency Operations Center and has a generator for emergency power. The Fire Department utilizes Blissville Pond to fill and empty the fire trucks of water.

The 2016 POCD notes that the fire station continues to experience space shortages for the purposes of training programs and records management. The department has begun to use the old Public Works garage for additional storage.

Additionally, although adequate for the equipment and supplies currently in use, additional or larger new equipment as the community grows will require expansion or relocation of the fire station.

Shelters

Lisbon Central Elementary School is the Town's shelter and can hold approximately 150 people. The school has a generator and the shelter is American Red Cross certified. The Town does not have a secondary or backup shelter. If additional space was needed, the Town would send people to a regional American Red Cross Shelter.

Communications

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

Communication was difficult during the power outages following Hurricane Irene and Winter Storm Alfred due to downed trees and power outages at the nearby cellular towers. Town

personnel made personal contact with residents by going door-to-door during the outage to pass along necessary information.

Health Care and Senior Living Facilities

The Town does not have any convalescent or nursing homes, senior homes, or complexes. The Town has one doctor's office and one physical therapy center, but no walk-in medical facilities. None of these facilities are considered by the Town to be critical facilities.

Evacuation Routes

Lisbon does not have a published evacuation map; residents utilize State roads or local roads to exit the town. The highest capacity egress routes from Lisbon include Interstate 395 into Norwich or Griswold, Route 138 into Griswold or Sprague, Route 169 into Norwich or Canterbury, and Route 12 into Norwich or Griswold.

Additional Groups

Lisbon has one in-home day care but no commercial day-care centers. These are not considered to be critical facilities.

In addition to Town departments, the American Red Cross and the Salvation Army provide services related to mitigation and emergency management. The American Red Cross and the Salvation Army help provide shelter and vital services during disasters and participate in public education activities.

Space Needs and Future Changes

Lisbon has conducted an assessment of space needs for its municipal functions and generated an internal report titled "2011 Space Needs Assessment for Lisbon Public Safety Facility in Lisbon, CT." The relocation of the Public Works garage and reallocation of the old garage space as storage was one result of this assessment.

Based on the results of this assessment, the Town is pursuing construction of a Public Safety Complex. This project, expected to cost four to five million dollars, is currently in the design phase and is awaiting approval by residents. Completion of the project should improve all municipal functions, especially emergency management and response.

3.0 INLAND FLOODING

3.1 Setting / Historic Record

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

The March 2010 storms continue to be considered the event that caused the most widespread flooding in Ledyard since the town began participating in the multi-jurisdiction hazard mitigation plan. These floods caused roadway flooding and a significant amount of nuisance flooding as noted below. Structures were not directly affected by overbank flooding, including those located in the 1% annual chance floodplain.

- Drainage systems on Bundy Hill Road, Ames Road, Ice House Road, and Lower Blissville Road that pass Blissville Brook are considered by the Town to be undersized. These roads all overtopped during the March 2010 floods.

- Homes in the Pleasant View Cove area adjacent to Aspinook Pond came close to flooding but did not flood.

- While the Town does not have records of the exact number of residents who needed their basements pumped out by the Fire Department's mobile equipment, the Town recalls that the number of homes affected exceeded any other storm in recent memory. Many homes that were affected had never needed pumpouts previously.

The Town reports no significant inland flood events have occurred since the previous HMP.

3.2 Existing Capabilities

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

Flood Control Structural Projects

As noted in Section 3.4.4 of the Multi-Jurisdictional HMP, several significant flood control projects have been constructed by the USACE upstream of Lisbon on the Shetucket and

Quinebaug Rivers. These flood protection projects were completed in the 1950's and 1960's and greatly reduce the incidence and severity of flooding in Lisbon.

Bridge Replacements, Drainage, and Maintenance

The Department of Public Works cleans and inspects catch basins and culverts at least annually or more often if problems are noted. As an example, in the summer of 2016 the DPW inspection uncovered drainage issues that led to the department repairing four catch basins and two culverts.

When flooding occurs, the Public Works department or the Fire Department handle the complaints depending on the location. For example, Public Works would inspect bridges and culverts and erect barricades to close roads, while the Fire Department responds to calls requesting help for flooded basements. The Town uses a message system on its webpage and fields phone calls related to drainage complaints. Drainage complaints are directed to the First Selectman.

Regulations, Codes, and Ordinances

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

The Town's Subdivision Regulations require that adequate drainage be provided to reduce exposure to flood hazards and that buildings and utilities be located to minimize the effects of flood damage. Regulations covering development in or within 100 feet of inland wetland or watercourse areas were last updated in 2012 and are enforced by the Town's Conservation Commission. The Town has also adopted a map prepared by the Conservation Commission which regulates building in wetland areas.

Acquisitions, Elevations, and Property Protection

The Town of Lisbon acquires open space as opportunities arise. Since the previous HMP, the Town has acquired two tracts of land for open space preservation. One of these, the Lisbon Country Club Property, is partially within the floodplain of Blissville Brook.

Property protection mostly focuses on preventive measures and maintaining and upgrading drainage systems.

Flood Watches and Warnings

The First Selectman and the Fire Department access weather reports through the National Weather Service and local media. The Town participates in the Statewide "Everbridge" Reverse 9-1-1 system. Residents are able to sign up to receive warnings when storms are imminent. The Town can telephone warnings into potentially affected areas, such as the 1% annual chance flood zone, using this system.

Public Education and Outreach

Lisbon displays FEMA-provided flood insurance brochures on the kiosk in the hallway of the Town Hall. When approached, the Town will encourage residents to purchase flood insurance if they are located in a Special Flood Hazard Area (SFHA), and will provide assistance to owners of non-residential structures regarding flood proofing techniques. Other education and outreach efforts include:

- ❑ Incorporation of the availability of flood insurance into all hazard-related public education workshops
- ❑ Encouraging residents to submit flood insurance claims following damage events
- ❑ Encouraging builders, developers, and architects to become familiar with NFIP land use and building standards (performed by the building official)

Summary

In general, municipal capabilities to mitigate flood damage have increased since the 2012 edition of the hazard mitigation plan was adopted. This is because the Town has continued to make investments in public works projects, planning, and open space acquisition.

3.3 Vulnerabilities and Risk Assessment

This section discusses specific areas at risk to inland flooding within the Town. Inland flooding due to nuisance flooding or poor drainage is most common type of flooding experienced by the Town, although roadway inundation also occurs during more severe events.

3.3.1 Vulnerability Analysis of Areas along Watercourses

Major inland watercourses and water bodies in Lisbon have the 1% annual chance floodplain defined by FEMA. The Shetucket River, the Quinebaug River, and Blissville Brook are mapped as Zone AE, indicating that flood elevations are available. The headwaters of Blissville Brook are mapped as Zone A. These watercourses do not typically present flooding hazards to residents, buildings, or roadways, although it is understood that an extreme event could cause structures and roadways to flood. Refer to Figure 3-1 for the location of the 1% annual chance floodplains within Lisbon. In addition, ice jams have not previously been an issue along the rivers in Lisbon.

Lisbon has several major transportation routes including Routes 12, 138, and 169. The DFIRM mapping suggests that Route 12 near the Shetucket River, Route 138 (Town House Road) just

west of Newent, and the crossings of Blissville Brook on Route 169 could be affected by extreme flooding. In addition to these major roads, several minor roads in the Town could also be impacted by an extreme flooding event, including Paper Mill Road from Versailles Pond (Little River) on the border with Sprague; and Mell Road, Ames Road, Schoolhouse Road, Bundy Hill Road, Ice House Road, and Lower Blissville Road along Blissville Brook. As noted in the previous HMP, a section of Phillips Road near the Quinebaug River has also flooded in the past. While floodplains are mapped adjacent to the two railroad lines, these structures are elevated and not considered to be at risk of overtopping.

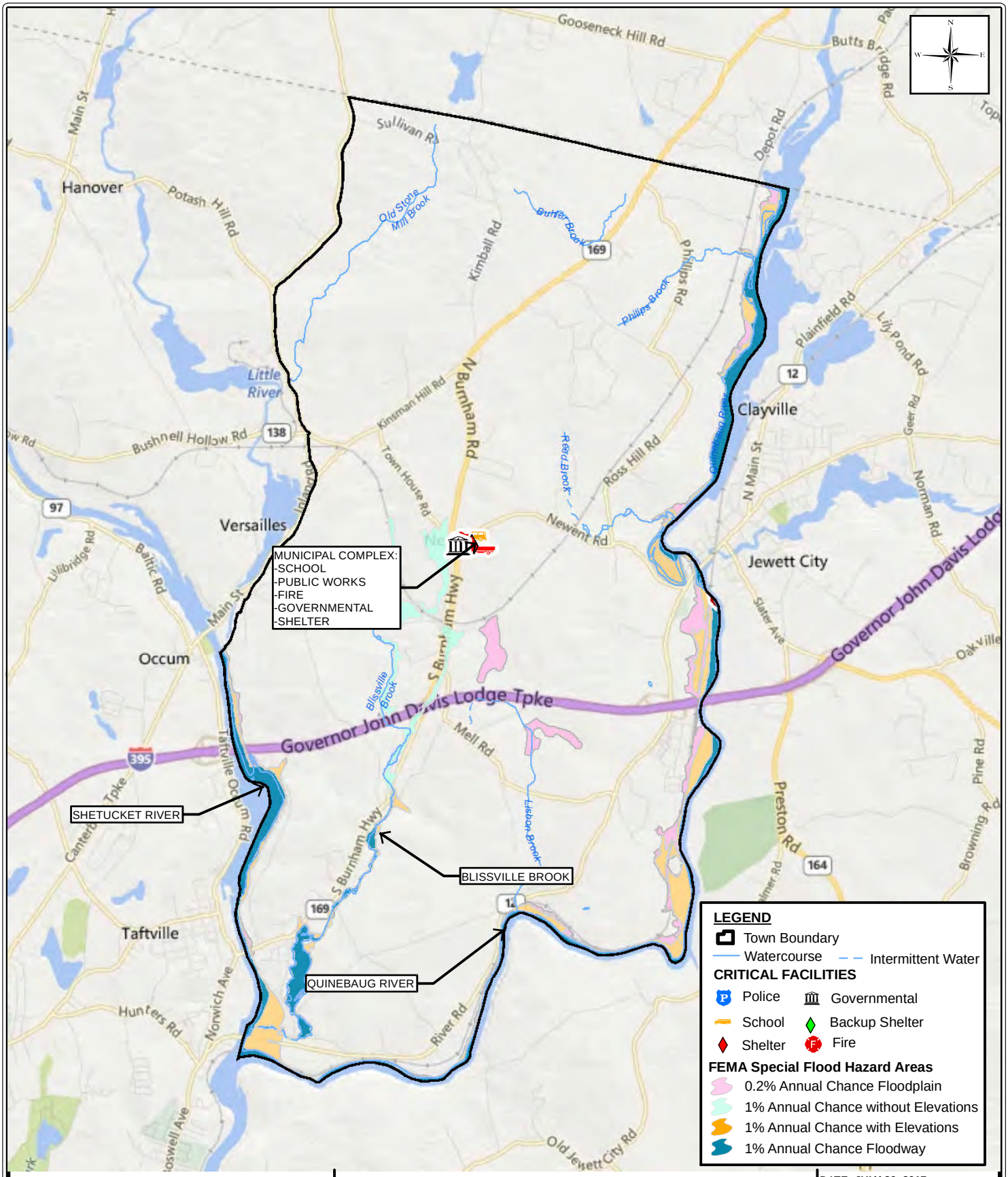
3.3.2 Vulnerability Analysis of Private Properties

As noted in Table 3-4 of the Multi-Jurisdictional HMP, a total of 49 structures in Lisbon appear to be located in the 1% annual chance floodplain. A total of 23 are located near the Quinebaug River, 18 are located nearby the Shetucket River, and eight are located along Blissville Brook and its tributaries. The majority of these structures are residential but some commercial structures are also located in the floodplain.

Town personnel indicate that structures do not typically get flooded by overbank flooding. Recall that significant flood control structures have been created upstream of Lisbon to mitigate flooding along the Quinebaug and Shetucket rivers. Repetitive flood insurance claims have not been filed at any properties in Lisbon over the past twenty-five years. Nuisance (basement) flooding is an issue particularly during major rainstorms, but the structures affected usually do not lie within the 1% annual chance floodplain.

The Lisbon Mobile Home Park is located on the eastern edge of Blissville Pond. Several mobile homes are located on periphery of the 1% annual chance floodplain associated with Blissville Pond. While the trailer park has not flooded over the past several years, the previous HMP notes that this park has been evacuated due to flooding in the past.

MXD: Y:\3570-09\Maps\annex_maps\Lisbon\Figure 3-1.mxd



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FEMA SPECIAL FLOOD HAZARD AREAS

SCCOG HAZARD MITIGATION UPDATE
TOWN OF LISBON ANNEX

LISBON, CONNECTICUT

SOURCE: NATIONAL FLOOD HAZARD LAYER, FEMA, 2017

DATE: **JULY 26, 2017**		
SCALE: **1"=4,500'**		
PROJ. NO.: **3570-09**		
DESIGNED **SB**	DRAWN **PS**	CHECKED **DM**

DRAWING NAME:

FIG. 3-1

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3.3.3 Vulnerability Analysis of Critical Facilities

As noted in Section 2.6, no critical facilities in Lisbon are located within the 1% annual chance floodplain. However, given the relatively limited development in Lisbon the closure of roadways and major transportation routes due to flooding is a concern for emergency personnel. For example, flooding along Blissville Brook and Blissville Pond could potentially overtop several roads, resulting in detours through local roads that would lengthen the time for emergency response.

3.4 Potential Mitigation Strategies and Actions

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

4.0 COASTAL FLOODING & STORM SURGE

4.1 Setting / Historic Record

The Town of Lisbon 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, the town is considered to be immune to the direct effects of coastal flooding and storm surge.

4.2 Existing Capabilities

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

The Town understands that in an extreme case its shelter spaces may need to be utilized by non-Lisbon residents if a regional evacuation occurred due to a coastal flooding event as managed through its mutual aid agreements with SCCOG. The Town is prepared for this potential circumstance.

4.3 Vulnerabilities and Risk Assessment

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

4.4 Potential Mitigation Strategies and Actions

No mitigation measures for reducing the impact of coastal flooding or storm surge in the town are necessary or are proposed.

5.0 HURRICANES AND TROPICAL STORMS

5.1 Setting / Historic Record

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

Hurricane Irene impacted the area in August 2011. Trees fell throughout the town and the region causing power outages that lasted up to seven days in Lisbon.

In late October, 2012 Hurricane Sandy struck the area with high winds and heavy rains. The wind damaged trees and knocked out power in many areas. Town staff report power loss lasted up to 2.5 weeks in some areas.

5.2 Existing Capabilities

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

Parts of trees (limbs) or entire tall and older trees may fall during heavy wind events, potentially damaging structures, utility lines, and vehicles. Utility lines are located underground in only a few areas of the town. Lisbon has a Tree Warden who can post notification and schedule tree removal. The Public Works staff also monitors trees as part of their normal rounds, performs informal inspections for the tree warden, and has a small budget for minor tree maintenance. The Town hires outside contractors for larger jobs and those near power lines.

The Tree Warden coordinates tree removal and maintenance with the local power utility. Since the previous HMP, CL&P has been acquired by Eversource. In response to the major power-outages caused by Tropical Storm Irene and Hurricane Sandy, as well as significant winter storm events, Eversource has taken an aggressive approach to tree maintenance and has improved communication and coordination with municipalities. Municipal staff report that Eversource has enhanced its tree clearing efforts along power lines, has updated its facilities, and has been

working to strengthen the power grid and build in redundancies. Communication and coordination has improved due to Eversource's liaison program.

Algonquin Gas also performs trimming near their utilities. AT&T and Comcast (telephone and cable) may also perform some trimming.

Every spring, and as needed after storm events, Lisbon collects fallen debris and brings it to the Public Works Garage. This has been sufficient up to this point, but the Town is interested in identifying and designating an additional brush disposal location.

Warning is one of the best ways to prevent damage from hurricanes and tropical storms, as these storms often are tracked well in advance of reaching Connecticut. The Town can access National Weather Service forecasts via the internet as well as listen to local media outlets (television, radio) to receive information about the relative strength of the approaching storm. This information allows the Town to activate its EOP and encourage residents to take protective or evacuation measures if appropriate. The Lisbon schools include wind hazard education in their general hazard education programming.

Prior to severe storm events, the Town ensures that warning/notification systems and communication equipment are working properly and prepares for the possible evacuation of impacted areas. Residents can sign up to receive warnings from the statewide CT "Everbridge" Reverse 9-1-1 system to receive critical information. Although hurricanes that have impacted Lisbon have historically passed in a day's time, additional regional shelters could be outfitted following a storm with the assistance of the American Red Cross on an as-needed basis for long-term evacuees.

Summary

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

5.3 Vulnerabilities and Risk Assessment

The entire Town is vulnerable to hurricane and tropical storm wind damage and from any tornadoes (Section 6) accompanying the storm, as well as inland flooding (Section 3). Of particular concern are the blockage of roads and the damage to the electrical power supply from falling trees and tree limbs. The Town had extensive outages in some areas because of tree damage to utility lines following Tropical Storm Irene in 2011 and Hurricane Sandy in 2012.

Direct wind damage to newer buildings from hurricane or tropical storm-level winds is rare in the Town since the new buildings were constructed to meet or exceed current building codes. Many buildings in the Town are historic and many were built prior to the 1970s and do not meet current building codes. Older buildings in the Town (particularly within Newent) and the two mobile home parks (located east of Blissville Pond and on Tunnel Hill Road) are particularly

susceptible to roof and window damage from high wind events. This risk to structures will be reduced with time as these buildings are remodeled or replaced with buildings that meet current codes.

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

5.4 Potential Mitigation Strategies and Actions

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

6.0 SUMMER STORMS AND TORNADOES

6.1 Setting / Historic Record

Similar to hurricanes and winter storms, wind damage associated with summer storms and tornadoes has the potential to affect any area of the town. Furthermore, because these types of storms and the hazards that result (flash flooding, wind, hail, and lightning) might have limited geographic extent, it is possible for a summer storm to harm one area within the town without harming another. Such storms occur in the town each year, although hail and direct lightning strikes to the town are rarer. For example, the NCDC reported that penny-sized hail was reported in Lisbon on June 26, 2009, but no other occurrences were reported.

No tornadoes have occurred in the town since the last HMP was adopted in 2012. Severe storms have impacted the region, however, since the last update. Notable storm events include a storm on July 20th, 2015. A passing cold front triggered an isolated severe storm in New London County. Tree damage was reports in the area of Route 169 and Baltic Heights.

6.2 Existing Capabilities

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

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

Summary

In general, municipal capabilities to mitigate thunderstorm and tornado damage have not increased significantly since the 2012 edition of the hazard mitigation plan was adopted, with the exception of some of the changes described in Section 5.2.

6.3 Vulnerabilities and Risk Assessment

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

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

Lightning and hail are generally associated with severe thunderstorms and can produce damaging effects. All areas of the town are equally susceptible to damage from lightning and hail, although lightning damage is typically mitigated by warnings and proper grounding of buildings and equipment. Hail is primarily mitigated by warning, although vehicles and watercraft can often not be secured prior to the relatively sudden onset of a hailstorm. Lightning and hail are considered likely events each year, but typically cause limited damage in the town. Older buildings and mobile homes are most susceptible to lightning and hail damage since many were constructed prior to current building codes.

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

6.4 Potential Mitigation Strategies and Actions

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

7.0 WINTER STORMS AND NOR'EASTERS

7.1 Setting / Historic Record

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

Winter storms and nor'easters have affected the town since the last HMP, as reported to the NCDC and reported by Town officials:

- The winter of 2010-2011 produced significant snowfall in Lisbon. The Town checked all flat-roofed buildings and while the school was a concern, it was not cleared and did not experience any damage. Many residents also cleared their own roofs or hired contractors. Several mobile homes experienced roof damage related to snow loading.

- Winter Storm Alfred in late October 2011 caused minor to moderate tree damage, with power outages lasting up to three days.

- On February 8, 2013 a low pressure that formed along the northern Gulf coast by the morning of Thursday, February 7, 2013 moved northeast to near Cape Hatteras by the morning of Friday, February 8, 2013. The low then rapidly intensified while moving northeast to a position east of Cape Cod by the morning of Saturday, February 9, 2013, producing blizzard conditions and very heavy snowfall across southern Connecticut on February 8th and 9th. Groton Airport ASOS (KGON) reported at least 3 consecutive hours of blizzard conditions. Snowfall began at 7:40 am on February 8. Spotters reported an average snowfall of 6 inches by 7:50 pm. Total snowfall ranged from 15 inches in Stonington to as much as 23.6 inches in Old Lyme. Winds also gusted as high as 60 mph at Groton Airport.

- On February 9, 2017 a blizzard impacted the region, with frequent gusts of over 35 mph, and visibility of less than a quarter mile. Snowfall was over one foot, and caused substantial travel disruptions throughout the region.

7.2 Existing Capabilities

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

As it is almost guaranteed that winter storms will occur annually in Connecticut, it is important to locally budget fiscal resources toward snow management. Snow is the most common natural hazard requiring additional overtime effort from Town staff, as parking lots and roadways need

constant maintenance during storms. The Public Works Department oversees snow removal in the Town and stores salt and sand at the Public Works Garage. The Town has established plowing routes that prioritize access to and from critical facilities. Overall, Lisbon feels its snow removal program is satisfactory.

The DPW has identified areas that are difficult to access during winter storm events. These include two privately-owned trailer parks and one small community at the end of a mile-long private dirt road. The DPW monitors the state of these roads in particular, and is prepared to assist with emergency access to these areas and others during hazardous conditions.

The Connecticut Department of Transportation (DOT) plows State roads. Since the nearest Connecticut DOT facility is located nearby in Occum (Norwich), plowing is generally timely.

The Connecticut Building Code specifies that a pressure of 30 pounds per square foot be used as the base "ground snow load" for computing snow loading for roofs. The Town monitors the roofs of municipal buildings when snow loads accumulate and shovel if necessary, and many residents and businesses also shovel or plow their roofs. Town staff note that significant snowfall events throughout the winter of 2015 did not lead to any roof collapse.

Lisbon posts information on its website for Town residents about protecting themselves during cold weather and about mitigating icing and insulating pipes at residences.

Summary

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

7.3 Vulnerabilities and Risk Assessment

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

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

The majority of buildings in Lisbon were constructed within the past several decades and therefore not particularly susceptible to damage from heavy snow. While some Town buildings could be susceptible to heavy snow loads, they will be cleared quickly if safety is a concern. For

example, Lisbon Central Elementary School has a flat roof which makes it more susceptible to snow load damage.

Icing is not a significant issue in the Town. In general, there are few steep slopes such that extra sanding and salting of the roadways in necessary locations alleviates any trouble spots. In addition, there are no issues with ice jams on any of the streams in the town. However, a few private roads in town are problematic for emergency response during the winter. For example, Pleasant View Cove Road is a nearly two-mile long unimproved road that includes a private railroad crossing. The road is very hilly and relatively narrow, making the road essentially one lane during winters with significant snow accumulation.

7.4 Potential Mitigation Strategies and Actions

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

8.0 EARTHQUAKES

8.1 Setting / Historic Record

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

8.2 Existing Capabilities

The Connecticut Building Codes include design criteria for buildings specific to each region as adopted by Building Officials and Code Administrators (BOCA). These include the seismic coefficients for building design in Lisbon. 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, Town land use policies do not directly address earthquake hazards, though they do indirectly limit residential development in areas prone to collapse or liquefaction. However, the potential for an earthquake and emergency response procedures is addressed in the Town's EOP.

Lisbon maintains backup supplies at its critical facilities in case of regional transportation and utility disruption caused by an event such as an earthquake.

Summary

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

8.3 Vulnerabilities and Risk Assessment

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

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

The built environment in the town primarily includes some more recent construction that is seismically designed. However, most buildings were built before the 1990's and therefore are not built to current building codes. In addition, there are two mobile home parks and at least one campground with recreational buildings or shelters that may not be seismically designed. Thus, it is believed that most buildings would be at least moderately damaged by a significant earthquake. Those town residents who live or work in older, non-reinforced masonry buildings are at the highest risk for experiencing earthquake damage.

Areas of steep slopes can collapse during an earthquake, creating landslides. Lisbon has many areas of steep slopes and bluffs although the majority of these features occur in undeveloped areas. Thus, landslides are not a concern in the town.

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

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

8.4 Potential Mitigation Strategies and Actions

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

9.0 WILDFIRES

9.1 Setting / Historic Record

Wildfires are considered to be highly destructive, uncontrollable fires. The most common causes of wildfires are arson, lightning strikes, and fires started from downed trees hitting electrical lines. Thus, wildfires have the potential to occur anywhere and at any time in both undeveloped and lightly developed areas of Lisbon. Structural fires in higher density areas of the town are not directly addressed herein.

Lisbon typically experiences a handful of brush fires each spring and autumn. The largest fires burn two to five acres at maximum. No major fires could be recalled in recent history.

9.2 Existing Capabilities

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

Existing mitigation for wildland fire control is typically focused on building codes, public education, Fire Department training, and maintaining an adequate supply of equipment. The Town's EOP recommends a 30-50 foot cleared radius be maintained around homes and buildings to prevent wildfires. The Volunteer Fire Department supports public outreach programs, including through the school system, to increase awareness of forest fire danger, equipment usage, and home protection.

The Lisbon Volunteer Fire Company has a strong mutual aid relationship with its neighbors to fight wildfires. The Town has an off-road vehicle and a gator to access distant fires, and goes to the fires as quickly as possible. Fire protection water is obtained through seven dry hydrants located throughout Lisbon. Areas along Route 169 and Route 12 have water service provided by Norwich Public Utilities or the Jewett City Water Company, respectively. These agencies test fire flows and inform the fire department of the pressure available.

In areas located far from available hydrants, the fire department drafts water from the various streams, ponds, and rivers in the town, and rely on pump trucks to carry water to distant areas. Blissville Pond is a primary source of fire protection water for such purposes. The amount of fire protection afforded by the existing hydrants and nearby water bodies is considered to be adequate for the development level of Lisbon. The Fire Department will continue to evaluate the level of risk and the need for additional hydrants as development continues in the future. The Fire Department regularly performs maintenance and repairs on the Town's dry hydrants such that fire flows from these sources are unimpeded.

The Connecticut DEEP has recently changed its Open Burning Program. It now requires individuals to be nominated and designated by the Chief Executive Officer in each municipality

that allows open burning and to take an online training course and exam to become certified as an "Open Burning Official." Lisbon has designated an Open Burning Official. Permit template forms were also revised that provide permit requirements so that the applicant/permittee is made aware of the requirements prior to, during, and after burn activity. The regulated activity is then overseen by the Town.

Summary

In general, municipal capabilities to mitigate wildfire damage have increased since the 2012 edition of the hazard mitigation plan was adopted, with continued public education and testing of dry hydrants; as well as the changes in the State's regulation of open burning.

9.3 Vulnerabilities and Risk Assessment

As Lisbon is largely forested, wildfires can occur almost anywhere due to the undeveloped nature of the town. Pleasant View Cove Road is a particular area of concern for emergency personnel since it is a long private road and no dry hydrants are located nearby. Firefighters draft water from Aspinook Pond to provide firefighting water in this area. Other undeveloped areas that are not nearby public water service, dry hydrants, or water bodies are considered to be moderate risk due to the need to transport fire fighting water, and the fact that off-road equipment must be utilized to fight fires. The remaining areas of the town that are located nearby water sources are considered to be a low-risk area for wildfires. Refer to Figure 9-1 in the Multi-Jurisdictional HMP for a general depiction of wildfire risk areas within Lisbon.

A particular concern for the Fire Department is that several of the dry hydrants need maintenance. The dry hydrants have been in place for many years and as such vegetation is impeding the intakes and reducing the volume of flow available.

9.4 Potential Mitigation Strategies and Actions

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

10.0 DAM FAILURE

10.1 Setting / Historic Record

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

10.2 Existing Capabilities

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. As noted in the Multi-Jurisdictional HMP, Lisbon is home to two Class B (significant hazard) dam, and six additional Class B or Class C dams are located upstream of Lisbon whose failure could potentially lead to flooding within the town. These dams are listed on Table 10-1.

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

Dam	Hazard Class	Location	Owner	River System
Aspinook Pond Dam	B	Jewett City / Lisbon	Private (Commercial)	Quinebaug River
Lower Blissville Pond Dam	B	Lisbon	Town of Lisbon	Blissville Brook
Crossing at Lisbon Detention Dam	B	Lisbon	Private (Commercial)	Quinebaug River
Paper Mill Pond Dam	B	Sprague	Private (Commercial)	Little River / Shetucket River
Scotland Dam	C	Windham	Private (Commercial)	Shetucket River
Taftville Dam #4 (Taftville Pond)	C	Norwich / Lisbon	Private (Commercial)	Shetucket River
Tunnel Dam	B	Preston / Lisbon	Private (Commercial)	Quinebaug River
Versailles Pond Dam	B	Sprague	Private (Commercial)	Little River / Shetucket River

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

Owners of high and significant hazard dams are required to maintain Emergency Action Plans (EAPs) for such dams. The Town of Lisbon owns two dams: the Blissville Pond dam (a low hazard dam) and the Lower Blissville Pond Dam (a significant hazard dam). The Town inspects these dams annually and they are believed to be in good condition.

The Town reports that an EAP has been developed and a dam failure inundation analysis has been performed for the Lower Blissville Pond Dam. The Town has incorporated the dam failure area for the Lower Blissville Pond Dam into its Everbridge Reverse 9-1-1 system, allowing it to alert residents within that area of an impending failure.

If approached and asked, Lisbon staff are ready to provide assistance to the owners of lesser ranked dams regarding resources available for inspection and maintenance.

Summary

In general, municipal capabilities to mitigate dam failure damage have increased since the 2012 edition of the hazard mitigation plan was adopted. In addition, changes in the State's regulation of dams have increased Statewide capabilities sharply.

10.3 Vulnerabilities and Risk Assessment

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

- *Scotland Dam* – The Scotland Dam is a Class C dam located on the Shetucket River near the Windham, Scotland, and Franklin boundary that is privately owned and used for hydroelectric power generation. Failure of this dam would likely result in an inundation area similar to the 0.2% annual chance flood event for areas downstream along the Shetucket River from the dam to Occum Pond, with lesser impacts downstream in Lisbon. Flooding of the access road to the trash to energy plant would be expected, as would the flooding of structures in the Lower Blissville Road and River Road (Route 12) area near Norwich.

- *Taftville Dam #4* – Taftville Dam #4 is a Class C dam located on the Shetucket River between Norwich and Lisbon and is privately owned. The dam impounds water for hydroelectric power generation. Failure of this dam would likely result in an inundation area similar to the 1% annual chance flood event for areas downstream along the Shetucket River from the dam to the Thames River. This would cause the inundation of several structures in Lisbon in the Lower Blissville Road and River Road (Route 12) area near Norwich.

- *Aspinook Pond Dam* – This privately-owned Class B dam impounds the Quinebaug River to provide hydroelectric power generation. Failure of this dam could cause a flood similar to the 1% annual chance flood downstream in Jewett City, Lisbon, and Griswold. Undeveloped

areas of Preston could also be affected. As shown by the dam failure inundation analysis prepared by Louis Berger & Associates, Inc. in the late 1970's for the USACE, Newent Road (Route 138) could potentially flood, as could agricultural fields located along the Quinebaug River in Lisbon.

- *Lower Blissville Pond Dam* – This Class B dam is owned by the Town of Lisbon and located at the southwestern end of Lower Blissville Pond just upstream of Ice House Road. The dam is in good condition with major repairs occurring in 1988. While a formal dam failure inundation analysis is not believed to have been prepared for this dam, failure of this dam would likely overtop Ice House Road and Lower Blissville Road and cause flooding of structures along Lower Blissville Road in Lisbon. The Shetucket River would likely absorb the floodwaters without further damage to structures.

- *Paper Mill Pond Dam* – This Class B dam is privately owned and located in Sprague on the eastern end of Paper Mill Pond. The dam was created to impound the waters of the Little River for industrial purposes. According to a 1970's report by the USACE, failure of the Paper Mill Pond Dam would mostly cause flooding in Sprague upstream of the railroad, although the water level rise within Versailles Pond could also cause minor flooding along Paper Mill Road on the eastern edge of the pond in Lisbon.

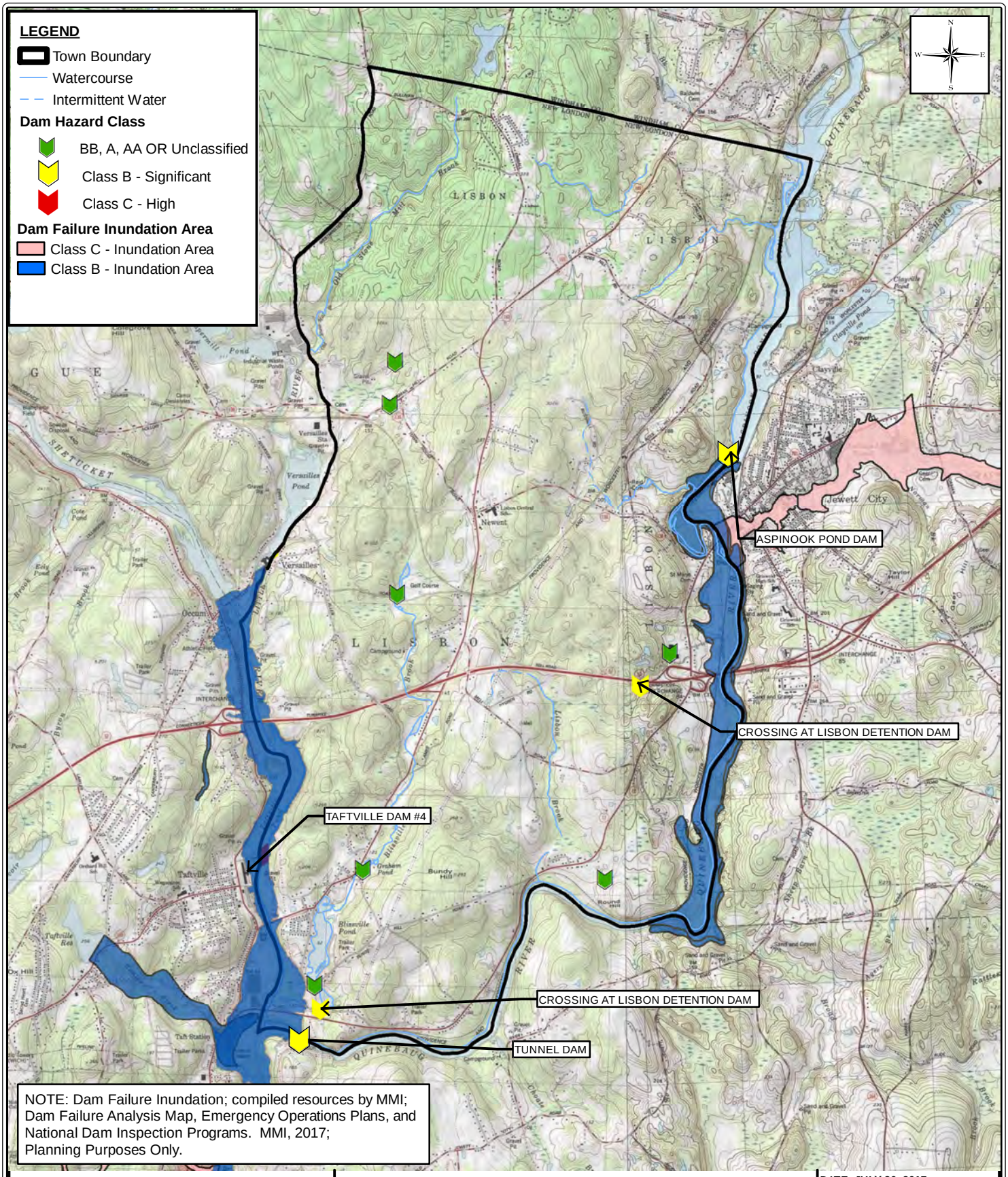
- *Tunnel Dam* – This Class B dam that impounds the Quinebaug River is privately-owned and located between Preston and Sprague just upstream of the confluence with the Shetucket River. The dam was originally constructed to provide power for industrial purposes, but now is utilized for hydroelectric power generation. Failure of this dam would likely cause minor flooding along the Shetucket River downstream to Taftville Dam #4, with no structures being affected in Lisbon.

- *Versailles Pond Dam* – This privately-owned Class B dam that impounds the Little River was originally constructed for industrial purposes. Failure of this dam would cause significant impacts in Sprague, but only minor flooding along the Little River and Shetucket River in Lisbon with no structures being affected.

10.4 Potential Mitigation Strategies and Actions

Lisbon is considered a low-risk area for dam failure since the majority of dams are well-maintained with active coordination with the Connecticut DEEP. Potential mitigation measures for dam failure include a combination of prevention, education, and emergency planning, as well as dam removal projects as discussed in Section 11.

MXD: Y:\3570-09\Maps\annex_maps\Lisbon\Figure 10-1.mxd



NOTE: Dam Failure Inundation; compiled resources by MMI; Dam Failure Analysis Map, Emergency Operations Plans, and National Dam Inspection Programs. MMI, 2017; Planning Purposes Only.

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HIGH & SIGNIFICANT HAZARD DAMS

SCCOG HAZARD MITIGATION UPDATE
TOWN OF LISBON ANNEX

LISBON, CONNECTICUT

SOURCE: DAM HAZARD CLASS; DAMS, CTDEEP 1996 & LISTING OF DAMS; CTDEEP, 2016

DATE: **JULY 26, 2017**		
SCALE: **1"=4,500 '**		
PROJ. NO.: **3570-09**		
DESIGNED **SB**	DRAWN **PS**	CHECKED **DM**

DRAWING NAME:

FIG. 10-1

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11.0 MITIGATION STRATEGIES AND ACTIONS

11.1 Status of Mitigation Strategies and Actions

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

11.1.1 Actions Applicable to All Hazards

Action	Status	Notes
Regional Coordination		
Continue to promote inter-jurisdictional coordination efforts for emergency response	*Capability*	*Completed through mutual-aid agreements and SCCOG regional hazard management initiatives. This action is reclassified as a capability.*
Continue to promote local and regional planning exercises that increase readiness to respond to disasters	*Capability*	*This action is reclassified as a capability.*
Continue to evaluate communication capabilities and pursue upgrades to communication and ensure redundant equipment is available	*Capability*	*This action is reclassified as a capability.*
Continue to promote regional transportation planning through SCCOG	*Capability*	*This action is the responsibility of, and is being performed by, SCCOG. This action is redefined as a regional capability.*
Work with the SCCOG to perform a regional study of the vulnerability of critical facilities to natural hazard damage	*Complete*	*This action is the responsibility of, and was performed by, SCCOG. None of the facilities in the analysis were located in Ledyard.*
Local Emergency Response & Public Information		
Continue to review and update the Town EOP at least once annually	*Capability*	*This action is reclassified as a capability.*
Continue to maintain emergency response training and equipment and upgrade equipment when possible	*Capability*	*This action is reclassified as a capability.*
Encourage Town officials to attend FEMA-sponsored training seminars at EMI	*Carry Forward*	*The Town has not had the funding or staff availability to perform this action, but it interested in pursuing it. As an alternative, Town staff can attend events of the Connecticut Association of Flood Managers (ctfloods.org).*
Continue to evaluate emergency shelters, update supplies, and check communication equipment	*Capability*	*This action is reclassified as a capability.*
Continue to promote dissemination of public information regarding natural hazard effects into Government buildings, with additions	*Capability*	*This action is reclassified as a capability.*
Encourage residents to submit contact information to the CT Alerts Reverse 9-1-1 system and utilize it during emergencies	*Capability*	*Performed through links on the Town website.*
Prevention		
Develop a checklist for land development applicants that cross-references the specific regulations and codes related to disaster resilience	*Complete*	*Performed through the building official.*

Action	Status	Notes
Integrate elements of this HMP into the Plan of Conservation and Development during the next update	*Complete*	*Performed for the 2016 POCD update. Additional incorporation is encouraged during the next POCD update outside the life of this HMP.*
Continue reviewing building plans to ensure proper access for emergency vehicles	*Capability*	*This action is reclassified as a capability.*
Require the underground installation of utilities for all new development	*Complete*	*Included in most recent subdivision regulations update.*
Continue to enforce the appropriate building code for new building projects	*Capability*	*This action is reclassified as a capability.*
Encourage residents to install and maintain lightning rods on their structures	*Delisted*	*Town does not feel it is necessary to encourage this action. Landowners can make that decision.*
Natural Resource Protection & Open Space		
Continue to regulate development in protected and sensitive areas including steep slopes, wetlands, and floodplains	*Capability*	*This action is reclassified as a capability.*

11.1.2 Actions Applicable to Inland Flooding

Action	Status	Notes
Prevention		
Continue to regulate new development activities within SFHAs to the greatest extent possible within City land use regulations	*Capability*	*This action is reclassified as a capability.*
Require developers to demonstrate whether detention or retention of stormwater is the best option for reducing peak flows downstream	*Capability*	*Required through subdivision regulations.*
Conduct an annual inspection of floodprone areas that are publically accessible. Recommend drainage improvements as appropriate	*Capability*	*Performed every summer by DPW.*
Property Protection		
Incorporate information on the availability of flood insurance into all hazard-related public education workshops	*Delisted*	*Public workshops are not held, but sufficient outreach is accomplished through other means.*
Make available FEMA-provided flood insurance brochures and encourage residents to purchase insurance if they are in a SFHA	*Capability*	*As the Town receives brochures they display them on the kiosk in the Town Hall hallway*
Provide technical assistance to owners of non-residential structures regarding flood proofing techniques	*Capability*	*As town is asked, they provide. This is not a common request.*
Encourage residents to submit flood insurance claims following damage events	*Capability*	*This is not a common need.*
Emergency Services		
Pursue mutual aid agreements with non-profits to provide volunteer labor for response activities	*Delisted*	*Town does not believe this is necessary.*
Include structures within the 1% annual chance floodplain within the Reverse 9-1-1 contact database	*Capability*	
Public Education and Awareness		
Visit schools and educate children about the risks of flooding and how to prepare	*Capability*	*Schools run hazard education programming.*
Encourage builders, developers, and architects to become familiar with NFIP land use and building standards at annual workshops	*Capability*	*Performed by the building official on a case-by-case basis. The Town does not run workshops.*

Action	Status	Notes
Natural Resource Protection		
Pursue the acquisition of additional open space in SFHAs	*Complete/ Capability*	*The Town has acquired land since the previous HMP. One lot is in the floodplain. The Town acquires land as opportunities arise, but does not specifically seek out land in the SFHA.*
Continue to aggressively pursue wetlands protection and incorporate performance standards into subdivision reviews	*Capability*	*This action is reclassified as a capability.*
Utilize the recently available extreme rainfall data to determine existing culvert sizing and encourage upgrades where undersized	*Delisted*	*It appears that the Town Engineer utilizes this data, but the procedure has not been formalized. This action is dropped and replaced with that listed below this table.*
Continue to perform catch basin and culvert surveys to prioritize upgrades and perform maintenance and cleaning	*Capability*	*This action is reclassified as a capability.*
Upgrade culverts along Blissville Brook to reduce the chance that roads will overtop during severe storm events	*Complete/ Carry Forward*	*2 culverts have been upgraded. More remain undersized. Carry forward to completion.*

Other actions or strategies developed during the HMP update include:

- ❑ Develop formalized guidance for culvert and bridge construction and replacement that requires utilization of the most up-to-date extreme rainfall data from http://precip.eas.cornell.edu (update to Zoning Regulations Appendix 1 S:2.1)
- ❑ Repair the Schoolhouse Road Bridge, if funding can be secured (CT DEEP approved a grant for the project, but it has yet to be pursued because it has not been a high priority for the Town).
- ❑ Complete Bundy Hill Road bridge replacement. A grant has been secured for this project, and it is currently in the planning phase with the Town engineer. Residents have approved the project.

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

Action	Status	Notes
Property Protection		
Promote the use of functional shutters for older buildings	*Delisted*	*The Town does not feel this addresses a need.*
Make information on wind-resistant construction techniques available to all building permit applicants	*Capability*	*The building official provides this information.*
Emergency Services		
Identify a location for a brush-disposal operation for dealing with debris following wind storms and determine potential reuse	*Complete/ Carry Forward*	*Every spring, and as needed beyond that, the Town brings brush to the Public Works Garage. The Town nevertheless wishes to designate an additional emergency debris storage location.*
Consider surveying all Town-owned buildings to determine their ability to withstand wind loading	*Carry Forward*	*The Town has not had the funding to accomplish this up to this point.*
Develop agreements with landowners and companies to chop/chip to ensure backup plans are in place for debris removal	*Carry Forward*	*The Town has not had the resources to accomplish this up to this point.*
Public Education and Awareness		

Action	Status	Notes
Visit schools and educate children about the risks of wind events and how to prepare for them	*Capability*	*Schools run hazard education programming*

11.1.4 Actions Applicable to Other Damage from Winter Storms

Action	Status	Notes
Consider conducting a study to identify buildings vulnerable to roof damage or collapse from heavy snow in the town	*Delisted*	*Roof collapses have not been a problem for the Town. Indicative of this is the fact that no roof collapses occurred during the snow-heavy winters of 2011, 2013, and 2015. Roof collapse is not a significant concern to Town officials, who do not feel this study is necessary.*
Consider drafting a written plan for inspecting and prioritizing the removal of snow from Town-owned structures	*Delisted*	*Town feels it is fully capable of monitoring and removing snow on Town-owned structures, and this action is unnecessary.*
Continue making funding available to the Public Works Department each year for clearing snow from roads and parking lots	*Capability*	*This action is reclassified as a capability.*
Provide information for protecting Town residents during cold weather and for mitigating icing and insulating pipes at residences	*Capability*	*Information is posted on the Town website*
Consider posting the snow plowing routes in local government buildings and on the Town's website	*Delisted*	*Plow routes too variable for this action to be feasible.*
Continue to identify areas that are difficult to access during winter storm events and develop contingency plans to access such areas	*Capability*	*Hard-to-access areas are known and monitored. They include 2 privately-owned trailer parks and 1 small community at the end of a mile-long private dirt road. Public Works is prepared to assist with emergency access.*

11.1.5 Actions Applicable to Earthquakes

Action	Status	Notes
Ensure that Town departments have adequate backup supplies and facilities for continued functionality following an earthquake	*Capability*	*Town has backup supplies in case of a major disaster.*
Consider preventing residential development in areas prone to collapse such as below steep slopes or areas prone to liquefaction	*Capability*	*Completed indirectly through Zoning Regulations and the Building Code*

11.1.6 Actions Applicable to Wildfires

Action	Status	Notes
Continue to evaluate public water supply hydrants, dry hydrants, and areas at risk of wildfire in the town	*Capability*	*This action is reclassified as a capability.*
Extend fire protection to future areas identified as being particularly at-risk, such as the Pleasant View Cove Road area	*Carry Forward*	*Pleasant View Cove is a mile-long private driveway. The Town has not yet completed this task due to funding limitations.*
Continue to support public outreach programs to increase awareness of forest fire danger, equipment usage, and protecting homes	*Capability*	*This action is reclassified as a capability.*
Ensure that provisions of Town regulations regarding fire protection facilities and	*Capability*	*This action is reclassified as a capability.*

infrastructure are being enforced		
Perform maintenance and repairs on the Town's dry hydrants such that fire flows from these sources are unimpeded	*Capability*	*This action is reclassified as a capability.*

11.1.7 Actions Applicable to Dam Failure

Action	Status	Notes
Include structures within the dam failure inundation areas in the Reverse 9-1-1 contact database	*Complete/ Carry Forward*	*Only the Lower Blissville Pond Dam failure inundation area is included. Carry forward until other dam-failure areas affecting the Town are included.*
Work with CT DEEP to ensure that the owners of high hazard dams have current EOPs and keep local copies	*Complete/ Capability*	*The Emergency Management Department has copies of EAPs.*
Provide assistance to the owners of lesser ranked dams regarding resources available for inspections and maintenance	*Capability*	*The Town is able to provide assistance if approached by dam owners.*
Create an EOP for Lower Blissville Pond Dam and submit it to DEEP	*Partially Complete/ Carry Forward*	*The Town is in the process of revising this EAP to conform to new DEEP requirements, and will submit when complete.*

11.2 Prioritization of Specific Actions

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

3570-09-n2117-rpt-lisbon annex update-adopted.doc

Action or Strategy #	Table 11-1: Mitigation Actions and Strategies for Lisbon 2016 - 2021	Status	Responsible Department[1]	Fiscal Year					Cost	Potential Funding Sources[2]	Weighted STAPLEE Criteria[3]															Total STAPLEE Score	Priority for Community
											Benefits								Costs								
				7/2018-6/2019	7/2019-6/2020	7/2020-6/2021	7/2021-6/2022	7/2022-6/2023	Minimal <$1,000 Low < $10,000 Mod. < $100,000 High > $100,000		Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	STAPLEE Subtotal	Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	STAPLEE Subtotal		
1	Encourage Town officials to attend FEMA-sponsored training seminars at EMI or elsewhere	Carried Forward	FS	x	x	x	x	x	Low	OB	1	1	1	1	1	0	0	**6.0**	0	0	0	0	0	0	0	**0.0**	**6.0**	Medium
2	Upgrade culverts along Blissville Brook to reduce the chance that roads will overtop during severe storm events	Carried Forward	DPW	x	x	x			High	CIB	0.5	1	1	1	1	0.5	0.5	**7.0**	0	0	0	0	0	-1	0	**-2.0**	**5.0**	Low
3	Develop formalized guidance for culvert and bridge construction and replacement that requires utilization of the most up-to-date extreme rainfall data from http://precip.eas.cornell.edu (update to Zoning Regulations Appendix 1 S:2.1)	New	FS		x				Low	OB	1	1	1	1	1	0	0	**6.0**	0	0	0	0	0	0	0	**0.0**	**6.0**	Medium
4	Repair the Schoolhouse Road Bridge, if funding can be secured (CT DEEP approved a grant for the project, but it has yet to be pursued because it has not been a high priority for the Town).	New	DPW					x	High	CIB	0.5	1	1	1	1	0.5	0	**6.5**	0	0	0	0	0	-1	0	**-2.0**	**4.5**	Low
5	Complete Bundy Hill Road bridge replacement. A grant has been secured for this project, and it is currently in the planning phase with the Town engineer. Residents have approved the project.	New	DPW				x		High	CIB	1	1	1	1	1	0.5	0	**7.0**	0	0	0	0	0	-1	0	**-2.0**	**5.0**	Low
6	Identify a location for a brush-disposal operation for dealing with debris following wind storms and determine potential reuse	Carried Forward	FS			x			Low	OB	1	1	1	1	1	0	0	**6.0**	0	0	0	0	0	0	-0.5	**-0.5**	**5.5**	Medium
7	Consider surveying all Town-owned buildings to determine their ability to withstand wind loading	Carried Forward	FS			x			Low	OB	1	1	1	1	1	0	0	**6.0**	0	0	0	0	0	0	0	**0.0**	**6.0**	Medium
8	Develop agreements with landowners and companies to chop/chip to ensure backup plans are in place for debris removal	Carried Forward	DPW	x	x	x	x	x	Low	OB	1	1	1	1	1	0	0	**6.0**	0	0	0	0	0	0	0	**0.0**	**6.0**	Medium
9	Include structures within the dam failure inundation areas in the Reverse 9-1-1 contact database	Carried Forward	FS	x	x				Low	OB	1	1	1	1	1	0.5	0	**7.0**	0	0	0	0	0	0	0	**0.0**	**7.0**	High
10	Create an EOP for Lower Blissville Pond Dam and submit it to DEEP	Carried Forward	FS	x	x				Low	OB	1	1	1	1	1	0.5	0	**7.0**	0	0	0	0	0	0	0	**0.0**	**7.0**	High
11	Extend fire protection to future areas identified as being particularly at-risk, such as the Pleasant View Cove Road area	Carried Forward	FS					x	High	CIB	0.5	0.5	1	1	0.5	0.5	0.5	**5.5**	0	0	0	0	0	-1	0	**-2.0**	**3.5**	Low

[1]Notes
DPW = Department of Public Works & Engineering
FS = First Selectman
PL = Planning Department (SCCOG)

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

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

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

APPENDIX A

ADOPTION RESOLUTION

CERTIFICATE OF ADOPTION
TOWN OF LISBON BOARD OF SELECTMEN

A RESOLUTION ADOPTING THE HAZARD MITIGATION PLAN UPDATE, 2017

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

WHEREAS, the Lisbon Board of Selectmen approved the previous version of the Plan in 2012; and

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

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

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

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

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

RESOLVED by the Board of Selectmen:

1. The Plan is hereby adopted as an official plan of the Town of Lisbon;
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 Board of Selectmen.

Adopted this _____ day of _____, 201_ by the Board of Selectmen of Lisbon, Connecticut

_____
First Selectman

IN WITNESS WHEREOF, the undersigned has affixed his/her signature and the corporate seal of the Town of Lisbon this _____ day of _____, 201_.

_____
Town Clerk