

HAZARD MITIGATION PLAN UPDATE ANNEX FOR THE TOWN OF SALEM

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

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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 in Salem. 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 Salem and is not to be considered a standalone document.

The primary goal of this hazard mitigation plan annex is to identify particular vulnerability 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. Salem, with an approved Mitigation Plan, may apply for assistance from FEMA directly as a subgrantee through the state of Connecticut under the various grant programs.

1.2 Setting

Salem comprises approximately 30 square miles in western New London County and is bordered by Montville to the east, Bozrah and Lebanon to the northeast, Colchester to the north, East Haddam to the west, and the municipalities of Lyme and East Lyme to the south.

The most significant surface water body in Salem is Gardner Lake which is located in the northeast corner of Salem and stretches east into the neighboring municipalities of Bozrah and Montville. The water from Gardner Lake flows northeasterly towards the Fitchville village section of Bozrah. The major transportation routes through Salem include Route 82 which runs northeast-southwest through the central portion of town, Route 85 which runs north-south through the center of town, and Route 11 which runs north-south through the eastern half of town and connects Route 2 to Route 82. Other important roadways include Route 354 in the northeast corner of town which connects Colchester to Montville, Witch Meadow Road which enters Salem from East Haddam in the northwestern section of town and passes through Route 11 to Route 85, and Gungy Road/White Birch Road which extends from Route 82 in the southeastern portion of town to the south and into Lyme.

1.3 Plan Development

The 2005 HMP and its annexes were developed through a series of meetings and the completion of written questionnaires, personal interviews, and workshops as described in the Multi-Jurisdictional HMP update. Since that time, the HMP has been available in municipal offices and available to emergency personnel. Residents have been encouraged to contact the First Selectman, Troop K in Colchester, or either Fire Department (the Gardner Lake Volunteer Fire Department or the Salem Volunteer Fire Department) with any concerns regarding emergency response or potential projects related to natural hazard damage.

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

- ❑ The SCCOG issued a press release on November 20, 2011 announcing a public information meeting on the multi-jurisdictional HMP update. This press release was published in the Norwich Bulletin and The Day. This notice was also posted on the SCCOG website. The public information meeting was held on December 13, 2011 at the SCCOG office.
- ❑ A data collection meeting was held with the First Selectman and Town Planner/Zoning & Wetlands Enforcement Officer, on January 31, 2012 to discuss the scope and process for updating the plan and to collect information. 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 Salem and that should be addressed in the update.
- ❑ The draft that is sent for State review will be posted on Salem's website (www.salemct.gov/Pages/index) as well as the SCCOG website (www.seccog.org) for public review and comment. In addition, a hard copy will be made available in the SCCOG office in Norwich. A press release will announce the availability of the HMP for review. This will provide residents, business owners, and other stakeholders throughout the SCCOG region the opportunity to review and comment on a relatively complete draft with all annexes. Comments received from the public will be incorporated into the final draft where applicable following State and Federal comments.

The adoption of this HMP update by Salem will be coordinated by SCCOG and the First Selectman. The HMP update must be adopted within one year of conditional approval by FEMA, or Salem 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 and be the local coordinator of this HMP (as the First Selectman has since 2005) under the authority of the Salem Board of Selectmen. 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 in Town Hall at the First Selectman's Office, available to all departments, to assist in guiding growth decisions. See Section 2.5 for recommendations related to integrating the findings of this HMP into additional town planning documents. Salem will continue to encourage town residents to contact the First Selectman, with concerns related to natural hazards or emergency response via the town's website.

Salem 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.

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

2.0 COMMUNITY PROFILE

2.1 Physical Setting

Salem is located at the western edge of the SCCOG planning area. Elevations range from approximately 600 at the top of Round Hill just north of Rattlesnake Ledge Road to the east of Whittlesey Swamp in the northeast section of Salem to approximately 140 feet near the Lyme/East Haddam town line near the headwaters of an unnamed tributary to East Branch Eightmile River. The most densely populated area of town is between Rattlesnake Ridge Road and Music Vale Road along Route 85. This is also the area that most community members suggested that a future village center be located in Salem. Most of town is rural and mostly undeveloped with many hills and forestland.

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 Salem. Salem has eleven bedrock formations which are generally situated in a northeast-southwest orientation. Salem lies above two inactive faults that are also oriented in this direction. The Hebron Gneiss Formation, the Plainfield Formation, and the Hope Valley Alaskite Gneiss formation cover nearly an equal amount of land area in Salem and account for approximately 46% of the town's land area. The remaining land area is covered by the other formations.

Salem's surficial geologic formations include glacial till and stratified drift. Refer to the Multi-Jurisdictional HMP for a generalized view of surficial materials. Till contains an unsorted mixture of clay, silt, sand, gravel, and boulders deposited by glaciers as a ground moraine. Areas adjacent to the Witch Meadow Brook, East Branch Eightmile River and its tributaries in southwestern Salem, Fairy Lake and its tributaries, Horse Pound Brook, and smaller tributaries have fairly extensive areas underlain by stratified drift. The amount of stratified drift present is important as areas of stratified materials are generally coincident with floodplains. These materials were deposited at lower elevations by glacial streams, and these valleys were later inherited by the larger of our present day streams and rivers. The amount of stratified drift also has bearing on the relative intensity of earthquakes and the likelihood of subsidence.

2.2 Land Use and Development Trends

Salem was incorporated in 1819 from lands that were formerly part of Montville, Lyme and Colchester. The town has had numerous names throughout history including New Salem, Salem Parish, the Society of Salem and Paugwonk. Salem has been a farming community with small population growth due to the town's landscape. Today, it still maintains the rural character. As a result, the town remains a residential community.

According to the "2006 Land Cover by Area" UConn Center for Land Use Education and Research" data for the town, Salem has achieved 23% open space protection thus far. According to the map, the town is dominated by deciduous forest land cover (66% or 12,586 acres) and developed land cover only accounts for 1,621 acres or approximately 8.5% of the town's land. A portion of the hypothetically developable land beyond the 23% of open space are steep slopes, water, wetlands, protected open space, and the like that prohibit the land from being developed.

A number of small developments have been recently completed or are underway. Two tennis court facilities and the town's first basketball court were completed in 2009, while construction began on the Salem multi-purpose path in 2010. More recently, a substantial equestrian center was opened named "Treasure Hill Farm" on Route 354 to the west of Gardner Lake.

A mixed-use building (one bedroom apartments over commercial space) is under construction at 24 Hartford Road in the town center near the Route 82/Route 85 intersection. A medical office building has been approved on Center Street off Route 82 (a short dead-end road off Route 82) and will be constructed behind this new building at 24 Hartford Road.

Finally, the Connecticut Department of Transportation (CT DOT) will soon be converting the Route 82/Route 85 intersection into a roundabout. The house at the southwest corner of Routes 82 and 85 will be demolished to accommodate the roundabout. A portion of the intersection and the house are in the SFHA. The new roundabout is reportedly being constructed at an elevation two feet higher than the current intersection of Routes 82 and 85, which may help reduce the potential for flooding.

It is likely that Salem will continue to be a rural-dominant community in the future, with limited industrial and commercial development. The housing stock in Salem consists primarily of single family homes. No housing developments are currently in front of the town. Among others, the POCD Update lists the encouragement of affordable housing development in town and the encouragement of cluster/conservation design subdivisions in town.

2.3 Drainage Basins, Hydrology, and Geology

As mentioned in Section 1.2, the most significant surface water body in Salem is Gardner Lake which is located in the northeast corner of Salem and stretches east into the neighboring towns of Bozrah and Montville. Additionally, the most significant watercourses include the East Branch Eightmile River, Harris Brook, Horse Pound Brook, Neck Brook, and Sucker Brook. The East Branch Eightmile River flows southwesterly from north-central Salem through East Haddam and towards Eightmile River in Lyme. Harris Brook, another substantial watercourse, flows south-southwesterly before it reaches East Branch Eightmile River in southwestern Salem. Shingle Mill Brook is a significant tributary which flows northerly before confluencing with Harris Brook. In total, there are approximately 14 named watercourses and many unnamed small tributaries in Salem.

There are a total of eight subregional watershed basins in Salem. The subregional basins are: Deep River, Gardiner Brook, Eightmile River, East Branch Eightmile River, Harris Brook, Oxoboxo Brook, Latimer Brook and Beaver Brook. Not surprisingly, the subregional drainage basin of the largest watercourse in Salem, East Branch Eightmile River, covers the majority of land cover in the town. The East Branch Eightmile River accounts for approximately 7,763 acres or approximately 40.5% of land cover stretching from the town's northern to southern border along the western half of Salem. The second largest subregional basin accounts for only approximately 20% of the central portion of Salem extending from northern Salem to the southern town line with East Lyme. The remaining six subregional watershed basins account for the remaining approximately 39.5% of land cover.

The Eightmile River subregional basin covers a small portion of the western Salem, while the dominant East Branch Eightmile River accounts for most of western Salem and Beaver Brook

accounts for a small area in southwestern Salem. In eastern Salem, the Gardner Brook basin accounts for a majority of the land cover, while the Deep River basin accounts for a less substantial amount of land cover. In southeastern Salem, the Oxoboxo Brook accounts for a smaller portion of land, while the Latimer Brook basin accounts for the majority.

2.4 Governmental Structure

Salem 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 Salem.

Salem has boards, commissions, and committees that can take an active role in hazard mitigation, including the Inland Wetlands and Conservation Commission, the Planning and Zoning Commission, the Emergency Management Committee, the Town Planning/Building Committee, the Plan of Conservation and Development Committee and the Board of Selectmen. Departments and commissions common to all municipalities in SCCOG were described in Section 2.8 of the Multi-Jurisdictional HMP. More specific information for the departments and commissions of Salem is noted below:

- ❑ The Salem Volunteer Fire Company (Station 21) and the Gardener Lake Volunteer Fire Company provide fire suppression, fire prevention, rescue, and hazardous materials response services to the town.
- ❑ The Building Official is responsible for the issuance of building, electrical, plumbing, mechanical, demolition and change of occupancy permits. The Building Official is also the Floodplain Manager and enforces NFIP regulations in Salem.
- ❑ The Planning & Zoning Commission prepares and adopts the local plan of development and adopts and administers local zoning regulations. The Planning, Zoning, and Wetlands Department assists applicants with the municipal approvals process, ensures that proposals comply with applicable regulations, and enforces local Zoning, Subdivision, and Inland Wetlands and Watercourses regulations.
- ❑ The Inland Wetlands and Conservation Commission mission is to produce and enforce regulations and amendments in conformity with the regulations of the State Commissioner of Environmental Protection and the Inland Wetlands and Watercourses Act, as amended, as are necessary to protect wetlands and watercourses in Salem.
- ❑ The Public Works Department provides services including maintaining safe, efficient and well-maintained infrastructure of roads and bridges, snow removal and deicing on roads, conducting the removal of hazardous trees, and maintaining and upgrading storm drainage systems to prevent flooding caused by rainfall.
- ❑ The Zoning Board of Appeals mission is to resolve conflicts which may arise between the common law rights of a property owner to his land as he or she wishes and the efforts of the Planning and Zoning Commission to manage land use in order to promote the general welfare

of Salem. The Zoning Board of Appeals is empowered by statute to grant variances to zoning regulations.

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

2.5 Review of Existing Plans and Regulations

Salem has different plans and regulations that recommend or create policies related to hazard mitigation. These policies and regulations are outlined in the Emergency Operations Plan (2010), *Plan of Conservation and Development* (2012), Open Space Plan (2007), Zoning Regulations, Subdivision Regulations and Inland Wetlands and Watercourse Regulations. The Zoning Regulations were revised to October 1, 2011 to incorporate new NFIP requirements associated with the DFIRM available in 2011.

Emergency Operations Plan

Salem 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 in case of an emergency. Emergencies can include but are not limited to hazard events such as hurricanes and nor'easters. The EOP is directly related to providing emergency services prior to, during, and following a hazard event.

Plan of Conservation and Development (2012)

The *Plan of Conservation and Development* is expected to be adopted in 2012 with contributions from local boards, commissions, committees, citizens and citizen groups. The goal of the Plan is to achieve Salem's vision for maintaining quality of life, housing, government, economic development, and natural resources. The Plan does not directly consider the potential impacts of natural hazards nor does it consider natural features such as steep slopes (those exceeding 15%) that could restrict development. Discussion of these areas could be considered to be included in the next update of the Plan.

Zoning and Subdivision Regulations (2011)

The NFIP regulations for Salem are in Section 3.13 of the Zoning Regulations while the Subdivision Regulation discuss flood elevations in Section 5.9, floodway encroachments in Section 5.10 and lists flooding considerations including drainage systems in Section 5.11. The Zoning Regulations require a 0% net increase in post-development runoff.

Inland Wetlands and Watercourses Regulations (2009)

The Inland Wetlands and Watercourses Regulations in Salem require a permit for certain regulated activities that are within 75 feet or in a wetland or watercourse or that may impact a wetland or watercourse. These regulations build on the preventative flood mitigation provided by the Zoning Regulations by preventing fill and sedimentation that could lead to increased flood stages.

2.6 Critical Facilities, Sheltering Capacity, and Evacuation

Salem 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 a Special Flood Hazard Area (SFHA). These facilities are described in more detail below.

**TABLE 2-1
Critical Facilities**

Facility	Address or Location	Emergency Power?	Shelter?	In SFHA?
<i>Emergency Services</i>				
Gardner Lake Volunteer Fire Company	429 Old Colchester Rd	✓	✓	
Salem Volunteer Fire Company	424 Hartford Road	✓		
<i>Municipal</i>				
Town Hall*	270 Hartford Road	✓		
Public Works Garage	270 Hartford Road	✓		
Elementary School	200 Hartford Road	✓	✓	

*Emergency Operations Center (EOC)

Gardner Lake & Salem Volunteer Fire Companies

Salem has two volunteer fire companies: the Gardner Lake and Salem (Station 21) Volunteer Fire Companies. Both fire companies work together to serve Salem with fire suppression and emergency response. The two fire companies are outfitted with standby power supply sources via generators. The Gardner Lake Fire Company is Salem's secondary shelter.

Station 21 is outfitted with three additional portable generators, a Polaris Ranger with a 75 gallon tank for all terrain emergency response, a 77 foot rescue ladder with a 300 gallon water tank, a 1,000 gallon rescue truck, a 2,500 gallon tanker, a 100 gallon forestry truck, a hazardous waste response truck with two portable generators, a rescue and service truck, and a service sports utility vehicle.

The Gardner Lake Volunteer Fire Company has an attack fire engine normally used on all calls aside from medicals, a service truck most often used during first responder calls or mutual aid calls in support of surrounding towns, a forestry truck used for wildland suppression, an ambulance used for emergency response, a 3,000 gallon tanker typically used for fire suppression, and a rescue trucked primarily used for response to vehicle accidents.

Town Hall

Salem's Emergency Operations Center (EOC) is the Town Hall. The facility is fitted with a generator. The Town Hall houses many of Salem's municipal departments including the Public Works, Planning, Zoning, and Wetlands Enforcement, the Building Department, and the Emergency Services Department.

A variety of useful information pamphlets regarding disaster preparations is on display at the Town Hall. These are focused on fire safety, fire prevention, evacuation procedures, evacuating people with special needs, and preparing disaster supply kits.

Communications

Salem has a considerable amount of equipment for interdepartmental emergency response and communication which, in addition to the equipment discussed above, includes handheld and workstation-based radios operable at many different frequencies. Salem's dispatch services are through KX Dispatch (Troop K in Colchester) with Hebron, Colchester, East Haddam, and a few other towns.

Salem's communication with its residents, visitors, and businesses and its communications with outside emergency preparedness and response groups is believed inadequate. Reverse 9-1-1 is not currently available. Tropical Storm Irene was significantly damaging for the town with many downed trees and tree parts. Outages within Salem reached seven days in some areas. Communication and proactive actions should be improved and introduced with respect to Salem and to Connecticut Light & Power's (CL&P) tree trimming efforts.

Salem should pursue registering to the CT Alert "Everbridge" Emergency Notification System for Reverse 9-1-1. Upon registration, town officials should encourage residents to sign up for the service via the CT Alert Emergency Notification System web site (<http://www.ct.gov/ctalert/site/default.asp>).

Additional Facilities

The Public Works Garage is located next door to the Town Hall, is outfitted with a generator and is outfitted with gasoline pumps for town equipment and vehicles. Salem Elementary School is the primary shelter.

Evacuation Routes

Annex E of Salem's EOP describes Salem's evacuation plans. Section V, Part A entitled "Administration" states that the Evacuation Coordinator is responsible for maintaining complete records and reports associated with tracking the status of evacuation events including evacuation notices, the number of persons evacuated and the number of evacuees in shelter/mass care centers. Additionally, the Evacuation Coordinator is responsible for maintaining up-to-date evacuation route maps that depict designated primary and alternate evacuation routes.

The highest capacity egress routes from Salem include:

- ❑ Route 85, which is oriented north-south and runs from Colchester to Montville across the center of Salem,
- ❑ Route 11 which runs almost parallel and to the west of Route 85 but only extends from the Colchester/Salem town line to Route 82, and
- ❑ Route 82 which extends from the Montville town line just below Gardner Lake southwest to the Lyme town line.

2.7 **Status of 2005 Plan Recommendations**

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

- ❑ Complete Catch Basin Surveys to Identify Catch Basins in Need of Maintenance and/or Replacement & Complete Culvert Survey to Determine Priority for Maintenance and/or Replacement Plan – Catch basin and culvert surveys are completed annually by the Public Works. Replacement and maintenance is performed on the local drainage systems as funding allows on an annual basis. *This recommendation will not be pursued further.*
- ❑ Evaluate the Hazard Resistant Nature of Critical Facilities – This is ongoing as part of Salem's annual EOP update. No critical facilities are believed to be more or less susceptible to natural hazards. *This recommendation remains valid but has been deferred to the EOP update.*
- ❑ Comprehensive Evaluation of Emergency Communication Capabilities Throughout the Town – This is ongoing along with the annual EOP update. Salem may join the CT Alert "Everbridge" Emergency Notification System for Reverse 9-1-1 capabilities. *This recommendation remains valid.*
- ❑ Develop a Flood Audit Program – At present, Salem suffers mainly from nuisance flooding. Salem is aware of the limited problem areas and floodplain development regulations restrict additional development within them. *This recommendation will not be pursued further.*
- ❑ Review of Transportation Facilities to Identify Critical Risks – This is ongoing annually as part of the EOP update. Salem had access issues during Hurricane Irene due to the many downed trees and power lines. *This recommendation remains valid but has been deferred to the EOP update.*
- ❑ Identify Appropriate Improvements to Traffic Infrastructure and Emergency Response Training and Equipment – This is ongoing as part of Fire Companies' training as well as the annual EOP update. Salem has access to CERRIT, the regional hazardous response team. *This recommendation is not pursued further.*
- ❑ Evaluate Potential Chemical Release as Well As Potential Containment Procedures – The Fire Companies work together to evaluate potential chemical releases and containment procedures and update those on an annual basis. *This recommendation is not pursued further.*

- ❑ Bridge Replacement or Structural Repair of Old New London Road and Darling Road Culverts – Salem is aware that Darling Road floods at a tributary of the East Branch Eightmile River. However only one house on White Birch Road floods. *This recommendation remains valid and is included in Chapter 11.*
- ❑ Implement a Reverse 9-1-1 System to Automatically Call Telephones Throughout Town, Relaying Important Information During an Emergency – Salem may join the CT Alert "Everbridge" Emergency Notification System for Reverse 9-1-1 capabilities to receive statewide notices and will work to implement the programming of specific areas. *This recommendation remains valid.*
- ❑ Distribute or Post Public Information Regarding Hazards in the Town – Literature is available at Town Hall as noted above. Local media is utilized to pass information prior to and during storms, including newspaper, television, and radio. Town personnel visit elderly residents prior to major storms to advise them to seek shelter or assistance. *This recommendation remains valid and there are additional opportunities such as visiting residents and businesses following an event to update them on road conditions and available services and posting of preparedness information on the Salem's web site.*
- ❑ Evaluate Emergency Shelters, Update Supplies, and Check Communication Equipment – This is conducted at least annually or following any use of the facilities. *This recommendation remains valid.*
- ❑ Maintain Emergency Personnel Training as Well as Maintaining and Updating Emergency Equipment and Response Protocols – Training is performed regularly, with equipment upgrades occurring to the extent the budget will allow. *This recommendation remains valid.*
- ❑ Evaluate and Consider Burying Power Lines Underground and Away from Possible Tree Damage – Utilities are not required to be underground. However, according to local officials, utilities are placed underground in large subdivisions. There are no plans to move existing utilities underground. Much of the time, a limiting factor when considering placing utilities underground is the bedrock depth. *This recommendation remains valid for future developments where bedrock depths allow. Salem should consider a requirement being placed into an ordinance for new development or substantial redevelopment where feasible.*
- ❑ Complete an Earthquake Survey of all Critical Facilities and Infrastructures –A formal survey is not proposed due to the infrequent nature of this hazard. Most buildings in town are relatively old and likely do not have any seismic protection. *This recommendation will not be pursued further.*
- ❑ Complete a Survey of Fire Hydrants to Assess Vulnerabilities and Capabilities for Fire Protection – Fire protection capabilities are reviewed at least annually with the EOP update. Salem believes that its fire protection level is adequate. Fire ponds and/or cisterns are not required, although a few dry hydrants are present in town. *This recommendation remains valid.*

3.0 INLAND FLOODING

3.1 Setting / Historic Record

Flooding is the primary hazard that impacts the town each year as documented in the previous HMP. While riverine flooding is of primary concern, nuisance flooding and poor drainage are also 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 in Salem.

The March 2010 storms produced the most widespread flooding in Salem since the last HMP, causing basement flooding, roadway flooding, and a significant amount of nuisance flooding. Three notable road closures occurred during the floods: Routes 82 at Harris Brook, Route 85 at Harris Brook, and Witch Meadow Road off Route 85 north of the town center. Because of these three closures, school children had to be bused north on Route 85 into Colchester then back down West Road to reach the northwest corner of Salem. This underscored the fact that Witch Meadow Road is an important connection and it floods easily. Salem would be interested in plan recommendations that address these three pinch points, such as elevating roads and upgrading bridges and culverts.

3.2 Existing Programs, Policies, and Regulations

Salem 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, 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. No structural flood control projects are located within or upstream of Salem, although the existing dams provide a small amount of flood mitigation.

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. When flooding occurs, the Public Works Director or either Fire Company typically handles complaints from residents. For example, the Public Works Department would inspect bridges and culverts and erect barricades to close roads, while the Fire Companies respond to calls requesting help for flooded basements. Drainage complaints are directed to the Public Works Director.

The new roundabout being constructed at the intersection of Routes 82 and 85 will be constructed at an elevation two feet above the current intersection. Although not confirmed, it is believed that this may be partly for increased flood mitigation.

Regulations, Codes, and Ordinances

Salem has planning and zoning tools in place that incorporate floodplain management. Salem also has Subdivision Regulations that require adequate drainage be provided to reduce exposure to flood hazards. Regulations covering development in and/or near inland wetland areas also exist.

Acquisitions, Elevations, and Property Protection

Salem has not performed acquisitions or elevations of floodprone property. Property protection has focused instead on preventive measures and maintaining and upgrading drainage systems.

Flood Watches and Warnings

The First Selectman and the Volunteer Fire Companies access weather reports through the National Weather Service and local media. Salem does not yet participate in the CT Alerts "Everbridge" Emergency Alerting and Notification Reverse 9-1-1 System. At the present time, Salem does not currently have the capability to telephone warnings into specific areas. Use of this service would allow the town the ability to receive geographically specific weather warnings when storms are imminent.

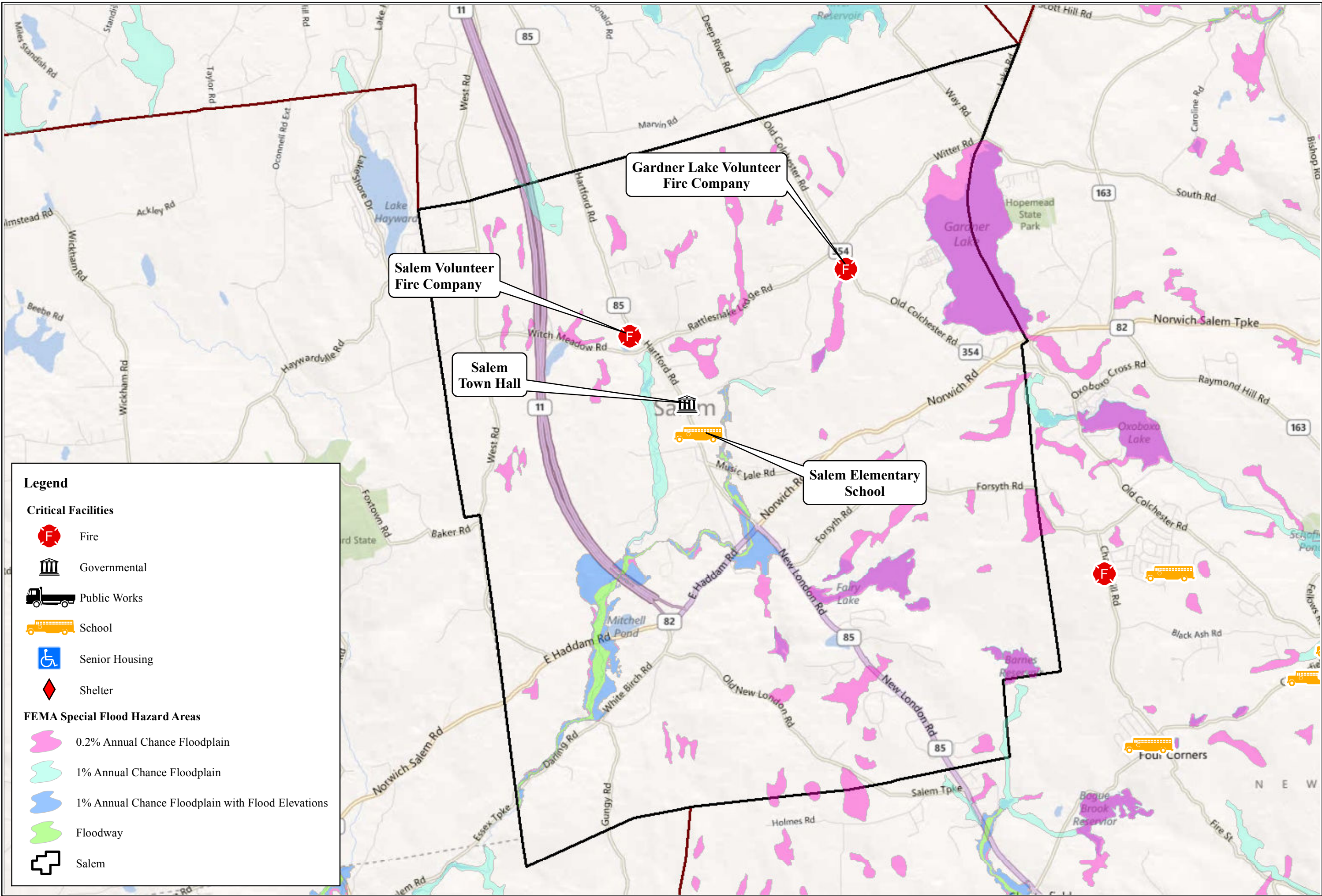
3.3 Vulnerabilities and Risk Assessment

This section discusses specific areas at risk to inland flooding within Salem.

3.3.1 Vulnerability Analysis of Areas along Watercourses

Parts of the East Branch Eightmile River, Harris Brook, Fraser Brook, Shingle Mill Brook, and Witch Meadow Brook have a Special Flood Hazard Area (SFHA) associated with them. Sections of the East Branch Eightmile River, Harris Brook, Fraser Brook, and Shingle Mill Brook are mapped as the SFHA Zone AE, indicating that flood elevations are available. Additional mapped SFHA floodplains are Zone A, indicating that elevations are not available. As previously discussed, there are a few areas of town where flooding is hazardous to residents, buildings, or roadways. Those areas are discussed in Section 3.1 and listed below; refer to Figure 3-1 for the location of SFHAs within Salem:

- ❑ The Harris Brook corridor is floodprone where it crosses Routes 82 and 85 in the center of town. The roadways in this area are relatively low in elevation and can be flooded by one to 1.5 feet of water during significant storms.
- ❑ The area behind the "Salem Town Center" strip mall at the southwest corner of Routes 82 and 85 is in the SFHA of Harris Brook. Approximately one to 1.5 feet of water has historically inundated the rear of the plaza, which is a parking lot.
- ❑ During the March 2010 storms there were three notable road closures: the intersection of Routes 82 and 85 at Harris Brook, Witch Meadow Road off Route 85 to the north of the town center, and the intersection of Darling Road and White Birch Road at a tributary of the East Branch Eightmile River which has a long standing history of inundation.
- ❑ Route 82 has a history of flooding at the East Branch Eightmile River and beavers have historically contributed to the flooding of Rattlesnake Ledge Road near Whittlesey Swamp.



Legend

Critical Facilities

- Fire
- Governmental
- Public Works
- School
- Senior Housing
- Shelter

FEMA Special Flood Hazard Areas

- 0.2% Annual Chance Floodplain
- 1% Annual Chance Floodplain
- 1% Annual Chance Floodplain with Flood Elevations
- Floodway
- Salem

Important transportation routes through town includes Routes 82 which runs northeast-southwest through the central portion of town, Route 85 which runs north-south through the center of town and Route 11 which runs north-south through the eastern half of town and connects Route 2 to Route 82. Other important roadways include Route 354 in the northeast corner of town which connects Colchester to Montville, Witch Meadow Road which enters Salem from East Haddam in the northwestern section of town and passes through Route 11 to Route 85, and Gungy Road / White Birch Road which extends from Route 82 in the southeastern portion of town to the south and into Lyme. The DFIRM mapping suggests that these transportation routes can be negatively affected by extreme flooding. The DFIRM mapping shows FEMA flood zones stretching across Routes 11, 82 and 85. According to town officials, the most problematic areas of flooding associated with transportation through town are the sections of Routes 82 and 85 described in Section 3.1.

3.3.2 Vulnerability Analysis of Private Properties

As noted in Table 3-4 of the Multi-Jurisdictional HMP, a total of seven structures in Salem appear to be located in an SFHA floodplain. The majority of these structures are located near the confluence of Fraser Brook with Harris Brook. Many of these structures are residential and only a few are commercial. Only one structure appears to be located within the Zone A floodplain (the SFHA floodplain without flood elevations defined), while the remaining six appear to be located either within Zone AE or the floodway in Zone AE.

Town personnel indicate that structures typically do not get flooded in Salem due to riverine or overbank flood conditions, despite their locations in SFHAs. As shown in Table 3-5 of the Multi-Jurisdictional HMP, there are no repetitive loss properties in town. Such properties are those which have received two or more claim payments of more than \$1,000 from the NFIP with any rolling 10-year period for the home or business.

3.3.3 Vulnerability Analysis of Critical Facilities

As noted in Section 2.6 no critical facilities are located within an SFHA flood zone. With respect to critical facilities, there are no serious concerns to the town in conjunction with flooding.

3.4 Potential Mitigation Measures, Strategies, and Alternatives

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

4.0 COASTAL FLOODING

4.1 Setting / Historic Record

Salem is not located along the coastline nor is it located in a potential hurricane surge zone. As such, no coastal flooding or storm surge has affected the town since the last HMP. Therefore, the town is not considered to be affected by coastal flooding and storm surge.

4.2 Existing Programs, Policies, and Regulations

Due to the town not being on the coast, it does not have and/or need regulations to restrict development due to coastal flooding hazards.

4.3 Vulnerabilities and Risk Assessment

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

4.4 Potential Mitigation Measures, Strategies, and Alternatives

No mitigation measures for reducing the impact of coastal flooding or storm surge 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.

The last major hurricane or tropical storm wind event to affect the town was associated with Tropical Storm Irene in August 2011. Sections of trees fell throughout the town and the region causing power outages that lasted up to seven days in Salem. Salem learned that communication between the local officials and Connecticut Light & Power (CL&P) needs to greatly improve in order to efficiently and effectively clear roadways throughout town in the future. According to local officials, town shelters were not needed following Tropical Storm Irene although the EOC was operational.

5.2 Existing Programs, Policies, and Mitigation Measures

Wind loading requirements for new buildings are addressed through the Connecticut Building Code which is utilized by the town. Effective December 31, 2005, the design wind speed for Salem is 110 miles per hour. Salem does not have a specific requirement requiring that utilities be located underground in new developments; however the utilities for large subdivisions are placed underground.

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 couple areas of the town. The Tree Warden posts notification and schedule tree removal. Most tree services are contracted out of town and the budget of tree removal is built into the Public Works Department budget and is not stand-alone. As mentioned previously when discussing the effectiveness of clean-up following Tropical Storm Irene, Salem and CL&P need to improve communications to prevent a long and extended outage such as what the Salem experienced following the storm.

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. Salem can access National Weather Service forecasts via the internet as well as listening to local media outlets (television, radio) to receive information about the relative strength of the approaching storm. This information provides the resources needed to determine whether or not to implement its EOP and encourage residents to take protective or evacuation measures if appropriate.

However, Salem does not subscribe to a Reverse 9-1-1 system, which is included in this subject document as a recommendation. Once implemented by Salem, residents will be able to sign up to receive warnings from the statewide CT Alert "Everbridge" Emergency Notification System to receive critical information and the town will have the ability to send area specific alerts.

Although hurricanes that have impacted Salem 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.

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. There was a town-wide seven day power outage due to tree damage to utility lines following Tropical Storm Irene in 2011.

A majority of structures built in town do not meet current building codes and 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. Those newer structures put in place since the 1990s are less vulnerable to damage from hurricanes and/or tropical storms.

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 Salem.

5.4 Potential Mitigation Measures, Strategies, and Alternatives

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

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 Salem. 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. No tornadoes have occurred in the town since the last HMP.

6.2 Vulnerabilities and Risk Assessment

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. Salem 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 local officials to implement the EOP and encourage residents to take protective measures if appropriate as was the case during Tropical Storm Irene.

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

6.3 Emergency Response Capabilities

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.

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 Salem's strong fire response and coordination with Connecticut DEEP fire fighters.

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

buildings are most susceptible to lightning and hail damage since many were constructed prior to current building codes, and many campgrounds offer little structural protection from the elements.

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 Connecticut. 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 Vulnerabilities and Risk Assessment

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 in Salem.

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 local officials. However, only the winter storms of 2010-2011 had a significant effect on the town during this period of time. The winter of 2010-2011 produced significant snowfall in Salem. A barn collapsed and Salem spent \$30,000 to clear 115,000 square feet of snow off of the Elementary School. An evaluation was never conducted prior to the removal; however additional snowfall was forecast and local officials believed that snow removal was necessary.

Winter Storm Alfred in October 2011 caused tree damage because Salem received seven inches of wet, heavy snow. However, the damage was believed not as bad as it could have been because T.S. Irene had taken down so many trees and branches two months earlier.

7.2 Existing Programs, Policies, and Mitigation Measures

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

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

The Public Works Department oversees snow removal in the town. The Connecticut Department of Transportation (DOT) plows the State roadways, while Salem plows approximately 40 miles of roads by employing five crews in Salem trucks. A high priority is given to school bus routes that include steep hills. Sand and salt are both used for deicing in Salem.

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. Salem monitors and shovels the roofs of municipal buildings when snow loads accumulate, and many residents and businesses shovel or plow their roofs. Many of the emergency calls in Salem in January 2011 were from people shoveling their roofs and falling.

7.3 Vulnerabilities and Risk Assessment

Severe winter storms can produce an array of hazardous weather conditions, including heavy snow, microclimates, 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.

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.

As a result of a significant change in elevation in town with elevations ranging from approximately 600 to approximately 140 feet, microclimates exist in Salem. This presents the possible situation of wintry weather impacting the highest elevations while the lowest elevations are not impacted. As such, snowfall amounts can vary significantly in Salem dependent on elevation.

In general, there are few steep slopes such that extra sanding and salting of the roadways in necessary locations alleviates any trouble spots. Town officials did not indicate this to be a major issue, rather an issue that deserves priority when staff begin treatment of roads. These areas are usually treated first by staff during and following winter storms.

7.4 Potential Mitigation Measures, Strategies, and Alternatives

Potential mitigation measures for flooding caused by nor'easters include those appropriate for flooding that were discussed in Section 3.7 of the Multi-Jurisdictional HMP and Section 11 of this annex. However, winter storm mitigation measures must also address blizzards, snow, and ice hazards. 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.

8.0 EARTHQUAKES

8.1 Setting / Historic Record

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

8.2 Existing Programs, Policies, and Mitigation Measures

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

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

8.3 Vulnerabilities and Risk Assessment

Surficial earth materials behave differently in response to seismic activity. Unconsolidated materials such as sand and artificial fill can amplify the shaking associated with an earthquake. As noted in Section 2.1, areas adjacent to Witch Meadow Brook, East Branch Eightmile River and its tributaries, Fairy Lake and its tributaries, Horse Pound Brook, and smaller tributaries have fairly extensive areas underlain by stratified drift. These areas are likely 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 local officials deems necessary, the possible prohibition of new construction.

Refer to Section 2.1 for a discussion regarding the two inactive faults in Salem which run in a northeast to southwest direction. 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 1990s and therefore are not built to current building codes. In addition, there are areas such as town parks 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. With a difference of upwards of five hundred feet in elevation, Salem has areas of steep slopes and bluffs, although the majority of these features occur in undeveloped areas. Thus, landslides are not a great 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 CL&P 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 Salem EOP.

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

8.4 Vulnerabilities and Risk Assessment

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 developed areas of Salem. Structural fires in higher density areas of the town are not directly addressed herein.

According to local officials, although most of Salem is not developed, no specific areas of wildfire risk or vulnerability are known. Small fires have historically occurred during dry spring weather in Connecticut. Fire ponds and cisterns are not required in Salem, although a few dry hydrants exist. That said, a series of water sources (surface water fire suppression sources) are located throughout town. Between both Volunteer Fire Companies' tanker trucks and several mutual aid agreements with neighboring towns, Salem believes their services are fully capable. Whenever water is needed for fire suppression, the tanker truck continuously moves to and from the nearest hydrant, or other water source, to maintain a constant water supply.

9.2 Existing Programs, Policies, and Mitigation Measures

Monitoring of potential fire conditions is an important part of mitigation. The Connecticut DEEP Forestry Division uses the rainfall data recorded by the Automated Flood Warning system to compile forest fire probability forecasts. This allows the DEEP to monitor drier areas to be prepared for forest fire conditions. Salem can access this information over the internet. Salem 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 two Volunteer Fire Companies have a variety of equipment including a Polaris Ranger with a 75 gallon tank, a 100 gallon forestry truck, and a second forestry truck, all of which are used for wildland fire suppression. The Fire Companies also have mutual aid agreements with surrounding communities. Although Salem owns two tanker trucks, local officials wish to replace one. The Volunteer Fire Companies will continue to evaluate the level of risk and the need for additional hydrants as development continues in the future.

9.3 Emergency Response Capabilities

Forests and inaccessible tracks of land are at the highest risk for wildfires. However, according to local officials, there are no specific areas of wildfire risk or vulnerability in Salem and the Fire Department is outfitted with three wildland-specific rigs used in fire suppression. Refer to Figure 9-1 in the Multi-Jurisdictional HMP for a general depiction of wildfire risk areas region-wide.

9.4 Vulnerabilities and Risk Assessment

Salem is a low-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 Salem 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 Regulations, Codes, and Ordinances

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, Salem does not have a Class C (high hazard) dam or a Class B (significant hazard) dam within its municipal limits.

10.3 Vulnerabilities and Risk Assessment

There are no high (Class C) or significant (Class B) hazard dams in Salem. However, according to the "Connecticut Dams" GIS shapefile published in 1996, the total number of CT DEEP-registered dams in Salem was 17. These dams were ranked as having a moderate hazard potential (Class BB), a low hazard potential (Class A), or were unranked. According to the same datafile, the Harris Brook subregional basin has the most number of dams with seven, followed by the East Branch Eightmile River basin with six and the Latimer basin with four. None of the remaining subregional basins have any CT DEEP-registered dams according the datafile.

Due to the absence of Class B and C dams, Salem is considered a low-risk area for dam failure.

10.4 Potential Mitigation Measures, Strategies, and Alternatives

Suggested recommendations for the lower-hazard dams in Salem are listed in Section 11.

11.0 RECOMMENDATIONS

11.1 Summary of Specific Recommendations

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

11.1.1 Recommendations Applicable to All Hazards

Regional Coordination

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

Local Emergency Response

- Continue to review and update Salem's EOP at least once annually.
- Continue to maintain emergency response training and equipment and upgrade equipment when possible.
- Encourage local officials to attend FEMA-sponsored training seminars at the Emergency Management Institute (EMI) in Emmitsburg, Maryland. All of these workshops are free of charge. Tuition, travel and lodging are provided by FEMA for the EMI training. Annual training sessions include emergency management, environmental reviews, the FEMA grant programs, the NFIP and CRS and others related to other hazards.
- Continue to evaluate emergency shelters, update supplies, and check communication equipment.
- Identify a replacement EOC as it has indicated that Town Hall is outdated.
- Pursue the ARC-certification of the main shelter, the Elementary School, and the secondary shelter, the Gardner Lake Volunteer Fire Company.

- ❑ Repair the link to the Gardner Lake Volunteer Fire Company on Salem's web site so that it directs the web browser to <http://gardnerlakevolfireco.org/>
- ❑ Continue to promote dissemination of public information regarding natural hazard effects and mitigation measures into local governmental and community buildings. Specifically,
 - ⇒ Obtain copies of the disaster planning guides and manuals from the "Are You Ready?" series (<http://www.ready.gov/are-you-ready-guide>).
 - ⇒ Encourage residents to purchase NOAA weather radios with an alarm feature.
 - ⇒ Post hazard preparedness information on the Salem's website. Include links to established sources at the State of Connecticut and FEMA.
- ❑ Enroll the town in the CT Alert Emergency Notification System. Following enrollment, encourage town residents to register with the service through the CT Alert ENS website (<http://www.ct.gov/ctalert/site/default.asp>).

Prevention

- ❑ Develop a checklist for land development applicants that cross-references the specific regulations and codes related to disaster resilience.
- ❑ Integrate elements of this HMP into the *Plan of Conservation and Development* during the current update and beyond.
- ❑ Consider requiring the underground installation of utilities for new development to the greatest extent/feasibility. Areas of shallow bedrock will likely be limiting.
- ❑ Continue reviewing building plans to ensure proper access for emergency vehicles.
- ❑ Continue to enforce the appropriate building code for new building projects.
- ❑ Encourage residents to install and maintain lightning rods on their buildings.

Natural Resource Protection & Open Space

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

11.1.2 Recommendations Applicable to Inland Flooding

Prevention

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

- ❑ Require developers to demonstrate whether detention or retention of stormwater is the best option for reducing peak flows downstream.
- ❑ Conduct an annual inspection of floodprone areas that are accessible to local officials. Determine if potential flood damage is stormwater facility related and make recommendations as appropriate.

Property Protection

- ❑ Incorporate information on the availability of flood insurance into all hazard-related public education workshops.
- ❑ Make available FEMA-provided flood insurance brochures at public accessible places such as the local government buildings. Encourage residents to purchase flood insurance if they are located within a FEMA SFHA.
- ❑ Provide technical assistance to owners of non-residential structures that suffer flood damage regarding floodproofing measures such as wet and dry floodproofing.
- ❑ Encourage residents to submit flood insurance claims following damage events.

Emergency Services

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

Public Education and Awareness

- ❑ Conduct a "Natural Hazards Fair" so that interested parties can familiarize themselves with natural hazard mitigation options. Consider working different "hazard weeks" into public education plans when possible tying into national hazard weeks such as "Fire Prevention Week", "Hurricane Preparedness Week", and others.
- ❑ Visit schools (as is currently done under fire prevention) and educate children about the risks of floods (and other natural hazards) and how to prepare for them.
- ❑ Encourage builders, developers, and architects to become familiar with the NFIP land use and building standards by attending annual workshops.

Natural Resource Protection

- ❑ Pursue the acquisition of additional municipal open space in SFHAs.
- ❑ Continue to aggressively pursue wetlands protection through existing wetlands regulations. Incorporate performance standards into subdivision reviews to include additional protective measures such as conservation easement areas around wetlands and watercourses.

Structural Projects

- ❑ Utilize recently available extreme rainfall data to determine existing sizing of culverts. Encourage bridge replacements and culvert replacements in areas found to be undersized. Web sites such as <http://precip.eas.cornell.edu/> publish this information.
- ❑ Continue to perform catch basin and culvert surveys to perform maintenance and cleaning and to identify and prioritize structures in need of replacement.
- ❑ Work with the CT DOT to elevate the bridge and/or increase the culvert capacity for the Harris Brook corridor which is floodprone where it crosses Routes 82 and 85 in the center of town.
- ❑ Pursue funding to install floodproofing measures, including elevations, acquisitions, and/or flood walls, to resolve the inundation problem affecting the area behind the "Salem Town Center" strip mall at the southwest corner of Routes 82 and 85 is in the SFHA of Harris Brook.
- ❑ Pursue funding to elevate the bridges and/or increase the culvert capacity of Witch Meadow Road off Route 85 to the north of town center.
- ❑ Pursue funding to elevate the bridges and/or increase the culvert capacity of the intersection of Darling Road and White Birch Road at a tributary of the East Branch Eightmile River. This recommendation remains from the 2005 Hazard Mitigation Plan Annex.
- ❑ Work with the CT DOT to either elevate the existing bridge and/or increase the culvert capacity of Route 82 at the East Branch Eightmile River.
- ❑ Pursue funding to elevate Rattlesnake Ledge Road near Whittlesey Swamp where beavers have historically contributed to flooding.

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

Prevention

- ❑ Encourage Connecticut Light & Power to also cut down trees as opposed to just trimming trees near power lines.
- ❑ Continue to perform appropriate tree maintenance to the greatest extent possible.

Property Protection

- ❑ Salem and CL&P need to improve communications to prevent a long and extended outage such as Salem experienced following Tropical Storm Irene in 2011.
- ❑ Promote the use of functional shutters for older buildings in the town to guard against window breakage which can result in structural failure.

- ❑ The Building Official should make information on wind-resistant construction techniques (such as hurricane straps) available to all building permit applicants.
- ❑ Encourage commercial building owners to develop Emergency Response Plans and identify mitigation opportunities.

Emergency Services

- ❑ Identify a location or locations in the town for a brush disposal operation for dealing with debris after wind storms. Determine how these trees can be reused within the town (chips, firewood, composting) to reduce costs of exporting.
- ❑ Consider surveying all town-owned buildings to determine their ability to withstand wind loading, particularly shelters and schools. Such effort could be included in the regional critical facility study described in Section 2.8.
- ❑ Develop agreements, if necessary, with land owners and with companies to chop/chip in order to ensure that plans are in place prior to damage and cleanup needs (as is done for snow plow operations).

Public Education and Awareness

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

11.1.4 Recommendations Exclusively Applicable to Winter Storms

- ❑ Consider drafting a written plan for inspecting and prioritizing the removal of snow from town-owned structures.
- ❑ Continue making funding available to the Public Works Department each budget year for clearing snow from roads and parking lots.
- ❑ Provide information for generally protecting town residents during cold weather and for mitigating icing and insulating pipes at residences.
- ❑ Consider posting the snow plowing routes in Town Hall and on Salem's web site such that residents and business owners may better understand their risks during winter travel.
- ❑ Continue to identify areas that are difficult to access during winter storm events and develop contingency plans for emergency personnel.

11.1.5 Recommendations Applicable to Earthquakes

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

- ❑ Consider preventing residential development in areas prone to collapse such as below steep slopes or in areas underlain by stratified drift and prone to liquefaction.

11.1.6 Recommendations Applicable to Wildfires

- ❑ Continue to evaluate dry hydrants, fire ponds, and areas at risk of wildfire in the town if or when they develop.
- ❑ Pursue funding to purchase a new tanker truck which is figured to cost approximately \$490,000.
- ❑ Continue to support public outreach programs to increase awareness of forest fire danger, equipment usage, and protecting homes from wildfires. Educational materials should be made available at the Town Hall.
- ❑ Ensure that provisions of town regulations regarding fire protection facilities and infrastructure are being enforced.

11.1.7 Recommendations Applicable to Dam Failure

- ❑ Work with the CT DEEP to provide assistance to the approximately 17 owners of low-ranking dams (Classes BB, A, AA and unranked) regarding resources available for inspections and maintenance.

11.2 Prioritization of Specific Recommendations

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

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

Implementation of Current Recommendations	Existing or New Recommendation?	Responsible Department ¹	Schedule	Cost ²	Potential Funding Source ³	Weighted STAPLEE Criteria ⁴														Total STAPLEE Score								
						Benefits							Costs															
						Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	STAPLEE Subtotal	Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)		Environmental	STAPLEE Subtotal						
Public Education and Awareness																												
Conduct a "Natural Hazards Fair" and consider working different "Hazard Weeks" into the town's public education program	New	FS, FC	2012-2017	Moderate	OB	1	1	0.5	0.5	1	1					7.0			-0.5	-0.5					-1.0	6.0		
Visit schools and educate children about the risks of flooding and how to prepare	New	FC	2012-2017	Low	OB	1	1	1	1	1	1					8.0										0.0	8.0	
Encourage builders, developers, and architects to become familiar with NFIP land use and building standards at annual workshops	New	PL, PLO	2012-2017	Low	OB	1	1	1	1	1	1					8.0			-0.5							-0.5	7.5	
Natural Resource Protection																												
Pursue the acquisition of additional municipal open space in SFHAs	New	BS	2012-2017	High	OB	1	1	1	1	1	1	1	1	1	1	9.0									-1	-2.0	7.0	
Continue to aggressively pursue wetlands protection and incorporate performance standards into subdivision reviews	New	PZ	2012-2017	Low	OB	1	1	1	1	1	1	1	1	1	9.0	-0.5		-0.5								-1.0	8.0	
Structural Projects																												
Utilize the recently available extreme rainfall data to determine existing culvert sizing and encourage upgrades where undersized	New	PW	2012-2017	Moderate	CI	0.5	1	1	0.5	1	1					7.0									-1	-2.0	5.0	
Continue to perform catch basin and culvert surveys to prioritize upgrades and perform maintenance and cleaning	Existing	PW	2012-2017	Moderate	OB	1	1	1	1	1	0.5	0.5				7.5										0.0	7.5	
Work with the CT DOT to elevate the bridge and/or increase the culvert capacity for the Harris Brook corridor at the Route 82/85 crossing	New	PW, FS	2012-2017	High	CI	1	1	1	1	1	1					8.0			-0.5						-0.5	-2.0	6.0	
Pursue funding to install floodproofing measures, including elevations acquisitions, and/or flood walls behind the Salem Town Center strip mall	New	PW, FS	2012-2017	High	CI	1	1	1	1	1	1					8.0			-0.5						-0.5	-2.0	6.0	
Pursue funding to elevate the bridges and/or increase the culvert capacity of Witch Meadow Road off Route 85	New	PW, FS	2012-2017	High	CI	1	1	1	1	1	1					8.0			-0.5						-0.5	-2.0	6.0	
Pursue funding to elevate the bridges and/or increase the culvert capacity of the intersection of Darling Road and White Birch Road	New	PW, FS	2012-2017	High	CI	1	1	1	1	1	1					8.0			-0.5						-0.5	-2.0	6.0	
Work with the CT DOT to either elevate the existing bridge and/or increase the culvert capacity of Route 82 at the E. Branch Eightmile River	New	PW, FS	2012-2017	High	CI	1	1	1	1	1	1					8.0			-0.5						-0.5	-2.0	6.0	
Pursue funding to elevate Rattlesnake Ledge Road near Whittlesey Swamp where beavers have historically contributed to flooding	New	PW, FS	2012-2017	High	CI	1	1	1	1	1	1					8.0			-0.5						-0.5	-2.0	6.0	
WIND DAMAGE FROM HURRICANES, TROPICAL STORMS, SUMMER STORMS, TORNADOES, AND WINTER STORMS																												
Prevention																												
Encourage CL&P to also cut down trees as opposed to just trimming trees near their power lines	New	FS	2012-2017	Minimal	OB	1	1	1	1	1	1	1	1	1	9.0											-0.5	-0.5	8.5
Continue to perform appropriate tree maintenance to the greatest extent possible	Existing	PW	2012-2017	Minimal	OB	1	1	1	1	1	1	1	1	9.0												-0.5	-0.5	8.5
Property Protection																												
Improve communications to prevent a future long, extended outage such as the one experienced following Tropical Storm Irene	New	FS, FC	2012-2016	Minimal	OB, CI	1	0.5	1	1	1	0.5					6.0										0.0	6.0	
Promote the use of functional shutters for older buildings in the town and investigate funding sources	New	BD	2012-2017	Minimal	OB, CI	1	0.5	1	1	1	0.5					6.0										0.0	6.0	
Make information on wind-resistant construction techniques available to all building permit applicants	New	BD	2012-2017	Low	OB	1	1	1	1	1	1					8.0										0.0	8.0	
Encourage commercial building owners to develop emergency response plans and identify mitigation opportunities	New	PL, FC	2012-2017	Low	OB	1	1	1	1	1	1					8.0										0.0	8.0	
Emergency Services																												
Identify a location for a brush disposal operation for dealing with debris following wind storms and determine potential reuse	New	PW	2012-2017	Minimal	CI	0.5	1	1	1	1	1					7.5										0.0	7.5	
Consider surveying all town-owned buildings to determine their ability to withstand wind loading giving priority to the oldest buildings	New	BD	2012-2017	Low	OB	1	0.5	1	0.5	1	0.5					5.5										0.0	5.5	
Develop agreements with landowners and companies to chop/chip to ensure backup plans are in place for debris removal	New	PW, FS	2012-2017	Low	OB	0.5	0.5	1	0.5	1	0.5					5.0										0.0	5.0	
Public Education and Awareness																												
Visit schools and educate children about the risks of wind events and how to prepare for them	New	FC	2012-2017	Low	OB	1	1	1	1	1	0.5					7.0										0.0	7.0	
WINTER STORMS																												
Consider drafting a written plan for inspecting and prioritizing the removal of snow from town-owned structures	New	PL, FS	2012-2017	Low	OB	0.5	1	1	1	1	0.5					6.5										0.0	6.5	
Continue making funding available to the Public Works Department each year for clearing snow from roads and parking lots	New	BS	2012-2017	High	OB	1	1	1	1	1	0.5					7.0										0.0	7.0	
Provide information for protecting Town residents during cold weather and for mitigating icing and insulating pipes at residences	New	BD	2012-2017	Low	OB	1	1	1	1	1	1					8.0										0.0	8.0	
Consider posting snow plow routes in Town Hall and on the town's web site so residents and businesses better understand procedures	New	PL, PW	2012-2017	Moderate	OB	1	1	1	0.5	0.5	1					7.0			-0.5						-1	-2.5	4.5	
Continue to identify areas that are difficult to access during winter storm events and develop contingency plans to access such areas	New	FC, PW	2012-2017	Minimal	OB	1	1	1	1	1	1					8.0										0.0	8.0	
EARTHQUAKES																												
Ensure that town departments have adequate backup supplies and facilities for continued functionality following an earthquake	New	BS	2012-2017	Moderate	OB, CI		0.5	1	0.5	0.5					3.0			-0.5								-2.0	1.0	
Consider preventing residential development in areas prone to collapse such as below steep slopes or areas prone to liquefaction	New	PZC	2012-2017	Minimal	OB	0.5	1	1	0.5	0.5	1	0.5			7.0											-0.5	6.5	

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

Implementation of Current Recommendations	Existing or New Recommendation?	Responsible Department ¹	Schedule	Cost ²	Potential Funding Source ³	Weighted STAPLEE Criteria ⁴												Total STAPLEE Score
						Benefits						Costs						
						Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	STAPLEE Subtotal	Social	Technical (x2)	Administrative	Political	
WILDFIRES																		
Continue to evaluate fire flows, available water supply, and areas at risk of wildfire in the town if/when they develop	New	FC	2012-2017	Minimal	OB	1	1	1	1	1	1	0.5	8.5				0.0	8.5
Pursue funding to purchase a new tanker truck which is figured to cost the town approximately \$490,000	New	FC	2012-2017	High	OB, CI	1	0.5	1	1	1	0.5		6.0				0.0	6.0
Continue to support public outreach programs to increase awareness of forest fire danger, equipment usage, and protecting homes	New	FC	2012-2017	Low	OB	1	1	1	1	1	0.5	1	8.0				0.0	8.0
Ensure that provisions of town regulations regarding fire protection facilities and infrastructure are being enforced	New	PD	2012-2017	Low	OB	0.5	0.5	1	0.5	1	0.5		5.0				0.0	5.0
DAM FAILURE																		
Provide assistance to the owners of lesser ranked dams regarding resources available for inspections and maintenance	New	PL	2012-2017	Minimal	OB	0.5	0.5	0.5	0.5	1		0.5	4.0				0.0	4.0

NOTES

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

APPENDIX A
ADOPTION RESOLUTION

TOWN OF SALEM HAZARD MITIGATION PLAN UPDATE

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

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

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedures for Salem;

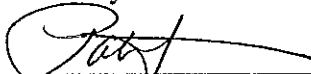
WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact Salem, with the effect of protecting people and property from loss associated with those hazards;

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

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

1. The Plan is hereby adopted as an official plan of the Town of Salem;
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 by October 1 of each calendar year.

PASSED by the Board of Selectmen this 5th day of Feb (month) 2013 (year).


(Signature Blocks as Required)
Patricia J. Crisanti
Salem Town Clerk

