

# **HAZARD MITIGATION PLAN UPDATE ANNEX FOR THE TOWN OF COLCHESTER**

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

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**MMI #3570-05**



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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 on the Town of Colchester. 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 Colchester 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. Colchester, 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

Colchester is a suburban town of approximately 50 square miles that lies in the northwest corner of New London County and is bordered by the Towns of Lebanon and Bozrah to the east, the Towns of Salem and East Haddam to the south, the Town of East Hampton to the west, and the Towns of Marlborough and Hebron to the north. Colchester is located approximately 25 miles southeast of Hartford, the Connecticut State capital. The Town of Colchester includes the villages of Westchester and North Westchester as well as the Colchester Village historic center.

The most significant surface water bodies in Colchester include the Blackledge River, Salmon River, Deep River, Jeremy River, Meadow Brook, Judd Brook, Deep River Reservoir, and Babcock Pond. In total, there are 16 sub-regional drainage basins in Colchester.

The major transportation routes through town includes Route 2 which extends from the town line with Marlborough in northwest Colchester to the town line with Lebanon in southeast Colchester, Route 11 which extends from central Colchester south into Salem, and Route 16 which runs east-west through the central portion of town from Lebanon in the east to East Hampton in the west. Other important roadways include Routes 149, 85 and 354 enter Colchester from the southern town line with East Haddam (Route 149) and Salem (Routes 85 and 354) and extend northward toward the northern town line with Hebron.

### 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's Office, the Emergency Management Director or the Fire Department (the Colchester Hayward 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 Emergency Management Director, Town Planner, Building Official and Director of Public Works 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 Colchester and that should be addressed in the update.
- ❑ The draft that is sent for State review will be posted on the Town of Colchester's website (<http://www.colchesterct.gov/pages/index>) as well as the SCCOG website ([www.seccog.org](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 Colchester will be coordinated by SCCOG and the Emergency Management Director. The HMP update must be adopted within one year of conditional approval by FEMA, or Colchester will need to update the HMP and resubmit it to FEMA for review. The adoption resolution is located in Appendix A of this annex.

#### **1.4 Progress Monitoring**

Following adoption, the Emergency Management Director will continue to administer and be the local coordinator of this HMP (as the Emergency Management Director has since 2005) under the authority of the Colchester Board of Selectmen. The Emergency Management Director will coordinate with responsible departments as listed in Table 11-1 and ensure that the recommendations of this HMP are considered or enacted. Refer to Section 1.8 of the Multi-Jurisdictional HMP for a description of how the local coordinator will perform progress monitoring. The majority of recommendations in this annex can be accomplished within or with only a slight increase in the operating budgets of the various departments. Projects that require capital improvements or additional funding will need to be approved by the Board of Finance and 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. Colchester will continue to encourage town residents to contact the Emergency Management Director, with concerns related to natural hazards or emergency response via the town's website.

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

Colchester 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 Emergency Management Director and 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**

Colchester is a suburban town located at the northwestern edge of the SCCOG planning area. Elevations range from approximately 650 feet along Bush Rock Road in the northeast section of Colchester to approximately 75 feet along the Salmon River near the intersection of Comstock Bridge Road and Route 16/Colchester Avenue at the town line with East Hampton. The most densely populated area of town is the Colchester Village Historic District which lies north of the Route 2 and Route 11 intersection in central Colchester where there are residential, commercial and industrial land uses. This area was once an incorporated borough and is listed on the National Register of Historic Places. Much of central Colchester is developed along with a significant amount of land along Route 149 in western Colchester.

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 Colchester. Dominated by Brimfield Schist, which covers approximately 76% of town stretching across central Colchester, the Town is also covered by two additional bedrock formations: Buttress Dolerite and Hebron Gneiss. Hebron Gneiss covers approximately 24% of outer Colchester with less than 1% covered by buttress Dolerite. There is no defined geographic orientation to the bedrock formations or geologic contacts in town.

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. Till contains an unsorted mixture of clay, silt, sand, gravel, and boulders deposited by glaciers as a ground moraine. Areas associated with the majority of major watercourses and waterbodies mentioned in Section 1.2 include fairly extensive areas underlain by stratified drift in Town. 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**

The Town of Colchester was incorporated in 1698 when land was purchased by Nathaniel Foote from the Sachem of the Mohegan Native American Tribe. Mr. Foote's grandfather had emigrated from Colchester, England, in the early 17<sup>th</sup> century and Colchester, England was what a group of early English settlers envisioned America to become by laying out a new plantation in a large tract of untouched wilderness. Colchester grew from a church parish-centralized community in its beginnings to a mill community before it was industrialized and then suburbanized once the commercial cities of Middletown, Norwich and New London emerged. Today, it still maintains the suburban character with some commercial and industrial land use, while largely existing as a residential community.

The suburban town is known for its principal industries of agriculture and manufacture of leather novelties, plastics, machine shops, and metal fabrication. Colchester also has a private airport called Skis Landing Area, which is generally used by small private planes and a heliport at Hub Ford.

Babcock Wildlife Management Area and Salmon River State Forest are located in Colchester near the western and southwestern corporate boundaries. These areas are open to the public for hiking and picnics.

According to the "Town of Colchester Open Space Plan" (Adopted October, 2006), Colchester has achieved approximately 6,500 acres or 20% open space protection thus far. According to the "2006 Land Cover by Area" data developed by the University of Connecticut's Center for Land Use Education and Research, Colchester is dominated by deciduous forest with approximately 59% or approximately 18,850 acres classified as such. The same data includes only approximately 14% (approximately 4,430 acres) classified as "developed" land use. The remaining approximately 27% of land cover in Colchester accounts for undeveloped land including areas of steep slopes, water, wetlands, protected open space, and the like that prohibit the land from being developed.

A number of developments have been recently completed, approved, or are underway. Colchester attempts to steer most new development in or adjacent to the Town Center. The Route 11/Route 2 area is the most important and immediate area of planned development in Colchester with water and sewer being extended into this area to promote development. A 20,000 square foot building and storage area for a tractor supply company is to be constructed in this area. Additionally, a large area of retail development was approved just to the east of the Route 11/Route 2 area on the southern side of Route 2. Although this area has not been developed to date, it may be developed in the near future in accordance with the Town's desire for economic development. SFHAs are not associated with the Route 11/Route 2 area.

Other smaller areas of development include a karate studio being constructed this year and a project known as "Settlers Green" which is locally approved with commercial uses adjacent to a SFHA. A large parcel adjacent to Settlers Green is potentially developable, while another project called "White Oak Farm" is approved for 134 one-acre lots at 520 Lebanon Avenue. The White Oak Farm development is largely incomplete, although 14 lots are built and occupied. "North Woods", another development, is under construction and includes 134 units of active adult age-restricted (over 55 years of age) housing at 351 Lebanon Avenue. Additionally, a 30-unit development adjacent to North Woods is approved and several smaller subdivisions are under construction.

It is likely that Colchester will continue to undergo development in the future and maintain its suburban nature, with a considerable amount of industrial and commercial development. The housing stock in Colchester consists primarily of single family homes. The Plan of Conservation and Development (POCD) (2001) Update encourages low and moderate income housing development and the use of cluster development to the extent consistent with soil types, terrain and infrastructure capacity.

### **2.3 Drainage Basins, Hydrology, and Geology**

As mentioned in Section 1.2, the most significant watercourses in Colchester includes the Salmon River which begins following the convergence of the significant tributaries of Jeremy Brook and Blackledge Brook in northwestern Colchester and continues into the Town of East Hampton; the Deep River which begins in southeastern Colchester near Route 354 and flows southerly toward the Town of Salem and ultimately to the Yantic River; and Sherman Brook which begins in east-

central Colchester north of Route 2 and flows north of Route 2 easterly into the Town of Lebanon towards the Yantic River. Altogether, there are approximately 23 named watercourses and many unnamed small tributaries in Colchester.

There are a total of 16 subregional watershed basins in Colchester including Bartlett Brook, Blackledge River, Deep River, Dickinson Creek, East Branch Eightmile River, Eightmile River, Gardner Brook, Jeremy River, Judd Brook, Meadow Brook, Moodus River, Pine Brook, Raymond Brook, Salmon River, Sherman Brook, and Yantic River. Three subregional drainage basins account for approximately 50% of Colchester's land cover; these are the Meadow Brook, Sherman Brook, and Deep River subregional drainage basins. Meadow Brook covers the majority of land cover in the town, accounting for approximately 7,119 acres or approximately 22% of Town land stretching from southeast to northwest across the central portion of Colchester. Sherman Brook accounts for the second largest amount of land cover 15% (4,765 acres) covering most of the northeastern portion, along the town line with the Town of Lebanon. Thirdly, Deep River accounts for 13% (4,181 acres) of Colchester's land cover including the majority of the southeastern portion of Town stretching from the town line with Town of Lebanon westerly approximately to Route 85 including a majority of the land cover between Route 2 southerly to the town line with the Town of Salem.

The most significant surface water impoundment in Colchester is the Deep River Reservoir which is located in the southeast corner of Colchester and stretches from near the town line with the Town of Lebanon southwest to Route 354 near the town line with Salem.

## **2.4 Governmental Structure**

Colchester 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 Colchester.

The Town of Colchester has boards, commissions, and committees that can take an active role in hazard mitigation, including the Conservation Commission (includes Wetlands), the Planning and Zoning Commission, the Police Commission, the Building Committee, the Open Space Advisory Committee, the Economic Development Commission, 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 the Town of Colchester is noted below:

- ❑ The Colchester Hayward Fire Department (CHFD) is a combination of career and volunteer fire fighters who protect lives and property from fire and hazardous incident damage and provides timely emergency medical services to the Town of Colchester and other neighboring municipalities.
- ❑ The Building Official is responsible for enforcing building, electrical, mechanical, plumbing, and energy code requirements to promote the safety for the people of Colchester by reviewing and administering the State of Connecticut Building Code.

- ❑ The Planning and Zoning Commission is the body that regulates land use and development in Colchester mainly through application of the Zoning Code.
- ❑ The Building Committee is charged with overseeing, coordinating and supervising all aspects of the planning and construction process, including selection of an architect and other consultants, choice of contractor, development of project documents and supervision of construction through completion and final acceptance by the Town.
- ❑ The Conservation Commissions responsibilities include the maintenance and update of the Town's Inland Wetlands and Watercourses Regulations, Wetlands Map and the Town's Open Space Plan.
- ❑ The Police Commission is a five-member Commission appointed by the Board of Selectmen which has the authority and responsibility for the general supervision and management of the police officers within Colchester and the property and equipment used.

The roles of Town departments have not changed since the time of the previous HMP. Thus, the Town of Colchester 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**

Colchester 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, POCD (2001), Open Space Plan (2006), Zoning Regulations (2010), Subdivision Regulations, Town Code (2010), and Inland Wetlands and Watercourse Regulations (2009). The Zoning Regulations and Subdivision Regulations were amended to June 1, 2010 and incorporate some of the NFIP requirements associated with the DFIRM available in 2011.

### 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 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 (2001)

The POCD was last updated in 2001 and includes contributions from local boards, commissions, committees, citizens and citizen groups. The purpose of the Plan is to provide a tool for the future of the community via addressing the social and economic development of Colchester. The Plan discusses the potential impacts of natural hazards including flooding and considers natural features such as steep slopes (those exceeding 15%) that could restrict development.

## Code of the Town of Colchester, Connecticut

Chapter 64 of the Town Code includes "Flood Hazard Areas" which includes discussion of policies, permit requirements and application procedures related to land use and development in SFHAs within Colchester consistent with the NFIP. The document also states that the SFHAs are those areas designated from the Town and Borough of Colchester Flood Insurance Rate Maps (FIRM) and the Flood Boundary and Floodway Maps dated July 15, 1992 on file in the office of the Town Clerk and with the Building Official.

## Zoning and Subdivision Regulations (2010)

Section 7 of the Zoning Regulations, "Flood Hazard Overlay Districts," discusses SFHAs in Colchester. The Subdivision Regulations discuss the standards in the flood plain district in Section 6.6. Although regulations within both documents include components of the current NFIP regulations, they are based on the FIRM dated July 15, 1992 and should be updated to the DFIRM mapping of July 18, 2011.

## Inland Wetlands and Watercourses Regulations (2009)

The Inland Wetlands and Watercourses Regulations in the Town of Colchester 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**

Colchester 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 SFHA. These facilities are described in more detail below.

### Colchester Hayward Fire Department (Companies 1 & 2)

Colchester has two fire companies (Companies 1 and 2) which are staffed by both voluntary and professional firefighters. Both fire companies work together to serve Colchester and provide support to neighboring municipalities with fire suppression, emergency response and rescue. The two fire company buildings are outfitted with standby power supply sources via generators and neither is located in a SFHA. As for professional services, the Fire Department employs eight full-time firefighters and two weekend part time Emergency Medical Technicians (EMT).

### Jack Jackter Elementary School and Bacon Academy

Jack Jackter Elementary School is both the Town's EOC and the Town's back-up shelter. The Town's main shelter is Bacon Academy which houses a 500 kW generator and is American Red Cross (ARC)-certified with a capacity of 450 persons. Jack Jackter Elementary School houses the essential equipment needed for the Town's EOC operation and can hold 350 persons as a backup shelter.

**TABLE 2-1  
Critical Facilities**

Facility	Address or Location(s)	Emergency Power?	Shelter?	In SFHA?
<b><i>Emergency Services</i></b>				
Colchester Hayward Fire Dept. Co. 1 & 2	52 Old Hartford Rd. / 424 Westchester Rd.	✓		
Colchester Police Department	127 Norwich Avenue	✓		
<b><i>Municipal</i></b>				
Town Hall	127 Norwich Avenue	✓		
Jack Jackter Elementary School*	362 Halls Hill Road	✓	✓	
Bacon Academy	611 Norwich Avenue	✓	✓	
Public Works Garage	300 Old Hartford Road	✓		
Cabin Road Wellfield WTP	140 Taintor Hill Road	✓		
Cabin Road Wellfield (Wells 3 and 5)	140 Taintor Hill Road	✓		✓
Judd Brook Wellfield (Well 4)	183 Lebanon Avenue	✓		✓
Elmwood water pump station	550 Elmwood Heights	✓		
Highland Farm water tank	36 Highland Circle			
Prospect Hill Sewer P.S.	31 Prospect Hill Road	✓		
<b><i>Nursing Homes, Senior Living and other Vulnerable Housing Developments</i></b>				
Apple Rehab Center	36 Broadway Street	✓		
Colchester Commons Mobile Home Park	Lebanon Avenue			
Dublin Village	300 Lebanon Avenue			
Gan Aden	385 South Main Street			
Gan Aden Chestnut	28 Chestnut Hill Road			
Gan Aden Field	564 Norwich Avenue			
Gan Aden Too	564 Norwich Avenue			
Genesis Elder Care	59 Harrington Court	✓		
Ponemah Village	283 Westchester Road			
Westchester Village Mobile Home Park	Shailor Hill Road			
<b><i>Communications Infrastructure</i></b>				
State Communication Tower	95 O'Connell Rd	✓		
State Communication Tower	11 Munn Rd. (Windham Ave.)	✓		
<b><i>Health Care Facilities</i></b>				
Backus Health Care	151 Broadway Street			

\*Emergency Operations Center (EOC)

### Town Hall

Colchester's Town Hall houses many important offices and departments critical to hazard mitigation planning including the Police Department, the First Selectman's Office, the Building Department and the office of the Emergency Management Director. The facility is also outfitted with a generator.

## Communications

The Town includes the two state communication towers on 95 O'Connell Road and 11 Munn Road in its list of critical facilities. Additionally, the KX Dispatch (Connecticut State Police Troop K) is located in Colchester and links into dispatch services with other neighboring municipalities including Hebron, Salem, East Haddam, East Hampton, Haddam Neck, Marlborough, and Bozrah.

Colchester's communication with its residents, visitors, and businesses and its communications with outside emergency preparedness and response groups is adequate. The town employs the CT Alert "Everbridge" Emergency Notification System for Reverse 9-1-1 and encourages its residents to sign up for the service via the CT Alert Emergency Notification System web site (<http://www.ct.gov/ctalert/site/default.asp>).

During Tropical Storm Irene, communication with Connecticut Light & Power (CL&P) was pursued by the Town, however CL&P's response was considered less than adequate. The outage following Tropical Storm Irene lasted seven to nine days in Colchester and trees blocked many roadways deeming both state and municipal roadways impassible and many wires were downed. Colchester seeks to improve communication with CL&P moving forward in an effort to prevent a prolonged outage such as the one following Tropical Storm Irene.

## Additional Municipal Facilities

The Public Works Garage is houses the equipment, materials and staff needed to respond to natural hazard damage. The garage is located to the west of Town Center near Route 2 on Old Hartford Road. The Town also considers its water and wastewater infrastructure to be critical facilities. Water and wastewater infrastructure includes Water Treatment Facility at 140 Taintor Hill Road, the Cabin Road Wellfield located adjacent to the treatment facility, the 31 Prospect Hill Road sewer pump station, the water booster station at 550 Elmwood Heights, the Highland Farm Water Tank at 36 Highland Circle, and Well No. 4 at 183 Lebanon Avenue.

## Private Facilities

The town considers some types of private facilities within its list of critical facilities. This list consists of eight nursing homes / senior living facilities and two mobile home parks.

## Evacuation Routes

Colchester's EOP describes the Town's evacuation plans. The Emergency Management Director 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 Emergency Management Director is responsible for maintaining up-to-date evacuation route maps that depict designated primary and alternate evacuation routes.

The highest capacity egress routes from Colchester include:

- ❑ Route 2, which is oriented east-west and runs from Lebanon to Marlborough across the center of Colchester,
- ❑ Route 16, which is oriented northeast-southwest and also enters Colchester from Lebanon to the east, but exits into East Hampton in the west,
- ❑ Route 11 which runs from Route 2 just south of the center of Colchester southerly to Salem, and
- ❑ Route 85 which extends from the Salem town line northerly through the Town Center and continues north into Hebron.

## 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 the Town'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 surveys are completed annually by the Public Works Department. Replacement and maintenance is performed on the town's drainage system as funding allows on an annual basis. *This recommendation will not be pursued further.*
- ❑ Evaluate the Hazard Resistant Nature of the Propane Supply – Town officials previously expressed concern with the possible release of materials the area of a privately owned propane supply facility. There are multiple propane tanks on site. The privately-owned tanks are in the center of Colchester and are near schools, shopping centers, and elderly housing. Town officials were concerned with the safety of the surrounding community and previously expressed an interest in developing a risk analysis and emergency plan for this area. The supply is not believed to be more or less susceptible to natural hazards than any other municipally-owned facility or piece of infrastructure in Colchester. *This recommendation has been modified to urge the development of emergency procedures for the facility.*
- ❑ Evaluate the Hazard Resistant Nature of Critical Facilities – This is ongoing as part of Colchester'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. Colchester is a member of the CT Alert "Everbridge" Emergency Notification System for Reverse 9-1-1 capabilities and actively encourages its citizens and businesses to sign up for the service via the Everbridge and Town web sites. *This recommendation remains valid but has been deferred to the EOP update.*
- ❑ Develop a Flood Audit Program – At present, the town suffers mainly from nuisance flooding. Colchester 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. Colchester had access issues during Tropical Storm 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. The town has access to CERRIT, the regional hazardous response team. *This recommendation is not pursued further.*
- ❑ Repair the Wooden Bridge at Savin's Pond to Make it Flood Resistant –The location called "Savin's Pond" in the previous HMP Annex is incorrectly named and should have been identified as "Caverly Mill Road." The road was cut off by Route 2 and is a dead-end road with two homes at the terminus that are accessed by a wooden bridge. During floods, the houses cannot be accessed safely. The Town prefers to formally abandon the road and convert it into a driveway. This recommendation is included in Section 11. Current practice to notify the two families to evacuate before significant storms will continue, but the roadway would no longer be owned by the Town. *With the clarifications described herein, this recommendation remains valid and the Town shall pursue a reasonable and safe resolution.*
- ❑ Implement a Reverse 9-1-1 System to Automatically Call Telephones Throughout Town, Relaying Important Information During an Emergency – The town has joined 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 is not pursued further.*
- ❑ Improve Hydraulics of the Route 616 Bridge – Just over the town line in Lebanon, the bridge on Route 616 reportedly floods periodically. Flooding of this roadway effectively cuts off access between Colchester and Lebanon, restricting the ability for the towns to assist one another with mutual aid during emergencies. Colchester officials no longer believe that this problem needs to be addressed, as Route 2 provides the needed access. *This recommendation has not been continued to this update.*
- ❑ 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. The Town visits 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 town'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 town 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. The town 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 town buildings 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. The town 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 some 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 the Town of Colchester.

The March 2010 storms produced the most widespread flooding in Colchester since the last HMP, causing basement flooding, roadway flooding, and nuisance flooding. However, the areas impacted by the March 2010 storms are not typically impacted by floodwaters. Following the basement flooding of March 2010, the Town submitted reimbursement requests to FEMA, but was not reimbursed.

### **3.2 Existing Programs, Policies, and Regulations**

The town attempts to mitigate inland flood damage and flood hazards by utilizing a wide range of measures including restricting activities in floodprone areas, placing riprap in locations currently experiencing bridge scour, promoting flood insurance, maintaining drainage systems, providing education and outreach, and by utilizing the reverse 9-1-1 warning system. 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 Colchester, although some 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 Meadow Brook Bridge at Route 16 was replaced since the previous Annex and has thus far been a successful mitigation project.

As explained in Section 2.7 above, the location named "Savin's Pond" in the previous Annex is not actually Savin's Pond, but rather Caverly Mill Road which was disconnected when Route 2 was developed and is now a dead-end road. The two homes at the terminus of the road are accessed via a wooden bridge and during floods the homes cannot be accessed safely. Colchester wishes to formally abandon the roadway, thereby converting it into a public driveway. Currently, the town notifies the two families at the end of the roadway prior to significant storms. The Town views the conversion from municipal roadway to a private driveway as a form of mitigation, as it will cut municipal expenditures to address flooding there.

The previous annex listed the improvement of the Route 616 Bridge/Roadway as a recommendation; however Town Officials indicate that this problem does not need to be further pursued because Route 2 provides a suitable substitute.

### Regulations, Codes, and Ordinances

Colchester has planning and zoning tools in place that incorporate floodplain management. The Town also has Subdivision Regulations that require adequate drainage (Section 6.4) be provided to reduce exposure to flood hazards. Regulations covering development in and/or near inland wetland areas also exist within the Inland Wetlands and Watercourses Regulations.

### Acquisitions, Elevations, and Property Protection

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

### Flood Watches and Warnings

The First Selectman and the Fire Companies access weather reports through the National Weather Service and local media. Colchester also participates in the CT Alerts "Everbridge" Emergency Alerting and Notification Reverse 9-1-1 System and actively recruits its residents and businesses to enroll in the service. As a result, Colchester has the capability to telephone warnings into specific areas of Town. Use of this service allows the town the ability to receive geographically specific weather warnings when storms are imminent.

## **3.3 Vulnerabilities and Risk Assessment**

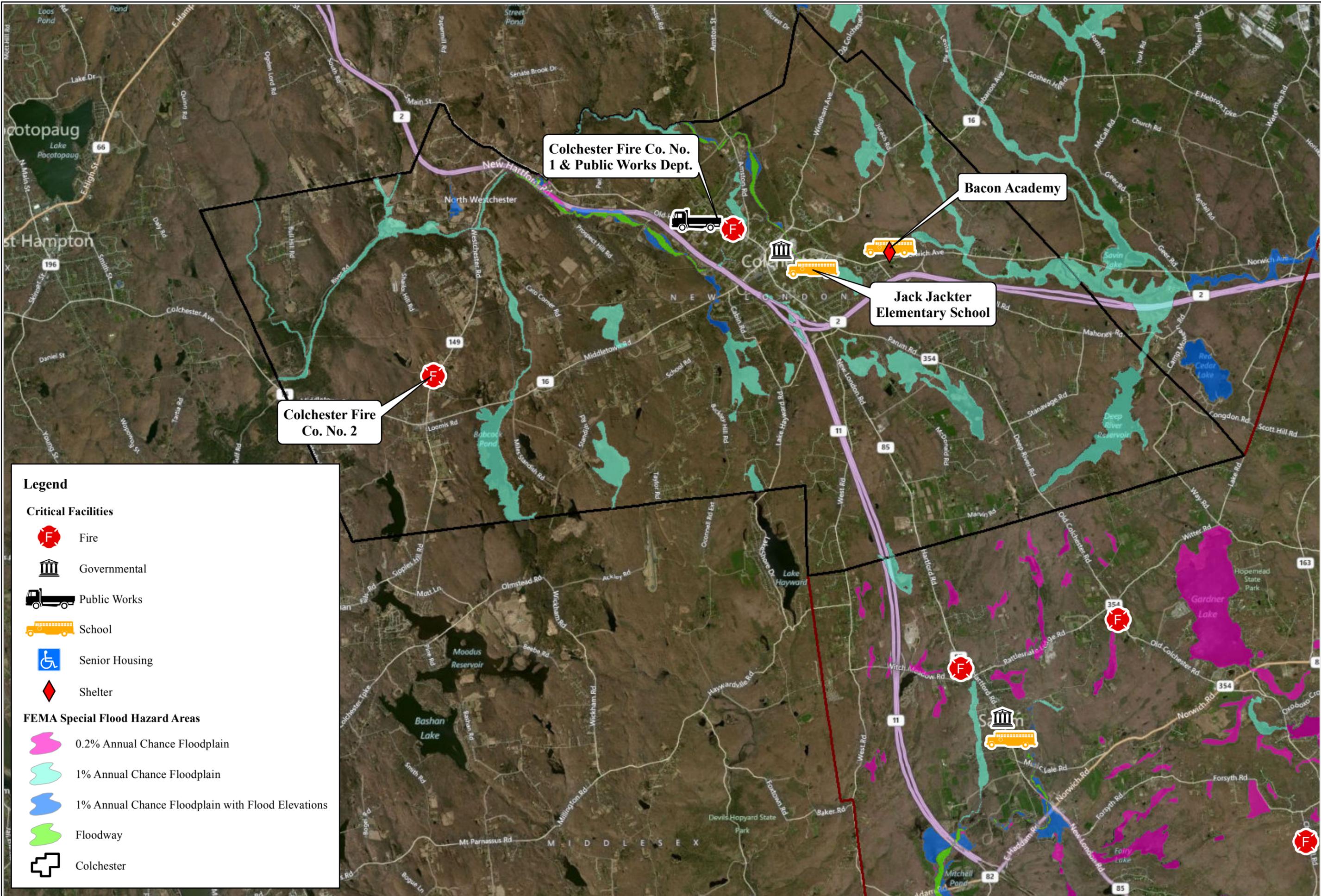
This section discusses specific areas at risk to inland flooding within Colchester.

### **3.3.1 Vulnerability Analysis of Areas along Watercourses**

Parts of Dickinson Creek, the Salmon River, the Blackledge River, the Jeremy River, Meadow Brook, Pine Brook and Babcock Pond, Gillette Brook, Day Meadow Brook, Judd Brook, Governor Brook, Nelkin Brook, Cabin Brook, Hall Brook, Sherman Brook, Deep River and the Deep River Reservoir, Standish Brook and Witch Meadow Brook are associated with a SFHA. Sections of the Judd Brook, Day Meadow Brook and Meadow 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.

The DFIRMs adopted in 2011 revealed two relatively large changes in Colchester: the Boretz Road area and the area adjacent to the Settlers Green residential project described in Section 2.0. A LOMR was reportedly completed for the Settlers Green project.

Refer to Figure 3-1 for the location of SFHAs within Colchester. There are a few areas of town where flooding is hazardous to residents, buildings, or roadways:



**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
-  Colchester

Colchester Fire Co. No. 1 & Public Works Dept.

Bacon Academy

Jack Jackter Elementary School

Colchester Fire Co. No. 2

Figure 3-1

- ❑ Lakeview Drive at Pickerel Lake suffers from poor drainage and nuisance flooding.
- ❑ An older subdivision in the Town Center experiences frequent basement flooding.
- ❑ A few bridges in Town are currently subject to ongoing scour.
- ❑ Two homes on Caverly Mill Road are subject to unsafe access conditions during significant floods. The wooden bridge remains serviceable, however, it becomes impassable.

The DFIRM mapping suggests that these transportation routes can be negatively affected by extreme flooding:

- ❑ Route 2, which is oriented east-west and runs from Lebanon to Marlborough across the center of Colchester,
- ❑ Route 16, which is oriented northeast-southwest and also enters Colchester from Lebanon to the east, but exits into East Hampton in the west,
- ❑ Route 11 which runs from Route 2 just south of the center of Colchester southerly to Salem, and
- ❑ Route 85 which extends from the Salem town line northerly through the Town Center and continues north into Hebron.

The DFIRM mapping shows FEMA flood zones stretching across all major roadways. According to town officials, the most problematic areas are those bridges that are subject to scour. The town wishes to place riprap in these locations to prevent further scour.

### 3.3.2 Vulnerability Analysis of Private Properties

As noted in Table 3-4 of the Multi-Jurisdictional HMP, a total of 42 structures in Colchester appear to be located in an SFHA floodplain. The majority of these structures are located in and around the Town Center and along Route 2 from the Town Center north towards the Hebron town line. Many of these structures are residential while a few are either commercial or industrial. Thirty-five structures appear to be located within the Zone A floodplain (the SFHA floodplain without flood elevations defined), while the remaining seven 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 Colchester 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. However, the March 2010 rain events caused many basements to flood. The Town submitted reimbursement requests to FEMA, however Colchester was not reimbursed.

### 3.3.3 Vulnerability Analysis of Critical Facilities

As noted in Section 2.6, critical facilities that are structures are not located within SFHAs. The Town's public water supply wells are located in SFHAs but the wellheads are raised above base flood elevations. Therefore, flood risks to critical facilities are low.

### **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 Colchester.

## **4.0 COASTAL FLOODING**

### **4.1 Setting / Historic Record**

Colchester 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 lasted up to seven to nine days in Colchester. The Town learned that communication between the Town and Connecticut Light & Power (CL&P) needs to greatly improve in order to efficiently and effectively clear roadways throughout town in the future.

### **5.2 Existing Programs, Policies, and Mitigation Measures**

Wind loading requirements for new buildings are addressed through the Connecticut Building Code which is utilized by the town. Effective December 31, 2005, the design wind speed for the Colchester is 105 miles per hour. The Town 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 placed underground in new developments; however most electrical lines have historically been installed above ground. Some streetscaping of Lebanon Avenue included the use of solar lighting as opposed to traditional electrical lines.

The Tree Warden has a modest budget to contract tree removal and the Town attempts to coordinate tree removal with CL&P, but as evident with the issues following Tropical Storm Irene, the communication between the Town and CL&P must improve to limit issues to the furthest extent. CL&P trims trees along power lines, however coordination with the Town as to locations and timeframes have historically been non-existent. Following Tropical Storm Irene, many roads, including many State roads were blocked from egress due to downed wires and pieces of trees. The Town attempted to remove these from town roadways and, in some cases, State roadways, however often found they are unable to do so because of delayed response to remove downed wires by CL&P.

The Town's transfer station accepts brush, tree trunks, limbs, and leaves and typically sees an increase in collections following wind storms. This material is reused within Colchester whenever possible. The Town also has agreements with companies to chop/chip following heavy wind events in order to ensure that cleanup occurs as efficiently as possible.

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

In addition, Colchester subscribes to the statewide CT Alert "Everbridge" Reverse 9-1-1 Emergency Notification System which provides residents the ability to register to receive warnings, critical information and area specific alerts.

Although hurricanes that have impacted Colchester 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 to nine 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 Colchester.

### **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 Colchester.

## **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 Colchester. 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 Existing Programs, Policies, and Mitigation Measures**

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

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

### **6.3 Vulnerabilities and Risk Assessment**

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

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 Colchester.

## **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. However, only the winter storms of 2010-2011 had a significant effect on the town during this period of time. The privately-owned Butler Building (which houses construction equipment) in town collapsed during the 2010-2011 winter, and a total of 12 homes were in danger with severe deflection and cracked sheetrock. All town-owned buildings were evaluated and critical roof areas were cleared. The town assisted some residents in clearing roofs with ladder trucks.

Winter Storm Alfred in October 2011 caused tree damage because Colchester received seven inches of wet, heavy snow. Even though the town experienced severe damage following Tropical Storm Irene just months before, some outages lasted five days in Colchester following Alfred. This is another example of why response and communication between CL&P and the Town must improve.

### **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 through deployment of 10 town trucks and four contracted trucks. The crew operates on 14 snow plowing routes. The Connecticut Department of Transportation (DOT) plows the State roadways, while the town prioritizes routes by steepness, proximity to major facilities such as schools and other factors. A high priority is given to school bus routes that include steep hills. Salt is used for deicing in Colchester.

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 and shovels the roofs of municipal buildings when snow loads accumulate, and many residents and businesses shovel or plow their roofs.

### **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 650 feet along Bush Rock Road to approximately 75 feet along the Salmon River, there are many steep slopes and sometimes significant differences in snowfall totals dependent on elevation. This presents the possible situation of wintry weather impacting the highest elevations while the lowest elevations are not impacted.

In general, there are few steep slopes that require extra salting of the roadways in necessary locations to alleviate trouble spots. Town officials did not indicate this to be a major mitigation issue but rather an issue that deserves priority when town staff begins their treatment of roads. These areas are usually treated first by town 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 Colchester. The town has adopted these codes for new construction, and they are enforced by the Zoning Enforcement Officer.

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

### **8.3 Vulnerabilities and Risk Assessment**

Surficial earth materials behave differently in response to seismic activity. Unconsolidated materials such as sand and artificial fill can amplify the shaking associated with an earthquake. As noted in Section 2.1, areas adjacent to the most significant surface water bodies in Colchester including the Blackledge River, Salmon River, Deep River, Jeremy River, Meadow Brook, Judd Brook, Gardner Lake, Deep River Reservoir, and Bobcock Pond and some smaller water bodies 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 the town deems necessary, the possible prohibition of new construction.

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, Colchester 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 another reason to improve communication with CL&P now. The coordinated response is covered in the Colchester 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 Colchester. Structural fires in higher density areas of the town are not directly addressed herein.

According to town officials, Colchester has experienced a few multi-acre burns including a 25 acre burn in the Babcock Wildlife area approximately three years ago. Small fires have historically occurred during dry spring weather in Connecticut.

### **9.2 Existing Programs, Policies, and Mitigation Measures**

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

Existing mitigation for wildland fire control is typically focused on building codes, public education, Fire Department training, and maintaining an adequate supply of equipment. As mentioned above, the two Fire Companies have access to both a Gator ATV and a brush truck.

The Town often recommends a fire pond or dry hydrant for new developments; however, neither is required. Draft subdivision amendments which have yet to be approved have some language regarding fire ponds and dry hydrants, although neither is required for new developments. Between the Gator All terrain Vehicle (ATV) and brush truck available to both Fire Companies, Colchester believes its services are fully capable. The Volunteer Fire Companies will continue to evaluate the level of risk and the need for additional hydrants or fire ponds 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 town officials, the only area that was specifically mentioned as having a significant wildfire in the past is the Babcock Wildlife Area which is described above in Section 9.1. The town feels that the Gator ATV and brush truck are sufficient, along with existing fire ponds and dry hydrants. 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**

The Town of Colchester is generally a 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 Colchester 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 Programs, Policies, and Mitigation Measures

The Connecticut DEEP administers the Dam Safety Section and designates a classification to each state-registered dam based on its potential hazard as detailed in the regional plan. As noted in the Multi-Jurisdictional HMP, the lone high or significant hazard dam in Colchester is the Deep River Reservoir Dam, a Class C (high hazard) dam located near the Lebanon town line (Figure 10-1). Colchester has no Class B (significant hazard) dams within its municipal limits, but according to the "Connecticut Dams" datafile, published in 1996, the list of CT DEEP-registered dams in Colchester included 18 additional dams ranging in classification from BB to unclassified.

### 10.3 Vulnerabilities and Risk Assessment

As mentioned above, the Deep River Reservoir Dam (Class C) is the lone high hazard (Class C) or significant hazard (Class B) dam in Colchester, although 18 additional CT DEEP-registered dams are located within town limits according to the "Connecticut Dams" datafile, published in 1996. Failure of a Class C dam would result in any of the following: loss of life; major damage to habitable structures, residences, hospitals, convalescent homes, schools, and main highways; and a significant economic loss.

The description of the Deep River Reservoir Dam below is based on information available at the Connecticut DEEP Dam Safety Section and in files of Milone & MacBroom, Inc. It is noted that the failure of any of the other dams in Town could also have impacts on human life and property within Colchester, although these are not discussed in detail here in favor of the high hazard class.

- Deep River Reservoir is a Class C dam located at the north end of the reservoir, upstream of the Deep River Water Treatment Plant and Reservoir Avenue. This dam is owned by Norwich Public Utilities, a municipal utility corporation.



**Legend**

**Dam Hazard Classification**

- ◆ BB, A, AA or Unranked
- ◆ B
- ◆ C

**Dam Failure Inundation Area**

- Deep River Reservoir Dam
- Colchester

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**SOURCE(S):**  
 USGS, CT DEEP, Town of Colchester

**Dam Failure Inundation Area Mapping**  
**SCCOG HMP Update**  
**Town of Colchester Annex**

**Colchester, Connecticut**

Map By: SMG  
 MMD#: 3570-05  
 MXD: H:\3570-05\GIS\Maps\Colchester\Figure 10-1.mxd  
 1st Version: 7/16/2012  
 Revision: 7/16/2012  
 Scale: 1 in = 5,000 ft

**Figure 10-1**

According to a 2008 Dam Inspection report by Milone & MacBroom, Inc., the dam consists of an earthen embankment with a concrete core wall, a stepped concrete spillway, and a gatehouse with outlet works. In 1972, the dam was raised by 24 feet to its present configuration. Construction included a new earthen embankment, concrete spillway, a gatehouse, and auxiliary earthen dike and spillway. The dam is 810 feet long, 62 feet high, and has an average top width of 20 feet. The dam outlet consists of a 42-inch steel pipe within a 48-inch diameter concrete pipe. The outlet pipe divides to two branches downstream of the dam, a 30-inch pipe and a 42-inch pipe. The 30-inch pipe discharges to the water treatment plant located several thousand feet downstream. The 42-inch pipe releases to the downstream channel at the toe of the slope.

The spillway is a 90-foot wide concrete ogee crest structure. The spillway channel is a 90-foot wide concrete chute with 10-foot high walls. A concrete gatehouse/outlet works control tower is centrally located on the upstream side of the dam.

The dam is equipped with a breakaway dike located along the northwest shoreline of the reservoir. The dike is earthen and approximately 240 feet long. The left and right shorelines of the dike are lined with riprap and overgrown with vegetation. The center 50 feet is unprotected and constructed of fine earthen material such that the central section would give way when water levels in the reservoir are rising. The crest of the dike was approximately 20 feet above the reservoir water level on the date of inspection. Water escaping the reservoir through the dike is constrained by natural topography and eventually flows into the inundation area downstream of the Deep River Dam in the low lying area adjacent to the water treatment plant. The topography downstream of the dike has been modified to create a flow path through a naturally existing chute. The flow path has been lined with riprap, presumably to provide erosion protection.

The spillway discharges to Deep River, which flows under Reservoir Road through twin culverts. Deep River flows through a marshy lowland before intersecting Route 2. The culvert under Route 2 is a 13-foot high by 16-foot wide cast-in-place concrete box culvert with flared wingwalls. Downstream of Route 2, the Deep River joins Sherman Brook and flows into the Yantic River.

An EOP was developed in March 2009 and includes a dam failure inundation area. Dam failure could result in damage to Route 2 and to several houses located approximately 2,500 feet downstream of the dam. However, only one structure owned by Norwich Public Utilities would be damaged in Colchester. The inundation area includes the Deep River Water Treatment Plant as well as the Lebanon Pines alcohol and drug rehabilitation facility in Lebanon.

The additional 18 dams held either a moderate hazard potential (Class BB), a low hazard potential (Class A), or were unranked. According to the same datafile, the Pine Brook subregional basin has the most number of dams in four, followed by the Meadow Brook and the Latimer basin with three each. The remaining dams are located in six of the remaining 16 drainage basins.

According to Town Officials, the Paper Mill Dam is located at a deteriorated mill and the dam may be removed in connection with site remediation. Reportedly, the CT DEEP is in favor of the dam's removal. Additionally, the CT DEEP is reportedly involved with the owner regarding the

condition of the Linwood Dam on Meadow Brook immediately north of Route 16. According to Town Officials, the dam is only four or five feet tall and the pond is drawn down twice each year.

Due to the fact that Colchester has only one Class C dam, Colchester is considered a low risk area for adverse impacts due to dam failure.

#### **10.4 Potential Mitigation Measures, Strategies, and Alternatives**

Suggested recommendations for the lower-hazard dams in Colchester 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 Colchester. 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 the town EOP at least once annually.
- Continue to maintain emergency response training and equipment and upgrade equipment when possible.
- Encourage local officials to attend FEMA-sponsored training seminars at the Emergency Management Institute (EMI) in Emmitsburg, Maryland. All of these workshops are free of charge. Tuition, travel and lodging are provided by FEMA for the EMI training. Annual training sessions include emergency management, environmental reviews, the FEMA grant programs, the NFIP and CRS and others related to other hazards.
- Continue to evaluate emergency shelters, update supplies, and check communication equipment.
- Ensure that emergency procedures are in place to minimize the potential for any releases of propane, fires, or explosions at the propane business in the center of town.

- ❑ Pursue the ARC-certification of the main shelter, Bacon Academy and the back-up shelter, Jack Jackter Elementary School which is also the Town's EOC.
- ❑ Continue to promote dissemination of public information regarding natural hazard effects and mitigation measures into local governmental and community buildings. Specifically,
  - ⇒ Obtain copies of the disaster planning guides and manuals from the "Are You Ready?" series (<http://www.ready.gov/are-you-ready-guide>).
  - ⇒ Encourage residents to purchase NOAA weather radios with an alarm feature.
  - ⇒ Post hazard preparedness information on the town's website. Include links to established sources at the State of Connecticut and FEMA.
- ❑ Continue to encourage town residents to register with the CT Alert Emergency Notification System via the ENS website (<http://www.ct.gov/ctalert/site/default.asp>) and continue to highlight this on the Town's web site.

### Prevention

- ❑ Develop a checklist for land development applicants that cross-references the specific regulations and codes related to disaster resilience.
- ❑ Integrate elements of this HMP into the *Plan of Conservation and Development* during the next update 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.

### Public Education & 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.

## 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 town officials. Determine if potential flood damage is stormwater facility related and make recommendations as appropriate.
- ❑ Both Subdivision and Zoning Regulations should be updated to integrate the NFIP regulations associated with the current DFIRM mapping which, for New London County, was updated on July 18, 2011.

### 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 continue 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

- ❑ 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.
- ❑ Pursue funding to place riprap in areas of bridge scouring throughout town to limit further damage.
- ❑ Work with the homeowners at the end of Caverly Mill Road to formally abandon the road and convert it into a private driveway. The town will continue to warn the two homeowners prior to significant storms of the likelihood of flooding. This recommendation remains from the 2005 Hazard Mitigation Plan Annex, but was mistakenly referred to as the "Savin's Pond" bridge.

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

#### Prevention

- ❑ Work with Connecticut Light & Power to improve communications and coordination to limit the replication of the outages such as the significant outages following Tropical Storm Irene and Winter Storm Alfred of 7-9 and 5 days respectively.
- ❑ Encourage Connecticut Light & Power to also cut down trees as opposed to just trimming trees near power lines.
- ❑ Continue to contract out appropriate tree maintenance to the greatest extent possible.

#### Property Protection

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

- 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.

#### 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 the town'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 town departments have adequate backup supplies and facilities for continued functionality in case earthquake damage occurs to these buildings and critical facilities. This should be part of the regional critical facility study discussed in Section 2.8.
- Consider preventing residential development in areas prone to collapse such as below steep slopes or in areas 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 /when they develop.
- Consider placing fire pond or dry hydrants language into Subdivision Regulation amendments.

- ❑ 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 18 owners of low-ranking dams (Classes BB, A, AA and unranked) regarding resources available for inspections and maintenance including the Paper Mill Dam and the Linwood Dam which CT DEEP is currently involved in.

### 11.2 Prioritization of Specific Recommendations

As explained in Section 11.3 of the Multi-Jurisdictional HMP, the STAPLEE method was utilized in this annex to prioritize recommendations. Table 11-1 presents the STAPLEE matrix for the Town of Colchester. 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 COLCHESTER STAPLEE MATRIX FOR PRIORITIZING RECOMMENDATIONS

Implementation of Current Recommendations	Existing or New Recommendation?	Responsible Department <sup>1</sup>	Schedule	Cost <sup>2</sup>	Potential Funding Source <sup>3</sup>	Weighted STAPLEE Criteria <sup>4</sup>														Total STAPLEE Score
						Benefits							Costs							
						Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	STAPLEE Subtotal	Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	
<b>ALL HAZARDS</b>																				
<b>Regional Coordination</b>																				
Continue to promote inter-jurisdictional coordination efforts for emergency response	New	BS, FC	2012-2017	Minimal	OB	1	1	1	1	1	1	1	9.0				0.0	9.0		
Continue to promote local and regional planning exercises that increase readiness to respond to disasters	New	BS, EM	2012-2017	Low	OB	1	1	1	1	1	0.5	1	8.0				0.0	8.0		
Continue to evaluate communication capabilities and pursue upgrades to communication and ensure redundant equipment is available	Existing	EM, FC	2012-2017	Low	OB, CI	1	1	1	1	1	1	1	9.0				-0.5	-1.0	8.0	
Continue to promote regional transportation planning through SCCOG	Existing	BS	2012-2017	Low	OB	1	1	1	1	1	0.5		7.0					0.0	7.0	
Work with the SCCOG to perform a regional study of the vulnerability of critical facilities to natural hazard damage	New	EM	2012-2017	Low	OB	1	1	1	1	1	0.5		7.0					0.0	7.0	
<b>Local Emergency Response</b>																				
Continue to review and update the town EOP at least once annually	Existing	BS, FC	2012-2017	Low	OB	1	1	1	1	1	1	1	9.0					0.0	9.0	
Continue to maintain emergency response training and equipment and upgrade equipment when possible	Existing	BS, FC	2012-2017	Moderate	OB, CI	1	1	1	1	1	0.5	1	8.0				-0.5	-1.0	7.0	
Encourage town officials to attend FEMA-sponsored training seminars at EMI	New	EM	2012-2017	Minimal	OB	0.5	0.5	1	1	1	1	0.5	7.0					0.0	7.0	
Continue to evaluate emergency shelters, update supplies, and check communication equipment	Existing	EM, FC	2012-2017	Low	OB	1	1	1	1	1	1		8.0					0.0	8.0	
Ensure that emergency procedures are in place to minimize the potential for any releases of propane, fires or explosions at the town center business	New	EM, FC	2012-2017	Low	OB	1	1	1	1	1	1		8.0					0.0	8.0	
Identify a replacement EOC as the Town Hall has become outdated	New	EM, FC	2012-2017	Low	OB	1	1	1	1	1	1	1	9.0					0.0	9.0	
Pursue American Red Cross-certification of the Elementary School and Gardner Lake Fire Company	New	EM, FC	2012-2017	Low	OB	1	1	1	1	1	1	1	9.0					0.0	9.0	
Continue to promote dissemination of public information regarding natural hazard effects into local government and community buildings	Existing	EM, PL	2012-2017	Minimal	OB	1	1	1	1	1	1	1	9.0					0.0	9.0	
<b>Prevention</b>																				
Develop a checklist for land development applicants that cross-references the specific regulations and codes related to disaster resilience	New	ZE	2012-2017	Minimal	OB	1	1	1	1	1	1		8.0			-0.5		-0.5	7.5	
Integrate elements of this HMP into the Plan of Conservation and Development during the next update and beyond	New	PZ, ZE	2012-2017	Low	OB	1	1	1	1	1	1	1	9.0			-1	-0.5		-1.5	7.5
Consider requiring underground installation of utilities for new development to the greatest extent/feasibility	New	PZ	2012-2017	Minimal	OB	1	1	1	1	1	0.5		7.0	-0.5		-0.5			-1.0	6.0
Continue reviewing building plans to ensure proper access for emergency vehicles	New	FC	2012-2017	Minimal	OB	1	1	1	1	1	1		8.0						0.0	8.0
Continue to enforce the appropriate building code for new building projects	New	BD, ZE	2012-2017	Minimal	OB	1	1	1	1	1	1		8.0						0.0	8.0
Encourage residents to install and maintain lightning rods on their structures	New	FC, BD	2012-2017	Minimal	OB	1	0.5	1	1	1	1	0.5	7.5						0.0	7.5
<b>Natural Resource Protection &amp; Open Space</b>																				
Continue to regulate development in protected and sensitive areas including steep slopes, wetlands, and floodplains	New	PZ	2012-2017	Minimal	OB	1	1	1	1	1	1	1	9.0						0.0	9.0
<b>Public Education &amp; Awareness</b>																				
Conduct a "Natural Hazards Fair" and consider working different "Hazard Weeks" into the town's public education program	New	EM, FC	2012-2017	Moderate	OB	1	1	0.5	0.5	1	1		7.0			-0.5	-0.5		-1.0	6.0
<b>INLAND FLOODING</b>																				
<b>Prevention</b>																				
Continue to regulate new development activities within SFHAs to the greatest extent possible within town land use regulations	New	PZ	2012-2017	Minimal	OB	1	1	1	1	1	1	1	9.0						0.0	9.0
Require developers to demonstrate whether detention or retention of stormwater is the best option for reducing peak flows downstream	New	PZ	2012-2017	Minimal	OB	0.5	1	1	1	1	1	0.5	8.0						0.0	8.0
Conduct an annual inspection of floodprone areas that are publically accessible and recommend drainage improvements as appropriate	New	PW	2012-2017	Low	OB	1	1	1	0.5	1	0.5	0.5	7.0						0.0	7.0
Update Zoning and Subdivisions to integrate the NFIP regulations associated with the current DFIRM mapping updated on July 18, 2011	New	PW	2012-2017	Minimal	OB	1	1	1	0.5	1	0.5	0.5	7.0						0.0	7.0
<b>Property Protection</b>																				
Incorporate information on the availability of flood insurance into all hazard-related public education workshops	New	BD, EM	2012-2017	Low	OB	1	1	0.5	0.5	1	1		7.0	-0.5					-0.5	6.5
Make available FEMA-provided flood insurance brochures and encourage residents to purchase insurance if they are in a SFHA	New	BD, EM	2012-2017	Minimal	OB	1	1	1	1	1	1		8.0						0.0	8.0
Provide technical assistance to owners of non-residential structures that suffer flood damage regarding flooding measures	New	EM, FC	2012-2017	Low	OB	1	0.5	0.5	1	1	1	0.5	7.0						0.0	7.0
Encourage residents to submit flood insurance claims following damage events	New	All	2012-2017	Minimal	OB	1	1	1	1	1	1		8.0						0.0	8.0
<b>Emergency Services</b>																				
Pursue mutual aid agreements with non-profits to provide volunteer labor for esponse activities	New	EM, FC	2012-2017	Low	OB	1	1	1	1	1	1		8.0						0.0	8.0

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

Implementation of Current Recommendations	Existing or New Recommendation?	Responsible Department <sup>1</sup>	Schedule	Cost <sup>2</sup>	Potential Funding Source <sup>3</sup>	Weighted STAPLEE Criteria <sup>4</sup>												Total STAPLEE Score	
						Benefits						Costs							
						Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	STAPLEE Subtotal	Social	Technical (x2)	Administrative	Political		Legal
<b>Public Education and Awareness</b>																			
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	PZ, ZE	2012-2017	Low	OB	1	1	1	1	1	1		8.0		-0.5		-0.5	7.5	
<b>Natural Resource Protection</b>																			
Pursue the acquisition of additional municipal open space in SFHAs	New	BS	2012-2017	High	OB	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		9.0	-0.5	-0.5		-1.0	8.0	
<b>Structural Projects</b>																			
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
Pursue funding to place riprap in areas of scouring throughout town to limit further erosion	New	PW, EM	2012-2017	High	CI	1	1	1	1	1	1		8.0	-0.5			-0.5	-2.0	6.0
Work with the homeowners at the end of Caverly Mill Road to convert it into a private driveway	New	PW, EM	2012-2017	High	CI	1	1	1	1	1	1		8.0	-0.5			-0.5	-2.0	6.0
<b>WIND DAMAGE FROM HURRICANES, TROPICAL STORMS, SUMMER STORMS, TORNADOES, AND WINTER STORMS</b>																			
<b>Prevention</b>																			
Work with CL&P to improve communications and coordination to limit future outages such as following T.S. Irene and Winter Storm Alfred	New	EM, FC	2012-2016	Minimal	OB, CI	1	0.5	1	1	1	0.5		6.0					0.0	6.0
Encourage CL&P to also cut down trees as opposed to just trimming trees near their power lines	New	EM	2012-2017	Minimal	OB	1	1	1	1	1	1	1	9.0				-0.5	-0.5	8.5
Continue to perform appropriate tree maintenance to the greatest extent possible	Existing	PW	2012-2017	Minimal	OB	1	1	1	1	1	1	1	9.0				-0.5	-0.5	8.5
<b>Property Protection</b>																			
Promote the use of functional shutters for older buildings in the town and investigate funding sources	New	ZE, PZ	2012-2017	Minimal	OB, CI	1	0.5	1	1	1	0.5		6.0					0.0	6.0
Make information on wind-resistant construction techniques available to all building permit applicants	New	ZE, PZ	2012-2017	Low	OB	1	1	1	1	1	1		8.0					0.0	8.0
Encourage commercial building owners to develop Emergency Response Plans and identify mitigation opportunities	New	ZE, FC	2012-2017	Low	OB	1	1	1	1	1	1		8.0					0.0	8.0
<b>Emergency Services</b>																			
Consider surveying all town-owned buildings to determine their ability to withstand wind loading giving priority to the oldest buildings	New	ZE, BD	2012-2017	Low	OB	1	0.5	1	0.5	1	0.5		5.5					0.0	5.5
<b>Public Education and Awareness</b>																			
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
<b>WINTER STORMS</b>																			
Consider drafting a written plan for inspecting and prioritizing the removal of snow from town-owned structures	New	ZE, EM	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	FC, 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
<b>EARTHQUAKES</b>																			
Ensure that town departments have adequate backup supplies and facilities for continued functionality following an earthquake	New	BS	2012-2017	Moderate	OB, CI		0.5	1	0.5	0.5			3.0	-0.5		-1		-2.0	1.0
Consider preventing residential development in areas prone to collapse such as below steep slopes or areas prone to liquefaction	New	PZC	2012-2017	Minimal	OB	0.5	1	1	0.5	0.5	1	0.5	7.0			-0.5		-0.5	6.5

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

Implementation of Current Recommendations	Existing or New Recommendation?	Responsible Department <sup>1</sup>	Schedule	Cost <sup>2</sup>	Potential Funding Source <sup>3</sup>	Weighted STAPLEE Criteria <sup>4</sup>														Total STAPLEE Score
						Benefits							Costs							
						Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	STAPLEE Subtotal	Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	
<b>WILDFIRES</b>																				
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	<b>8.5</b>				<b>0.0</b>	<b>8.5</b>		
Consider placing fire pond or dry hydrants language into Subdivision Regulation amendments	New	FC	2012-2016	High	OB, CI	1	0.5	1	1	1	0.5		<b>6.0</b>				<b>0.0</b>	<b>6.0</b>		
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	<b>8.0</b>				<b>0.0</b>	<b>8.0</b>		
Ensure that provisions of town regulations regarding fire protection facilities and infrastructure are being enforced	New	ZE	2012-2017	Low	OB	0.5	0.5	1	0.5	1	0.5		<b>5.0</b>				<b>0.0</b>	<b>5.0</b>		
<b>DAM FAILURE</b>																				
Work with the CT DEEP to provide assistance to the 18 owners of low-ranking dams, specifically Paper Mill and Linwood Dams	New	PW, EM	2012-2017	Minimal	OB	0.5	0.5	0.5	0.5	1		0.5	<b>4.0</b>				<b>0.0</b>	<b>4.0</b>		

**NOTES**

- Departments:  
 BS = Board of Selectmen  
 EM = Emergency Management Director  
 FC = Fire Companies (Salem Volunteer Fire Company & Gardner Lake Volunteer Fire Company)  
 PW = Public Works Department  
 ZE = Zoning Enforcement Officer  
 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**

## **RESOLUTION**

### **TOWN OF COLCHESTER HAZARD MITIGATION PLAN UPDATE**

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

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

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

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

**WHEREAS**, The following corrections are hereby incorporated into the Hazard Mitigation Plan Update- Annex for the Town of Colchester, dated October 22, 2012:

- 1) Pg. 2-7- The Elmwood Heights Booster Station is located at 55 Elmwood Heights, Not 550.
- 2) Pg. 8-1, section 8.2 -should reference adopted by the International Code Council (ICC), not BOCA and enforced by the Building Official , Not the Zoning Enforcement Officer
- 3) Pg. 9-1, section 9.2- Reference should be Colchester Hayward Volunteer Fire Department, Not Volunteer Fire Companies
- 4) Pg. 11-2 -First Bullet- Bacon Academy is presently an ARC-Certified Shelter. Reference to Jack Jackter Intermediate School should be removed as a secondary backup shelter.

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

1. The Plan is hereby adopted as an official plan of the Town of Colchester;
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 7<sup>th</sup> day of March (month), 2013 (year).

Nancy A. Bray  
Name and Title of Town Clerk 3/12/13

(Town Seal)