

**TOWN OF SOUTHBURY  
NATURAL HAZARD PRE-DISASTER MITIGATION PLAN**

**CENTRAL NAUGATUCK VALLEY  
REGIONAL PLANNING AREA**

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*Prepared For:*



**Council of Governments  
Central Naugatuck Valley**

Under a grant from the Federal Emergency Management Agency (FEMA) through Connecticut Department of Environmental Protections (DEP)

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## EXECUTIVE SUMMARY

### *Town of Southbury Natural Hazard Pre-Disaster Mitigation Plan*

1. The Disaster Mitigation Act of 2000 requires local communities to have a Federal Emergency Management Agency (FEMA)-approved mitigation plan in order to be eligible to receive post-disaster Hazard Mitigation Grant Program (HMGP) grants and Pre-Disaster Mitigation (PDM) program project grant funds.
2. In general, the Town of Southbury has three unique situations that can potentially lead to difficult disaster response: the presence of Heritage Village, with its 2,500 age-restricted units and access limitations; the predominance of year-round homes in challenging riverside and hilly locations that were formerly summer cottages; and the tendency for more recent developments to rely on dead-end streets.
3. As a result of its unique land uses, the Town of Southbury has large vulnerable populations in Heritage Village and the Southbury Training School, as well as nationally-important businesses that may all be vulnerable to certain hazards.
4. Regarding the second of the three unique situations, many of the cottages in Southbury date back to the 1930s when Connecticut Light & Power sold numerous cottage home lots for \$100 each. These cottage home lots were transformed into year-round dwellings mostly during the 1950s, 1960s and 1970s. These homes are now located in some of the larger problem areas in the Town in terms of overbank flooding and flooding caused by poor drainage.
5. The Department of Public Works is the principal municipal department that responds to problems caused by natural hazards.
6. The Town considers its police, fire, medical, governmental, major transportation facilities, and senior center (a designated shelter) to be its most important critical facilities, for these are needed to ensure that emergencies are addressed while day-to-day management of Southbury continues. Age-restricted, State facilities, life care centers, assisted living communities, a national defense satellite/communications facility, sewage treatment plants, the Public Works Department, and the Heritage Village Water Company wellfield are included with critical facilities, as these house populations of individuals and utilities that would require special assistance during an emergency.
7. Southbury has several buildings available for shelters, including the Southbury Senior Center and the Southbury Fire House. The central locations of these buildings make them easily accessible from most locations in Town. Southbury encourages residents to shelter in place whenever possible.

8. Many private roads and trails (including Hillside Road, Heritage Village and Berkshire Estates) are too narrow for emergency vehicular transit. They present the possibility of access problems during emergencies in the area.
9. In every season of the year, the Town of Southbury has experienced various degrees of flooding. It has in place a number of measures to prevent flood damage including zoning and subdivision regulations, the Southbury code, aquifer protection regulations, and ordinances preventing encroachment and development near floodways. The areas with the highest vulnerability to flood events are concentrated along the Pomperaug River.
10. The Town's Police and Fire Departments regularly monitor the stage of the Pomperaug River and combine forces to provide advanced notice to residents in the floodplain surrounding the river of potential flooding problems.
11. The Town of Southbury primarily attempts to mitigate flood damage and flood hazards by restricting building activities in flood-prone areas. This process is carried out through the Zoning Commission, the Planning Commission, and the Inland Wetlands Commission. The primary areas of concern are Flood Bridge Road, River Road, River Trail, Manor Road, and Pomperaug Trail. Secondary areas of concern are Hulls Hill Road/Jeremy Swamp Road Intersection, Spruce Brook Road near Route 172, Lakeside Road and Lee Farm Drive, Community House Road, Route 172 Bridge over the Pomperaug River, Route 172 at "Hay Fever Farm", Little Fox Lane, and Flagg Swamp Road.
12. Based on the above guidelines and the existing roles of the IWC, the PC, the ZC, and the, Zoning Enforcement Officer, one specific preventive measure is recommended. A checklist should be developed that cross-references the bylaws, regulations, and codes related to flood damage prevention that may be applicable to a proposed project. This will streamline the permitting process and ensure maximum education of a developer or applicant.
13. The following specific recommendations are offered for consideration for natural resource protection, and are subject to a favorable FEMA cost-benefit analysis: Apply for a grant to acquire property on a voluntary basis on Flood Bridge Road, River Road, River Trail, Manor Drive, and Pomperaug Trail. Stormwater controls such as drainage systems, detention dams and reservoirs, and culverts should be employed to lessen floodwater runoff in these areas.
14. The Pomperaug River is considered the third most-susceptible river in the state with regard to ice jams, after the Shetucket River and the Salmon River.
15. Ice jams have historically been concentrated in a small area of Southbury near the confluence of the Housatonic and Pomperaug Rivers. The neighborhoods which are under highest threat by ice jams include those along Manor Road and Pomperaug Trail.
16. Programs, policies, and mitigation measures that are specifically applicable to ice jams are not addressed within Town of Southbury regulations.

17. While only some of the areas of Southbury are susceptible to flood damage caused by hurricanes, wind damage can occur anywhere in the Town.
18. Wind loading requirements are addressed through the state building code. The Town of Southbury has adopted the Connecticut Building Code as its building code.
19. Tree limbs and trees may fall during heavy wind events, potentially damaging structures, utility lines, and vehicles. The Town of Southbury Department of Public Works performs annual tree maintenance near roadways. Connecticut Light & Power also performs tree maintenance, but landowners are primarily responsible for conducting tree maintenance on private property.
20. The Town of Southbury is less vulnerable to hurricane damage than coastal towns in Connecticut because it does not need to deal with the effects of storm surge, but the Town is vulnerable to hurricane damage from wind and flooding, and from any tornadoes accompanying the storm. As the residents and businesses of the State of Connecticut become more dependent on the internet and mobile communications, the impact of hurricanes on commerce will continue to increase.
21. The public should be made aware of evacuation routes and available shelters. A number of specific proposals for improved public education are recommended to prevent damage and loss of life during hurricanes.
22. The entire Town of Southbury is susceptible to summer storms (including heavy rain, flash flooding, wind, hail, and lightning) and tornadoes.
23. Continued location of utilities underground is an important method of reducing wind damage to utilities and the resulting loss of services.
24. The entire Town of Southbury is susceptible to winter storms. The Town ensures that all warning/notification and communications systems are ready before a storm, and ensures that appropriate equipment and supplies, especially snow removal equipment, are in place and in good working order. The Town also prepares for the possible evacuation and sheltering of some populations which could be impacted by the upcoming storm (especially the elderly and special needs persons).
25. The heavily treed landscape in close proximity to densely populated residential areas in the Town of Southbury poses problems in relation to summer storm and blizzard condition damage. Tree limbs and some building structures may not be suited to withstand high wind and snow loads. There is a high propensity of traffic accidents during such storms because, when coupled with slippery road conditions, poor sightlines and heavy glare can create dangerous driving conditions.

26. Connecticut is at a low risk for experiencing a damaging earthquake, however, the entire Town of Southbury is considered susceptible. Areas of steep slopes can collapse during an earthquake, creating landslides.
27. With 32 registered dams and potentially several other minor dams in the Town or along its border, dam failure can occur almost anywhere in The Town of Southbury. Fortunately, a major dam failure is considered only a possible natural hazard event in any given year. One Class C (high hazard) dam and five Class B (significant hazard) dams are located within the Town.
28. The only Class C dam in the Town of Southbury, the Shepaug Dam, presents the highest damage potential to Town residents should it fail. Review of DEP files indicated that the Pomperaug River Dam, a Class B dam, is currently in poor condition.
29. The Town should consider specifically including dam failure areas in its CodeRED emergency notification system.
30. Wildfires are more common in rural areas than in developed areas, as most fires in populated areas are quickly noticed and contained. The current proactive approach of going on the offense is believed to be effective for controlling wildfires. Despite having a considerable amount of forest/urban interface, the overall risk of wildfires occurring in the Town of Southbury is considered to be low.

## **1.0 INTRODUCTION**

### **1.1 Background and Purpose**

The term hazard refers to an extreme natural event that poses a risk to people, infrastructure, or resources. In the context of natural disasters, pre-disaster hazard mitigation is commonly defined as any sustained action that permanently reduces or eliminates long-term risk to people, property, and resources from natural hazards and their effects.

The primary purpose of a natural hazard pre-disaster mitigation plan (HMP) is to identify natural hazards and risks, existing capabilities, and activities that can be undertaken by a community or group of communities to prevent loss of life and reduce property damages associated with the identified hazards. This HMP is prepared specifically to identify hazards in the Town of Southbury, Connecticut ("Southbury" or "Town"). The HMP is relevant not only in emergency management situations, but also should be used within the Southbury's land use, environmental, and capital improvement frameworks.

The Disaster Mitigation Act of 2000 (DMA), commonly known as the 2000 Stafford Act amendments, was approved by Congress and signed into law in October 2000, creating Public Law 106-390. The purposes of the DMA are to establish a national program for pre-disaster mitigation and streamline administration of disaster relief.

The DMA requires local communities to have a Federal Emergency Management Agency (FEMA)-approved mitigation plan in order to be eligible to receive post-disaster Hazard Mitigation Grant Program (HMGP) grants and Pre-Disaster Mitigation (PDM) program project grant funds. Once a community has a FEMA-approved hazard mitigation plan, the community is then eligible to apply for PDM project funds for mitigation activities.

The subject natural hazard pre-disaster mitigation plan was developed to be consistent with the requirements of the HMGP, PDM, and Flood Management Assistance (FMA) programs. These programs are briefly described below.

### **Pre-Disaster Mitigation (PDM) Program**

The Pre-Disaster Mitigation program was authorized by Part 203 of the Robert T. Stafford Disaster Assistance and Emergency Relief Act (Stafford Act), 42 U.S.C. 5133. The PDM program provides funds to states, territories, tribal governments, communities, and universities for hazard mitigation planning and implementation of mitigation projects prior to disasters, providing an opportunity to reduce the nation's disaster losses through pre-disaster mitigation planning and the implementation of feasible, effective, and cost-efficient mitigation measures. Funding of pre-disaster plans and projects is meant to

#### ***Mitigation Funding***

Note that starting in 2008 applications for hazard mitigation grant funding are administered under the Unified Hazard Mitigation Assistance program. More information on this and the following programs can be found at FEMA's website, <http://www.fema.gov/>

reduce overall risks to populations and facilities. PDM funds should be used primarily to support mitigation activities that address natural hazards. In addition to providing a vehicle for funding, the PDM program provides an opportunity to raise risk awareness within communities.

### **Hazard Mitigation Grant Program (HMGP)**

The HMGP is authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act. The HMGP provides grants to States and local governments to implement long-term hazard mitigation measures after a major disaster declaration.

The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. A key purpose of the HMGP is to ensure that any opportunities



to take critical mitigation measures to protect life and property from future disasters are not "lost" during the recovery and reconstruction process following a disaster.

### **Flood Mitigation Assistance (FMA) Program**

The FMA program was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). FEMA provides FMA funds to assist States and communities with implementing measures that reduce or eliminate the long-term risk of flood damage to buildings, homes, and other structures insurable under the NFIP. The long-term goal of FMA is to reduce or eliminate claims under the NFIP through mitigation activities. Three types of grants are available under FMA. These are Planning, Project, and Technical Assistance grants.

## **1.2 Hazard Mitigation Goals**

The primary goal of this hazard mitigation plan is to ***reduce the loss of or damage to life, property, infrastructure, and natural, cultural and economic resources from natural disasters***. 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.

Developing, adopting, and implementing this hazard mitigation plan is expected to:

- ❑ ***Increase access to and awareness of funding sources for hazard mitigation projects.*** Certain funding sources, such as the Pre-Disaster Mitigation Competitive Grant Program and the Hazard Mitigation Grant Program, will be available if the hazard mitigation plan is in place and approved.

- ❑ ***Identify mitigation initiatives to be implemented if and when funding becomes available.*** This HMP will identify a number of mitigation recommendations, which can then be prioritized and acted upon as funding allows.
- ❑ ***Connect hazard mitigation planning to other community planning efforts.*** This HMP can be used to guide Southbury's development through inter-departmental and inter-municipal coordination.
- ❑ ***Improve the mechanisms for pre- and post-disaster decision making efforts.*** This plan emphasizes actions that can be taken now to reduce or prevent future disaster damages. If the actions identified in this plan are implemented, damage from future hazard events can be minimized, thereby easing recovery and reducing the cost of repairs and reconstruction.
- ❑ ***Improve the ability to implement post-disaster recovery projects*** through development of a list of mitigation alternatives ready to be implemented.
- ❑ ***Enhance and preserve natural resource systems.*** Natural resources, such as wetlands and floodplains, provide protection against disasters such as floods and hurricanes. Proper planning and protection of natural resources can provide hazard mitigation at substantially reduced costs.
- ❑ ***Educate residents and policy makers about natural hazard risk and vulnerability.*** Education is an important tool to ensure that people make informed decisions that complement the Town's ability to implement and maintain mitigation strategies.
- ❑ ***Complement future Community Rating System (CRS) efforts.*** Implementation of certain mitigation measures may increase a community's rating, and thus the benefits that it derives from FEMA. Southbury does not participate in the CRS at the present time.

### 1.3 Identification of Hazards and Document Overview

As stated in Section 1.1, the term *hazard* refers to an extreme natural event that poses a risk to people, infrastructure, or resources. Based on a review of the Connecticut Natural Hazard Mitigation Plan and correspondence with local officials, the following have been identified as natural hazards that are most likely to affect Southbury:

- ☐ Inland Flooding
- ☐ Ice Jams
- ☐ Hurricanes and Tropical Storms
- ☐ Summer Storms (including lightening, heavy winds, hail, downbursts, and tornadoes)
- ☐ Winter Storms and Nor'easters
- ☐ Earthquakes
- ☐ Dam Failure
- ☐ Wildfires

This document has been prepared with the understanding that a single *hazard effect* may be caused by multiple *hazard events*. For example, flooding may occur as a result of frequent heavy rains, a hurricane, a winter storm, or ice jams. Thus, Appended Tables 1 and 2 provide summaries of the hazard events and hazard effects that impact Southbury, and include criteria for characterizing the locations impacted by the hazard, the frequency of occurrence of the hazards, and the magnitude or severity of the hazards.

Despite the causes, the effects of several hazards are persistent and demand high expenditures from the Town. In order to better identify current vulnerabilities and potential mitigation strategies associated with other hazards, each hazard has been individually discussed in a separate chapter.

This document begins with a general discussion of Southbury's community profile, including the physical setting, demographics, development trends, governmental

structure, and sheltering capacity. Next, each chapter of this Plan is broken down into six or seven different parts. These are *Setting*; *Hazard Assessment*; *Historic Record*; *Existing Programs, Policies, and Mitigation Measures*; *Vulnerabilities and Risk Assessment*; and *Potential Mitigation Measures, Strategies, and Alternatives*, and if necessary, *a Summary of Recommendations*. These are described below.

- ❑ ***Setting*** addresses the general areas that are at risk from the hazard. General land uses are identified.
- ❑ ***Hazard Assessment*** describes the specifics of a given hazard, including general characteristics, and associated effects. Also defined are associated return intervals, probability and risk, and relative magnitude.
- ❑ ***Historic Record*** is a discussion of past occurrences of the hazard, and associated damages when available.
- ❑ ***Existing Programs, Policies, and Mitigation Measures*** gives an overview of the measures that the Town is currently undertaking to mitigate the given hazard. These may take the form of ordinances and codes, structural measures such as dams, or public outreach initiatives.
- ❑ ***Vulnerabilities and Risk Assessment*** focuses on the specific areas at risk to the hazard. Specific land uses in the given areas are identified. Critical buildings and infrastructure that would be affected by the hazard are identified.
- ❑ ***Potential Mitigation Measures, Strategies, and Alternatives*** identifies mitigation alternatives, including those that may be the least cost effective or inappropriate for Southbury.

- ❑ ***Summary of Recommended Mitigation Measures, Strategies, and Alternatives***  
provides a summary of the recommended courses of action for Southbury that are included in the STAPLEE analysis described below.

This document concludes with a strategy for implementation of the Hazard Management Plan, including a schedule, a program for monitoring and updating the plan, and a discussion of technical and financial resources.

#### ***1.4    Discussion of STAPLEE Ranking Method***

To prioritize recommended mitigation measures, it is necessary to determine how effective each measure will be in reducing or preventing damage. A set of criteria commonly used by public administration officials and planners was applied to each proposed strategy. The method, called STAPLEE, stands for the "Social, Technical, Administrative, Political, Legal, Economic and Environmental" criteria for making planning decisions. The following questions were asked about the proposed mitigation strategies:

- ❑ **Social:** Is the proposed strategy socially acceptable to Southbury? Is there equity issues involved that would mean that one segment of the Town could be treated unfairly?
- ❑ **Technical:** Will the proposed strategy work? Will it create more problems than it will solve?
- ❑ **Administrative:** Can Southbury implement the strategy? Is there someone to coordinate and lead the effort?
- ❑ **Political:** Is the strategy politically acceptable? Is there public support both to implement and maintain the project?
- ❑ **Legal:** Is Southbury authorized to implement the proposed strategy? Is there a clear legal basis or precedent for this activity?

- ❑ **Economic:** What are the costs and benefits of this strategy? Does the cost seem reasonable for the size of the problem and the likely benefits?
- ❑ **Environmental:** How will the strategy impact the environment? Will the strategy need environmental regulatory approvals?

Each proposed mitigation strategy presented in this plan was evaluated and assigned a score (Good = 3, Average = 2, Poor = 1) based on the above criteria. An evaluation matrix with the total scores from each strategy can be found in Appendix A. After each strategy is evaluated using the STAPLEE method, it is possible to prioritize the strategies according to the final score. The highest scores are determined to be of more importance, economically, socially, environmentally and politically and, hence, prioritized over those with lower scoring.

### ***1.5     Documentation of the Planning Process***

Southbury is a member of the Council of Governments of the Central Naugatuck Valley (COGCNV), the responsible regional planning body for Southbury and twelve other member municipalities: Beacon Falls, Bethlehem, Cheshire, Middlebury, Naugatuck, Oxford, Prospect, Thomaston, Waterbury, Watertown, Wolcott, and Woodbury. The municipalities of Cheshire, Oxford, Prospect, Waterbury, Watertown, Wolcott and Woodbury have existing mitigation plans, and hazard mitigation plans are being concurrently developed for the remaining municipalities.

Ms. Virginia Mason of the COGCNV coordinated the development of this Hazard Mitigation Plan. The COGCNV applied for the grant from FEMA through the Connecticut Department of Environmental Protection (DEP). The adoption of this plan in the Town of Southbury will also be coordinated by the COGCNV.

The following individuals from the Town of Southbury provided information, data, studies, reports, and observations; and were involved in the development of the Plan:

- ❑ H. William Davis, Jr., First Selectman
- ❑ Mr. Mark A. R. Cooper, former First Selectman
- ❑ Ms. Jennifer Naylor, Assistant to First Selectman
- ❑ Ms. DeLoris S. Curtis, AICP, Town Planning Department Administrator
- ❑ Mr. Thomas F. Crowe Jr., P.E., Director of Public Works
- ❑ Mr. Richard Lyle, Assistant Fire Chief/LEPC
- ❑ Mr. George Slaiby, Town Emergency Management Department

An extensive data collection, evaluation, and outreach program was undertaken to compile information about existing hazards and mitigation in the Town, as well as to identify areas that should be prioritized for hazard mitigation. The following is a list of meetings that were held to develop this Hazard Mitigation Plan:

- ❑ ***An Initial Data Collection Meeting with Town Officials was held February 6, 2008.***

This meeting addressed the scope of services necessary to develop this HMP. Initial input was provided by the project team, necessary documentation was collected, and problem areas within the Town were discussed.

- ❑ ***A field inspection was performed February 13, 2008.*** Observations were made by the project team of numerous flooding areas, ice jam areas, and other problem areas within the Town.

- ❑ ***A public information meeting was held March 19, 2008 at 6:30 P.M. at the Southbury Fire House.*** Preliminary observations and findings were presented and public comments solicited. Representatives from the project team, the Town and the public were in attendance.

Residents were invited to attend the public meeting via newspaper announcements. There were approximately eight residents of the Town that attended the meeting,

providing valuable comments with regard to flooding in the Town. A total of 14 municipal agencies and civic organizations were invited via a mailed copy of the press release that announced the public information meeting. These included:

- ☐ The Tribury Chamber of Commerce
- ☐ United Water of Greater Waterbury
- ☐ American Red Cross
- ☐ Lake Lillinonah Authority
- ☐ Lake Zoar Authority
- ☐ Southbury Business Association
- ☐ Southbury Economic Development Commission
- ☐ Southbury Land Trust
- ☐ Southbury Planning Commission
- ☐ Southbury Zoning Commission
- ☐ Southbury Land Use Office
- ☐ Pomperaug Health District
- ☐ Pomperaug River Watershed Coalition

Refer to Appendix B for copies of the newspaper announcement, letters to the agencies and organizations listed above, and an article that was printed after the meeting. Of the listed organizations, none were represented at the meeting.

It is important to note that COGCNV manages the Central Naugatuck Valley Emergency Planning Committee. This committee has begun coordinating emergency services in the region. Fire, Police, EMS, Red Cross, emergency management directors, and other departments participate in these efforts. In June 2004, over 120 responders participated in the region's first tabletop exercise on biological terrorism. Area health directors, hospitals, and other health care professionals also meet monthly with the Health and Medical Subcommittee to share information, protocols, and training. Thus, local



knowledge and experience gained through the Emergency Planning Committee activities has been transferred by the COGCNV to the pre-disaster mitigation planning process.

Additional opportunities for the public to review the Plan will be implemented in advance of the public hearing to adopt this plan, tentatively scheduled for March 2009, contingent on receiving conditional approval from FEMA. The draft that is sent for FEMA review will be posted on the Town website (<http://www.southbury-ct.gov/>) and the COGCNV website (<http://www.cogcnv.org/>) to provide opportunities for public review and comment. Such comments will be incorporated into the final draft when applicable. Upon receiving conditional approval from FEMA, the public hearing will be scheduled, at which time any remaining comments can be addressed. Notification of the opportunity to review the Plan on the above websites and the announcement of the public information meeting will be posted on the websites and placed in local newspapers.

If any final plan modifications result from the comment period leading up to and including the public hearing to adopt the plan, these will be submitted to FEMA as page revisions with a cover letter explaining the changes. It is not anticipated that any major modifications will occur at this phase of the project.

Appendix B also contains copies of meeting minutes, field notes and observations, the public information meeting presentation, and other records that document the development of this Pre-Disaster Hazard Mitigation Plan.

## **2.0 COMMUNITY PROFILE**

### **2.1 Physical Setting**

The Town of Southbury is located in New Haven County at the intersection of Interstate 84 and Route 67. It is bordered by the towns of Roxbury and Woodbury to the north, Middlebury and Oxford to the east, Newtown to the south, and Bridgewater to the west. Refer to Figure 2-1 for a location map and Figure 2-2 for a region map.

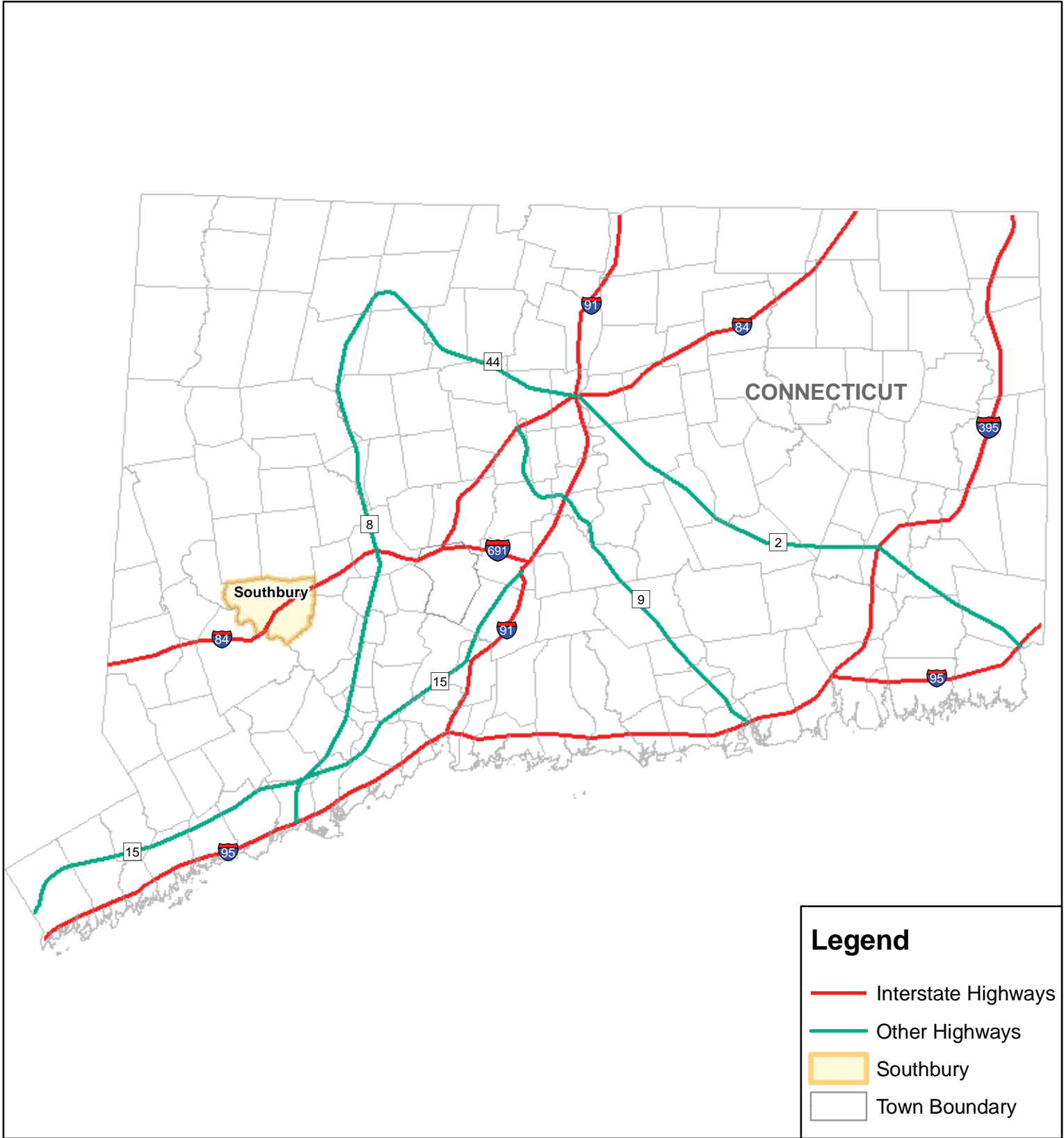
The Town is located in the lower portion of the Pomperaug River watershed, with the river flowing through the center of Town and adjacent to several residential areas. The Housatonic River and its two impoundments, Lake Zoar and Lake Lillinonah, comprise the entire southern border of the Town. Likewise, the Shepaug River forms the western border with Bridgewater, and the Eightmile River forms portions of the eastern borders with Middlebury and Oxford.

The Town is comprised of suburban neighborhoods, rural country areas, and historic districts nestled within and among its many river valleys and hills.

### **2.2 Existing Land Use**

The Town of Southbury encompasses 40 square miles. Table 2-1 provides a summary of land use in Southbury by area. Refer to Figure 2-3 for a map of generalized land use.

Figure 2-1: Southbury Location Map

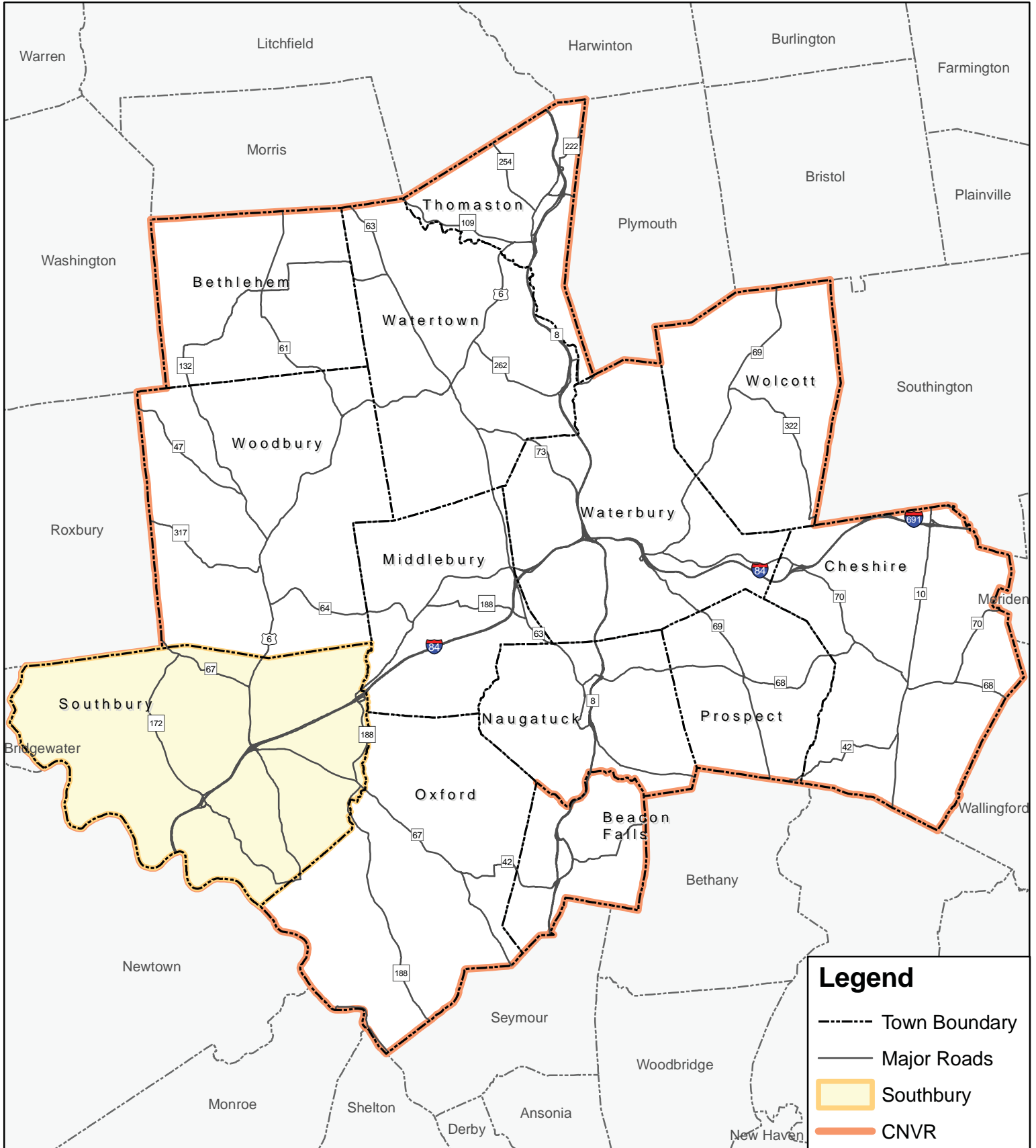


Source: "Roads", c1984 - 2008 Tele Atlas, Rel. 04/08.  
"Town Boundary", DEP  
For general planning purposes only. Delineations may not be exact.  
June 2008



0 10 20 Miles

## Figure 2-2: Southbury in the CNVR



Source: "Roads", c1984 - 2008 Tele Atlas, Rel. 04/08.

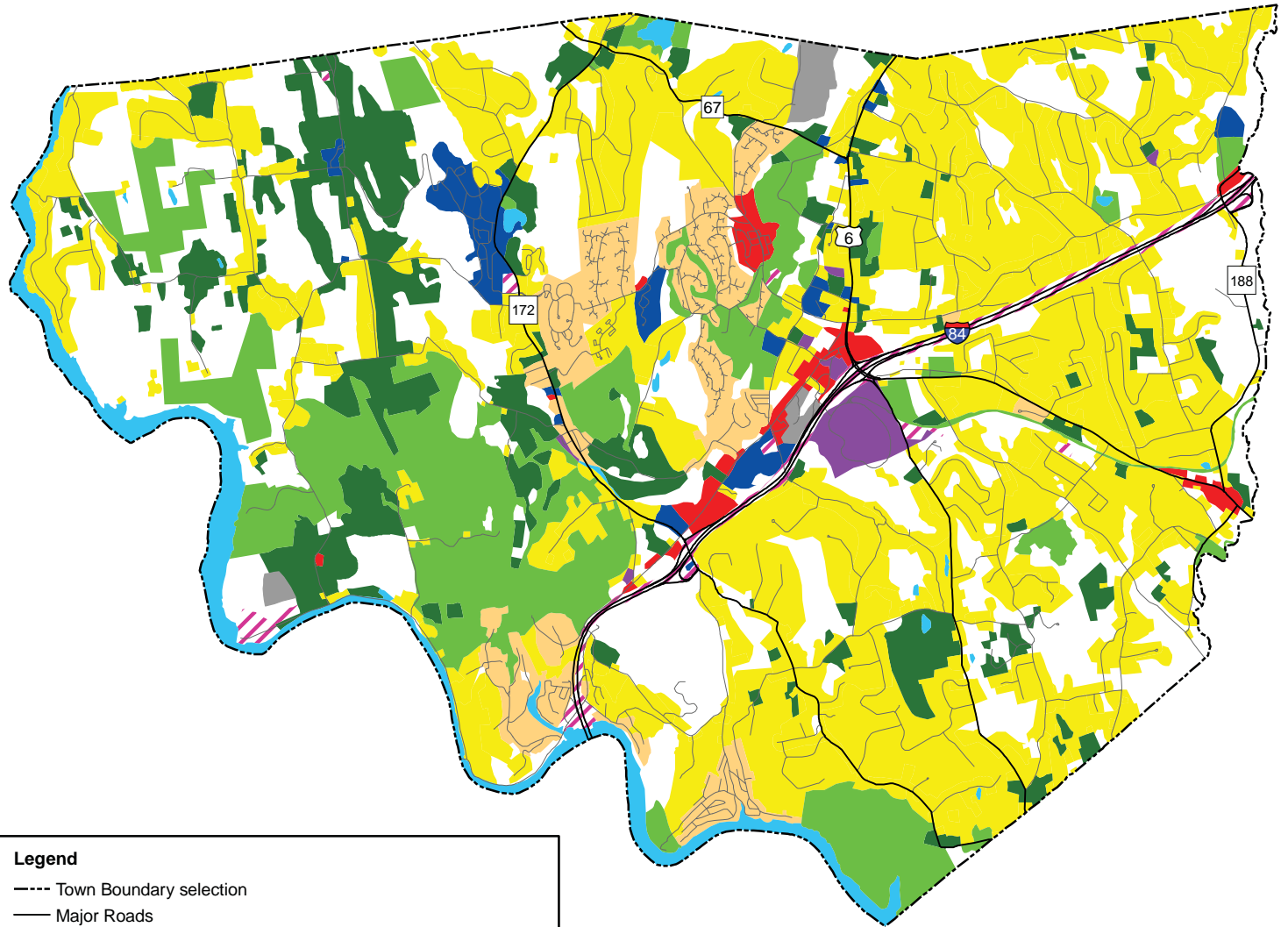
"Town Boundary", DEP

For general planning purposes only. Delineations may not be exact.  
June 2008



**COUNCIL OF GOVERNMENTS  
CENTRAL NAUGATUCK VALLEY**

# Figure 2-3: Southbury Generalized Land Use



## Legend

- Town Boundary selection
- Major Roads
- Local Roads
- AG Agriculture
- CF Institutional
- CM Commercial
- IN Industrial
- RC Recreational
- RL Residential - Low Density less than 2 dwelling units per acre
- RM Residential - Medium Density 2-8 dwelling units per acre
- RH Residential - High Density 8 or more dwelling units per acre
- RX Resource Extraction
- TU Transportation & Utilities
- UL Undeveloped Land
- W Water



**Table 2-1**  
**Land Use by Area**

<b>Land Use</b>	<b>Area (acres)</b>	<b>Pct.</b>
Residential - Low Density	10,085	39%
Vacant	6,459	25%
Recreational	3,129	12%
Agricultural	2,388	9%
Residential - Medium Density	1,296	5%
Water	734	3%
Institutional	430	2%
Utilities/Transportation	419	2%
Commercial	306	1%
Industrial	212	1%
Mining	143	1%
<b>Total</b>	<b>25,601</b>	<b>100%</b>

*Source: Council of Governments Central Naugatuck Valley, 2000*

The Town of Southbury is centered on a linear commercial and institutional district running northeast-southwest along Main Street and along the north side of Interstate 84, extending from Route 67 to Route 172. Many of the municipal facilities and various commercial plazas are located in and near this corridor. Outside of this central developed corridor, low density residential areas are interspersed with agricultural areas. However, the Town of Southbury contains several unique land uses, including the following:

- ❑ A very large age-restricted condominium complex known as Heritage Village is located north of the Town center. This complex, reportedly New England's largest retirement community, is comprised of more than 2,500 housing units and has a population of more than 4,000.
- ❑ The Town hosts a national defense communications technology vendor, Vizada Americas (formerly Telenor Satellite Communications), located at the far west end of River Road near the Shepaug Dam. This facility provides service to NASA as well as other clients.
- ❑ A large IBM campus is located on the south side I-84 near the junction of I-84 and Route 67.

- ❑ The Southbury Training School, a large state institutional facility, is located on 1,600 acres in the northwest part of Town on Route 172. The school was built in the late 1930s as home for individuals with mental retardation. Over 500 individuals reside at the facility, and more than 1,500 people are employed there.

As a result of these unique land uses, the Town of Southbury has large vulnerable populations in Heritage Village and the Southbury Training School, as well as nationally-important businesses that may all be vulnerable to certain hazards.

Much of the Town is comprised of protected open space, including an Audubon center and multiple state parks.

### 2.3 Geology

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 Southbury. The following discussion highlights Southbury's geology at several scales.

In terms of North American bedrock geology, the Town of Southbury is located in the northeastern part of the Appalachian Orogenic Belt, also known as the Appalachian Highlands. The Appalachian Highlands extend from Maine south into Mississippi and Alabama and were formed during the orogeny that occurred when the super-continent Pangea assembled during the late Paleozoic era. The region is generally characterized by deformed sedimentary rocks cut through by numerous thrust faults.

Regionally, in terms of New England bedrock geology, the Town of Southbury is divided between two geologic provinces. Bedrock intrusions belonging to the Mesozoic Basin lie under the north-central part of the Town, while bedrock belonging to the Eugeosyncline Sequence underlies the remainder of the Town. Mesozoic Basin rocks contain

characteristic sedimentary conglomerates, sandstones, and mudrocks that usually bear a red or brownish appearance from an abundance of iron oxide minerals (chiefly hematite and limonite). Eugeosynclinal rocks are typically more deformed, metamorphosed, and intruded by small to large igneous plutons.

The bedrock beneath the Town of Southbury is part of two terranes.

The majority of the Town is underlain by the Newark Terrane which formed when Pangea split

### ***Bedrock Geology***

Connecticut bedrock geology is comprised of several "terranes." Terranes are geologic regions that reflect the role of plate tectonics in Connecticut's natural history.

apart. This area lies within the Mesozoic Basin geologic province described above.

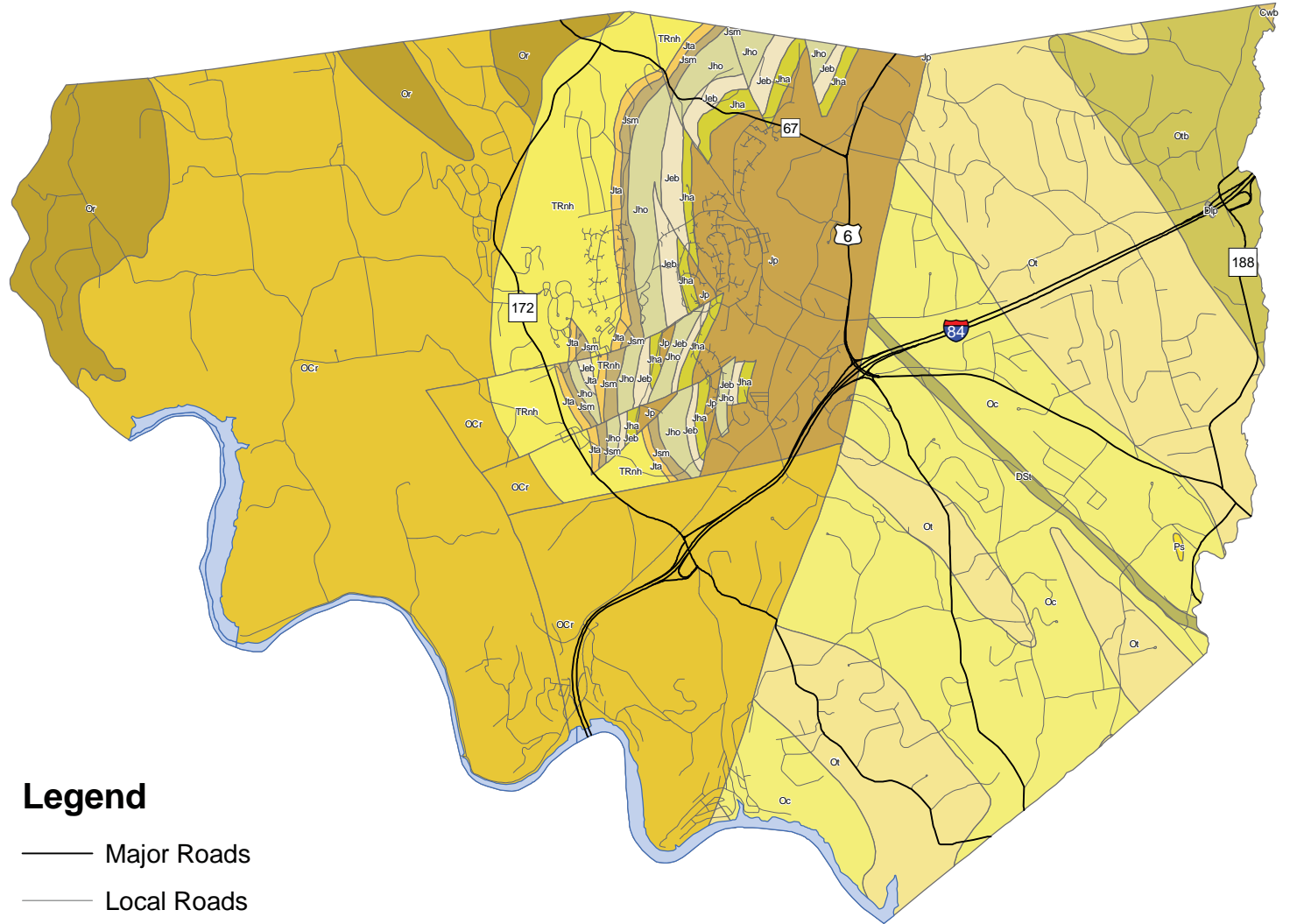
The northwestern portion of Southbury is underlain by the Iapetos Terrane, comprised of remnants of the Iapetos Ocean that existed before Pangaea was formed. This terrane formed when Pangaea was consolidated and its boundaries are coincident with the Eugeosyncline Sequence geologic province described above.

The Town of Southbury's bedrock consists of three general lithologies: volcanic and intrusive igneous silicate gneisses and basalts, sedimentary arkose, and metasedimentary and metaigneous schists. The bedrock intrusions trend northeast-southwest through the Town. Refer to Figure 2-4 for a depiction of the bedrock geology in the Town of Southbury.

The north-central portion of the Town is underlain by the New Haven Arkose, Portland Arkose, and associated rocks (Holyoke Basalt, Talcott Basalt, Shuttle Meadow Formation, East Berlin Formation, and Hampden Basalt) of the Newark Terrane. The arkoses are thick sequences of sedimentary rock striking north-northeast and dipping approximately 15° to the east.



# Figure 2-4: Southbury Bedrock Geology

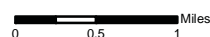


## Legend

- Major Roads
- Local Roads
- Housatonic River

## Bedrock

<span style="display: inline-block; width: 20px; height: 10px; background-color: #f4a460; border: 1px solid black;"></span> Cwb	Waterbury Gneiss	<span style="display: inline-block; width: 20px; height: 10px; background-color: #ffff00; border: 1px solid black;"></span> Jha	Hampden Basalt	<span style="display: inline-block; width: 20px; height: 10px; background-color: #f0e68c; border: 1px solid black;"></span> Oc	Collinsville Formation
<span style="display: inline-block; width: 20px; height: 10px; background-color: #d2b48c; border: 1px solid black;"></span> DSt	Straits Schist	<span style="display: inline-block; width: 20px; height: 10px; background-color: #ffcc00; border: 1px solid black;"></span> Jho	Holyoke Basalt	<span style="display: inline-block; width: 20px; height: 10px; background-color: #ffff00; border: 1px solid black;"></span> Or	Ratlum Mtn Schist
<span style="display: inline-block; width: 20px; height: 10px; background-color: #ffcc00; border: 1px solid black;"></span> Dlp	Lamprophyre	<span style="display: inline-block; width: 20px; height: 10px; background-color: #cc9933; border: 1px solid black;"></span> Jp	Portland Arkose	<span style="display: inline-block; width: 20px; height: 10px; background-color: #c4a87d; border: 1px solid black;"></span> Ot	Taine Mtn Formation
<span style="display: inline-block; width: 20px; height: 10px; background-color: #cc9933; border: 1px solid black;"></span> Jeb	East Berlin Formation	<span style="display: inline-block; width: 20px; height: 10px; background-color: #f4a460; border: 1px solid black;"></span> Jsm	Shuttle Meadow Formation	<span style="display: inline-block; width: 20px; height: 10px; background-color: #808080; border: 1px solid black;"></span> Otb	Basal Taine Mtn Formation
		<span style="display: inline-block; width: 20px; height: 10px; background-color: #f0e68c; border: 1px solid black;"></span> Jta	Talcott Basalt	<span style="display: inline-block; width: 20px; height: 10px; background-color: #a9a9a9; border: 1px solid black;"></span> Ps	Syenite
		<span style="display: inline-block; width: 20px; height: 10px; background-color: #c4a87d; border: 1px solid black;"></span> OCr	Rowe Schist	<span style="display: inline-block; width: 20px; height: 10px; background-color: #d2b48c; border: 1px solid black;"></span> TRnh	New Haven Arkose



The entire midsection of the Town of Southbury is highly fractured and faulted, and the Newark Terrane rocks are bounded to the west and east by faulted contacts.

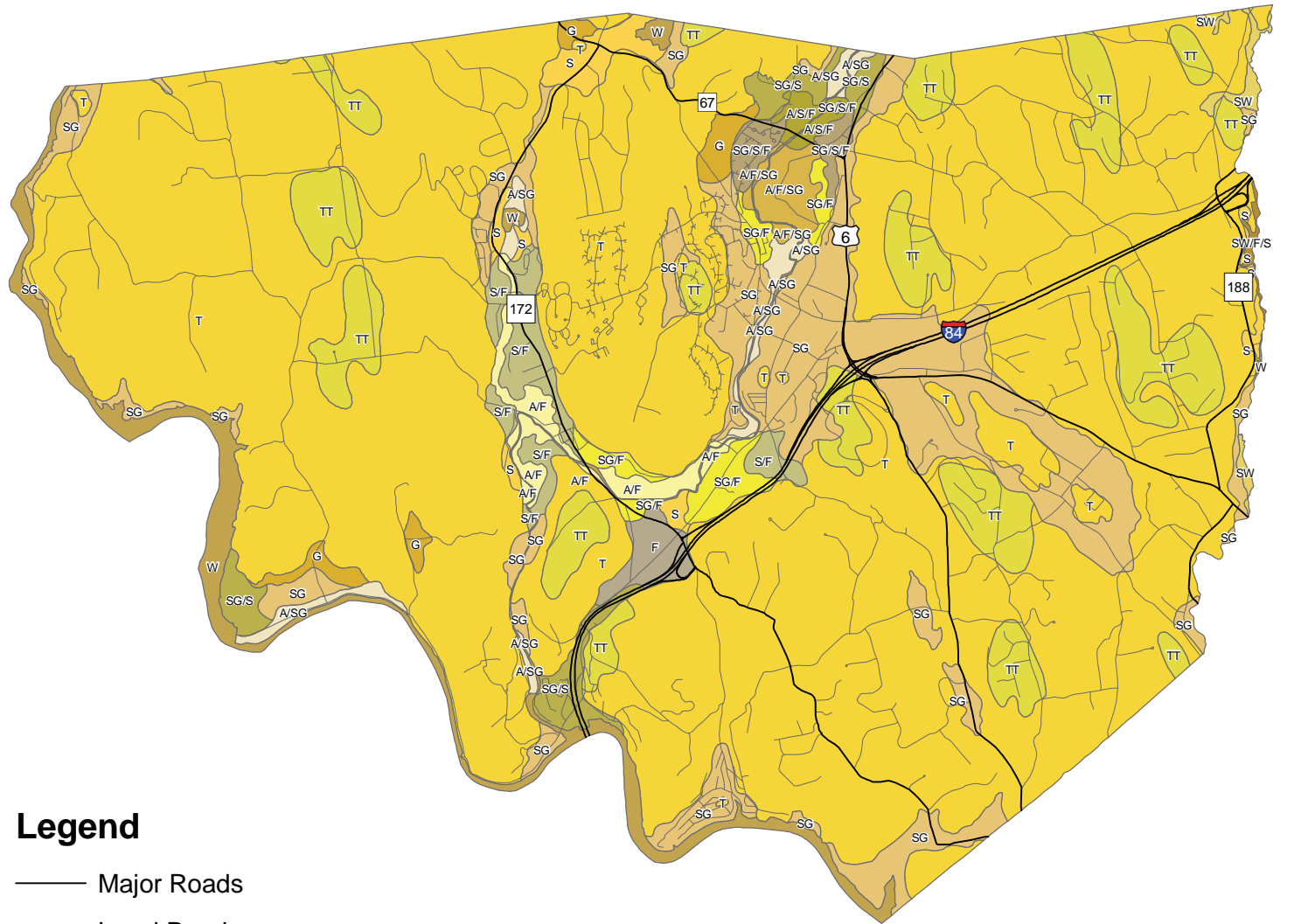
At least twice in the late Pleistocene, continental ice sheets moved across Connecticut. As a result, surficial geology of the Town is characteristic of the depositional environments that occurred during glacial and postglacial periods. Refer to Figure 2-5 for a depiction of surficial geology.

Large areas of the Town are covered by glacial till. Tills contain an unsorted mixture of clay, silt, sand, gravel, and boulders deposited by glaciers as a ground moraine. Sections of the Town lying along the rivers consist primarily of stratified sand and gravel ("stratified drift") and alluvium deposits associated with these rivers. The stratified drift deposits accumulated by glacial meltwater streams during the outwash period following the latest glacial recession. Major stratified drift deposits are aligned along the Shepaug River, Pomperaug River, Transylvania Brook, Housatonic River, and Eightmile River.

The amount of stratified drift present in the Town is important for several reasons:

- ❑ The stratified drift in Southbury provides productive aquifers currently used by the Heritage Village Water Company and the Southbury Training School to provide drinking water via highly productive wells.
- ❑ With regard to flooding, areas of stratified materials are generally coincident with floodplains. This is because these materials were deposited at lower elevations by glacial streams, and these valleys later were inherited by the larger of our present-day streams and rivers. The Pomperaug River corridor is a good example.
- ❑ The amount of stratified drift also has bearing on the relative intensity of earthquakes. This topic will be discussed in Section 8.0.

# Figure 2-5: Southbury Surficial Materials



## Legend

- Major Roads
- Local Roads

## Surficial Materials

A/F Alluvium Overlying Fines	G Gravel	SG/S/F Sand and Gravel Overlying Sand Overlying Fines
A/F/SG Alluvium Overlying Fines Overlying Sand and Gravel	S Sand	SW Swamp
A/S/F Alluvium Overlying Sand Overlying Fines	S/F Sand Overlying Fines	SW/F/S Swamp Overlying Fines Overlying Sand
A/SG Alluvium Overlying Sand and Gravel	SG Sand and Gravel	T Till
F Fines	SG/F Sand and Gravel Overlying Sand Overlying Fines	TT Thick Till
	SG/S Sand and Gravel Overlying Sand	W Water



## 2.4 Climate

Southbury has an agreeable climate, characterized by moderate but distinct seasons. The average mean temperature is approximately 48 degrees Fahrenheit, with summer temperatures in the mid-80s and winter temperatures in the upper 20s to mid-30s. Extreme conditions raise summer temperatures to near 100 degrees and winter temperatures to below zero. Median snowfall is approximately 43 inches per year as averaged between the weather stations in Thomaston, Litchfield, Woodbury, and Waterbury (NCDC, 2007). Median annual precipitation is 44 inches, spread evenly over the course of a year.

***The continued increase in precipitation only heightens the need for hazard mitigation planning, as the occurrence of floods may change in accordance with the greater precipitation.***

By comparison, average annual state-wide precipitation based on more than 100 years of record is nearly the same, at 45 inches. However, average annual precipitation in Connecticut has been increasing by 0.95 inches per decade since the end of the 19<sup>th</sup> century (Miller et. al., 2004; NCDC, 2005). Likewise, total annual precipitation in the Town has increased over time. The continued increase in precipitation only heightens the need for hazard mitigation planning, as the occurrence of floods may change in accordance with the greater precipitation.

## 2.5 Drainage Basins and Hydrology

The Town of Southbury is drained by seven defined drainage basins corresponding with the Housatonic River, Shepaug River, Hesseky Brook, Pomperaug River, Eightmile River, Transylvania Brook, and Kettletown Brook. These subregional drainage basins are part of the Housatonic Main Stem, Shepaug River, and Pomperaug River regional basins which either directly, in the case of the Housatonic River Main Stem, or ultimately

drain into the Housatonic River. The subregional drainage basins are described below and summarized in Table 2-2.

**Table 2-2**  
**Drainage Basins**

<b>Drainage Basin</b>	<b>Area (sq. mi)</b>	<b>Percent of Town</b>
Housatonic River	8.30	20.75
Shepaug River	3.12	7.80
Hesseky Brook	0.35	0.88
Pomperaug River	14.77	36.92
Eightmile River	5.05	12.63
Transylvania Brook	4.61	11.53
Kettletown Brook	3.80	9.50
<b>Total</b>	<b>40.00</b>	<b>100.0</b>

*Source: Drainage Basins, 2008 CT DEP GIS Data for Connecticut*

### Housatonic River

The Housatonic River has its headwaters in western Massachusetts near the Town of Pittsfield. It flows almost 150 miles southward through Massachusetts and Connecticut before flowing into Long Island Sound between the City of Milford and the Town of Stratford. While approximately 624 square miles of land drain directly into the Housatonic River, regionally it is responsible for draining approximately 1,950 square miles of land across New England. The river has a history of contamination from industrial sources and still has resident levels of PCBs in some areas. In addition, it has been impounded in Connecticut in several places for hydroelectric power generation.

While all the land in Southbury eventually drains into the Housatonic River, only 8.30 square miles, representing 20.8% of the Town's land area, does so directly. Starting at its confluence with the Shepaug River, the Housatonic forms Southbury's border with Newtown to the south. In this same stretch of river there are a number of tributaries that feed into the Housatonic River. Cavandaug Brook, Little Pootatuck Brook, Pole Bridge Brook, Lee Brook, and a number of unnamed tributaries all feed into the Housatonic

River from within its drainage basin. The Shepaug River, Pootatuck River, Pomperaug River and Kettletown Brook are all watercourses that correspond with other drainage basins that feed into the Housatonic River in this stretch along Southbury's southern boundary.

Two densely populated neighborhoods are located along the Housatonic River, near the end of the Pomperaug River and near the end of Lee Brook. These were cottage communities that now have numerous year-round residents.

### *Shepaug River*

In its entirety, the Shepaug River drains 70.94 square miles of land stretching from a location at the border between the Town of Cornwall and the Town of Goshen to the river's confluence with the Housatonic River.

The Shepaug River is dammed on the border between the Town of Warren and the Town of Litchfield, forming the Shepaug Reservoir which is operated by the City of Waterbury. Upstream of the Shepaug Reservoir, the Shepaug River has two branches. The West Branch of the Shepaug River pertains to its own subregional drainage basin, and was dammed to form the Upper Shepaug Reservoir. The East Branch of the Shepaug River is considered to be part of the same Shepaug River Basin, and is joined by a number of tributaries to the north before it flows into the Shepaug Reservoir.

The western portion of Southbury is a part of the Shepaug River drainage basin. This small area covers only 3.12 square miles, or 7.8% of the Town's land area. Most of the area drains into the Shepaug River via Upper Purchase Brook, which meets the Shepaug River prior to its confluence with the Housatonic River. This part of Southbury is very sparsely populated.

### Hesseky Brook

The drainage basin that corresponds to Hesseky Brook is by far the smallest in Southbury. Located along the Town's northern boundary, this area drains 0.35 square miles of land, or 0.9% of the Town's land area. The area drains to the north into Hesseky Brook, which passes through Transylvania Pond, Radey Pond, and Hesseky Meadow Pond before turning to the east and joining the Pomperaug River in the Town of Woodbury near the junction between Routes 317 and 6. Hesseky Brook is joined by a number of unnamed tributaries, as well as Good Hill Brook, which flows to the southeast into Hesseky Meadow Pond. In all, the Hesseky Brook drainage basin covers 6.22 square miles of land in the Towns of Southbury, Woodbury and Roxbury.

### Pomperaug River

The Pomperaug River originates at the confluence of the Weekepeemee and Nonnewaug Rivers in the Town of Woodbury. The river winds southward through Woodbury, converging with Hesseky Brook near the intersection of Routes 317 and 6. Downstream of this confluence, the Pomperaug River is joined by South Brook, which drains the Woodbury Reservoir. Just after crossing into Southbury, the Pomperaug River is met by Stiles Brook from the southeast. Further downstream it converges with several unnamed tributaries before meeting Transylvania Brook along East Flat Hill Road. After that point, the Pomperaug River continues southward and flows into the Housatonic River along Southbury's southern border. In all, the Pomperaug River Basin drains 21.39 square miles of land across Southbury and Woodbury.

The drainage basin pertaining to the Pomperaug River is the largest in Southbury, covering 14.77 square miles, or 36.9% of the Town's total land area. It contains most of the critical facilities and most densely developed neighborhoods in the Town.



### Eightmile River

Eightmile River has its headwaters in Lake Quassapaug in western Middlebury. South of Lake Quassapaug, Eightmile River enters Kelley Pond. Beginning just to the south of Kelley Pond, Eightmile River makes up much of the eastern border of Southbury.

Several tributaries located within Southbury enter Eightmile River throughout this stretch. An unnamed tributary enters the river in a wetland along Judd Road. Another unnamed tributary enters the river to the south near its crossing with Interstate 84. Walnut Hill Brook meets Eightmile River just upstream of Route 67. One final watercourse, Jeremy Brook, enters Eightmile River from the Southbury side at the end of the section of the river that makes up Southbury's eastern border. Eightmile River drains the easternmost 5.05 square miles of Southbury or 12.6% of the Town's land area.

After leaving Southbury and entering Oxford, Eightmile River is joined by a number of watercourses, including Sevenmile Brook, Sixmile Brook, and several unnamed tributaries, before meeting the Housatonic River in Oxford. In all, the Eightmile River basin drains 17.44 square miles across the Towns of Oxford, Southbury, Middlebury, and Woodbury.

### Transylvania Brook

The Transylvania Brook watershed drains 4.61 square miles, or 11.5% of Southbury's total land area in the north-central section of the Town. It has its headwaters in the Town of Roxbury near the border with the Town of Woodbury.

From its headwaters, Transylvania Brook flows southward through Roxbury then Woodbury before crossing the border into Southbury near the junction of Routes 67 and 172. As the Brook travels southward it converges with several tributaries before entering Gravel Pit Pond along the side of Route 172. Just south of the pond, Transylvania Brook



passes by the Southbury Training School's wastewater treatment plant, the only point source discharge into the Brook. Downstream of this facility, Transylvania Brook continues southward and eventually converges with the Pomperaug River. In all, the Transylvania Brook basin drains 7.21 square miles of land across the Towns of Southbury, Roxbury, and Woodbury.

### *Kettletown Brook*

The Kettletown Brook watershed drains 3.80 square miles, or 9.5% of Southbury's total land in the Town's southeastern corner. Kettletown Brook's headwaters are located near Georges Hill Road in Southbury. In this area, there are several small streams and ponds that flow together to form Kettletown Brook.

From this location, the Brook flows southward in the vicinity of Kettletown Road for about a mile before turning to the southwest. Kettletown Brook converges with several more unnamed tributaries before flowing into the Housatonic River at Kettletown State Park. In all, Kettletown Brook drains 4.87 square miles of land in the Towns of Southbury and Oxford.

## **2.6 *Population and Demographic Setting***

The total CNV Region estimated 2005 population is 281,895 persons. The total land area is 309 square miles, for a regional population density of 912 persons per square mile. Southbury has a population density of 504 individuals per square mile. By comparison, Waterbury has the highest population density in the region with 3,757 individuals per square mile; Bethlehem has the lowest population density in the region with 185 individuals per square mile.

**Table 2-3**  
**Population Density by Municipality, Region and State, 2005**

<b>Municipality</b>	<b>Total Population</b>	<b>Land Area (square miles)</b>	<b>Population Density</b>
Beacon Falls	5,700	9.77	583
Bethlehem	3,577	19.36	185
Cheshire	28,833	32.90	876
Middlebury	7,132	17.75	402
Naugatuck	31,872	16.39	1,945
Oxford	12,309	32.88	374
Prospect	9,264	14.32	647
Southbury	19,686	39.05	504
Thomaston	7,916	12.01	659
Waterbury	107,251	28.55	3,757
Watertown	22,329	29.15	766
Wolcott	16,269	20.43	796
Woodbury	9,757	36.46	268
CNV Region	281,895	309.02	912
Connecticut	3,495,753	4,844.80	722

*Source: United States Census Bureau, 2005 Population Estimates*

Southbury is ranked 56<sup>th</sup> out of 169 municipalities in Connecticut in terms of population, with an estimated population of 19,686 in 2006. The Town is the 79<sup>th</sup> most densely populated municipality in the state.

The population of Southbury increased by 51% between 1960 and 1970, and increased again by a large percentage of 80% between 1970 and 1980, representing the last surge in development in recent history. Growth then dropped to 12% from 1980-1990 and remained steady at 17% in the decade 1990-2000. Growth from 2000 to 2006 was 6%.

Based on analysis by the Council of Governments of the Central Naugatuck Valley, population growth in the region outside of Waterbury is estimated to be about 10% from 2005 to 2025, while the state of Connecticut is expected to grow about 5% during this same timeframe. According the Connecticut Economic Resource Center, the median sales price of owner-occupied housing in the Town of Southbury in 2006 was \$426,500, which is higher than the statewide median sales price of \$275,000.

Southbury has very large populations of people who are elderly and disabled, although very few who are linguistically isolated. These are depicted by census block on Figures 2-6, 2-7, and 2-8. The populations with these characteristics have numerous implications for hazard mitigation, as they may require special assistance or different means of notification before disasters occur.

In general, the Town of Southbury has three unique situations that can potentially lead to difficult disaster response:

1. the presence of Heritage Village, with its 2,500 age-restricted units and access limitations;
2. the predominance of year-round homes in challenging riverside and hilly locations that were formerly summer cottages; and
3. the presence of existing subdivisions with only one point of egress.

With regard to the first, Heritage Village has its own security but not its own police and rescue teams. It relies on the Town of Southbury for these services. The adjacent Traditions development of 150 units is similar although smaller, but it relies on a one way entrance/exit and an emergency access connection to Heritage Village.

With regard to the second, many of the cottages in Southbury date back to the 1930s when Connecticut Light & Power sold numerous cottage home lots for \$100 each. These cottage home lots were transformed into year-round dwellings mostly during the 1950s, 1960s and 1970s. These homes are now located in some of the larger problem areas in the Town in terms of overbank flooding and flooding caused by poor drainage.

The presence of existing dead end streets cannot be easily corrected, but the Town has revised its subdivision regulations such that new subdivisions are not allowed to have dead-end streets.

# Figure 2-6: Southbury Elderly Population

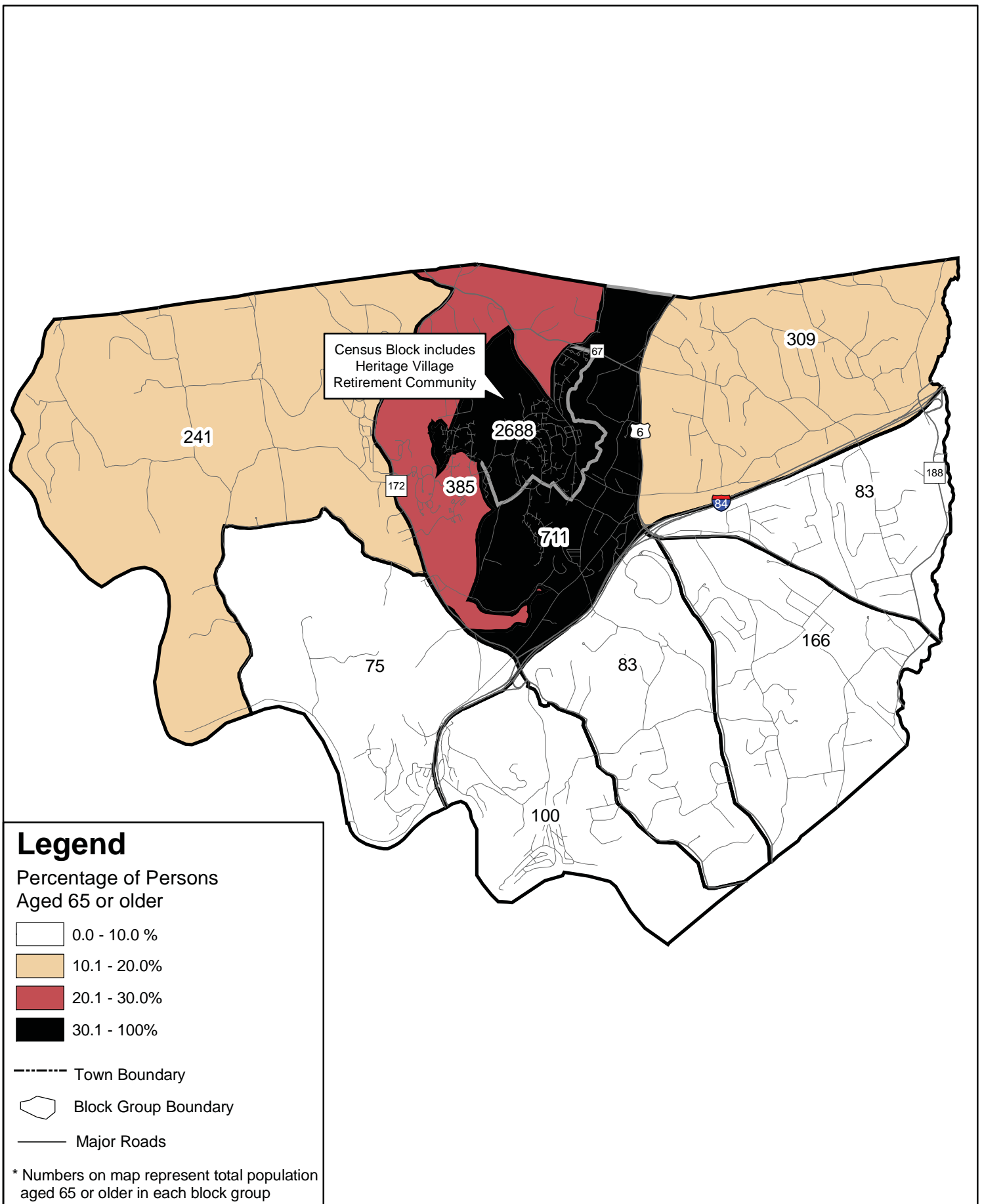
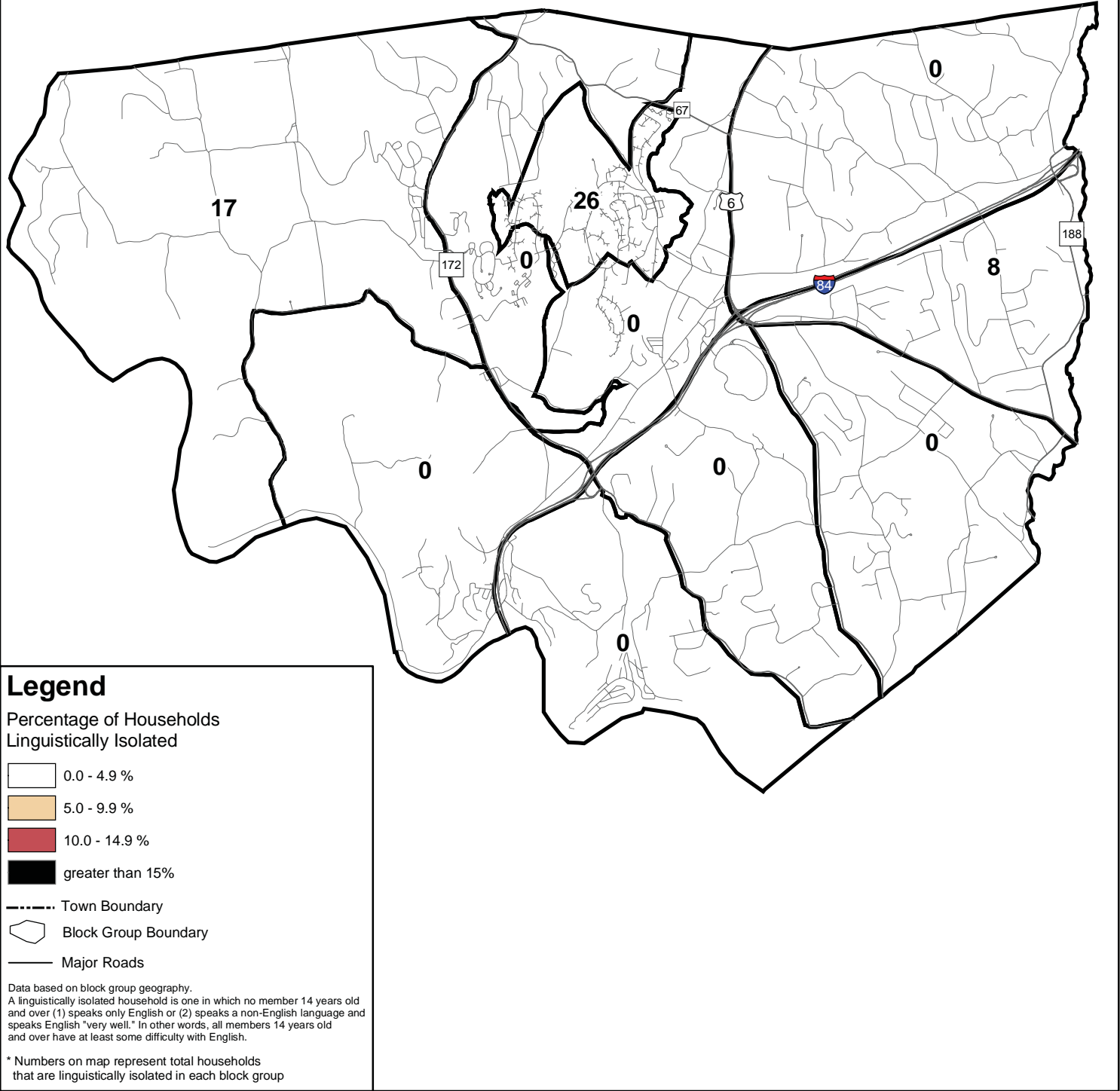
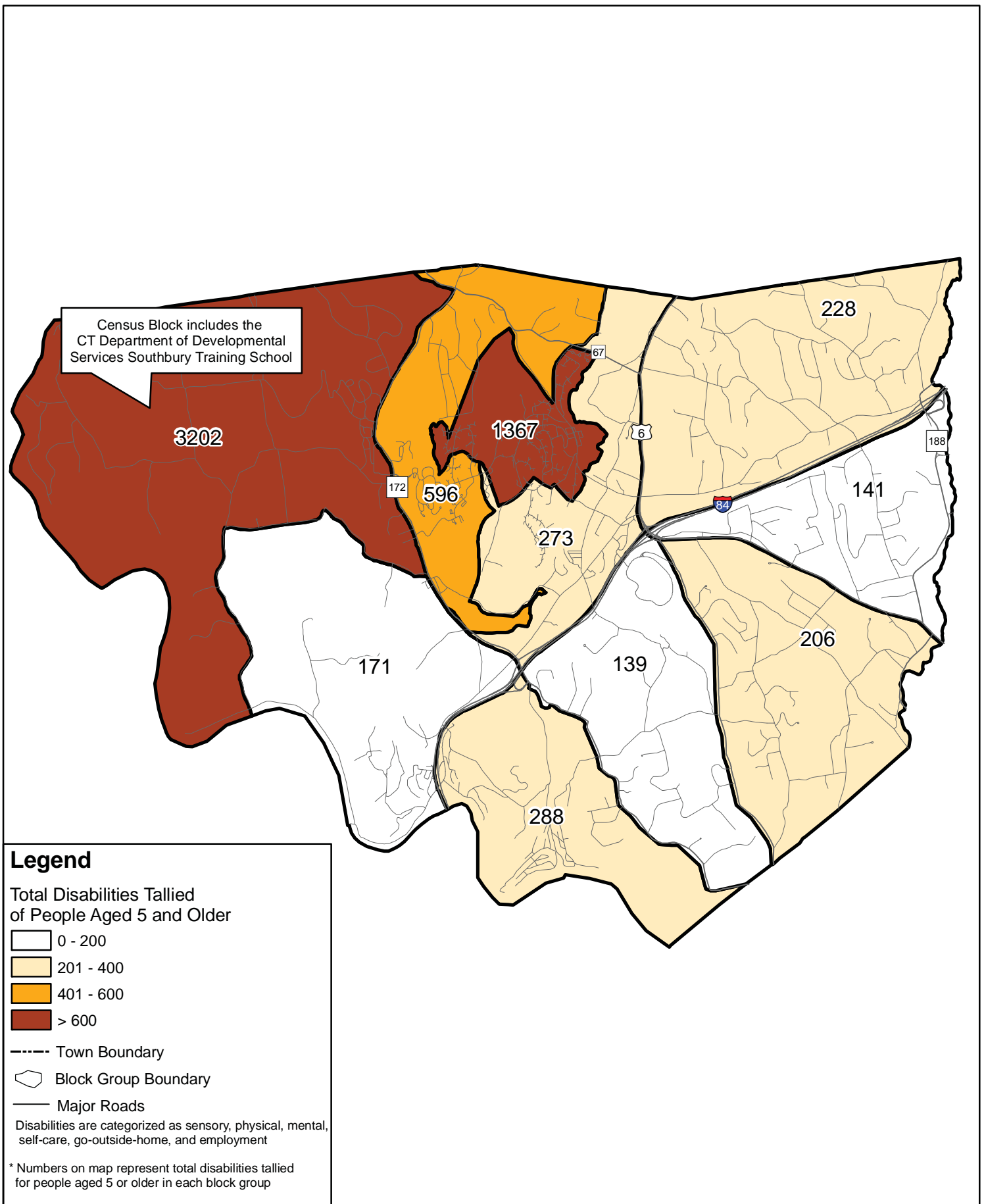


Figure 2-7: Southbury Linguistically Isolated Households



# Figure 2-8: Southbury Disabilities Map



## **2.7     Governmental Structure**

The Town of Southbury is governed by a Selectman-Town Meeting form of government in which legislative responsibilities are shared by the Board of Selectmen and the Town Meeting. The First Selectman serves as the chief executive.

In addition to Board of Selectmen and the Town Meeting, there are boards, commissions and committees providing input and direction to Town administrators. Also, Town departments provide municipal services and day-to-day administration. Many of these commissions and departments play a role in hazard mitigation, including the Planning Commission, the Zoning Commission, the Conservation Commission, the Inland Wetland Commission, the Pomperaug River Watershed Coalition, the Lake Lillinonah Authority, the Lake Zoar Authority, the LEPC, the Building Official, the Fire Department, the Police Department, Emergency Medical Services, and the Highway Department/Public Works.

The Department of Public Works is the principal municipal department that responds to problems caused by natural hazards. Complaints related to Town maintenance issues are routed to the Department of Public Works. These complaints are usually received via phone, fax, mail, or email and are recorded in a logbook. The complaints are investigated as necessary until remediation surrounding the individual complaint is concluded.

## **2.8     Development Trends**

Southbury was settled in the late 1600s as part of the Town of Woodbury. Southbury was officially incorporated in 1787. The Town's origins were largely agrarian; industry developed in the 1800s which utilized water power from the Pomperaug and Housatonic Rivers, including mills, shoe making shops, tanneries and distilleries. Carpet and hat making centered in South Britain, a village located on the Pomperaug River in the

western section of Southbury. Much of the industry migrated to the City of Waterbury as that area became an economic center.

The population boom in Southbury in the 1960s and 1970s was largely a result of the completion of I-84, connecting Southbury with nearby employment centers in the City of Danbury, the City of Waterbury and the City of Hartford. Heritage Village also opened in that timeframe. The IBM facility, which employs 2,500 people, opened in 1987.

Cul-de-sacs in new developments are discouraged, while the connectivity of roads is encouraged. Subdivisions featuring cul-de-sacs offer a single access point for emergency services, lengthening emergency response times and rendering those residential areas vulnerable if access is cut off by flooding or downed tree limbs. In addition, new subdivisions must have two points of egress by ordinance. The road widths of those roadways associated with new subdivisions are required to be at least 26 feet unless the subdivision has less than 20 lots. In this case, 22 foot road widths have been considered acceptable.

The Town of Southbury requires a 50-foot right of way for local residential streets with a hammerhead located at the end of dead end streets, and dead end streets can have only 20 homes or fewer. In addition, utilities serving new developments must be installed underground wherever possible. Exceptions due to shallow bedrock are granted on a case-by-case basis. In the 1990s, the average number of housing units approved in Southbury was about 95 per year.

The Town of Southbury has created an ordinance which prohibits dwellings from being constructed in the floodplain, and development on steep slopes is also prohibited within the Town. Age-restricted housing is no longer allowed to be constructed in Southbury. Based on the Town's 2001 Plan of Conservation and Development, efforts are being made to preserve Southbury's small-town charm and limit the impact of future development through an ongoing open space acquisition program.



## 2.9 Critical Facilities and Sheltering Capacity

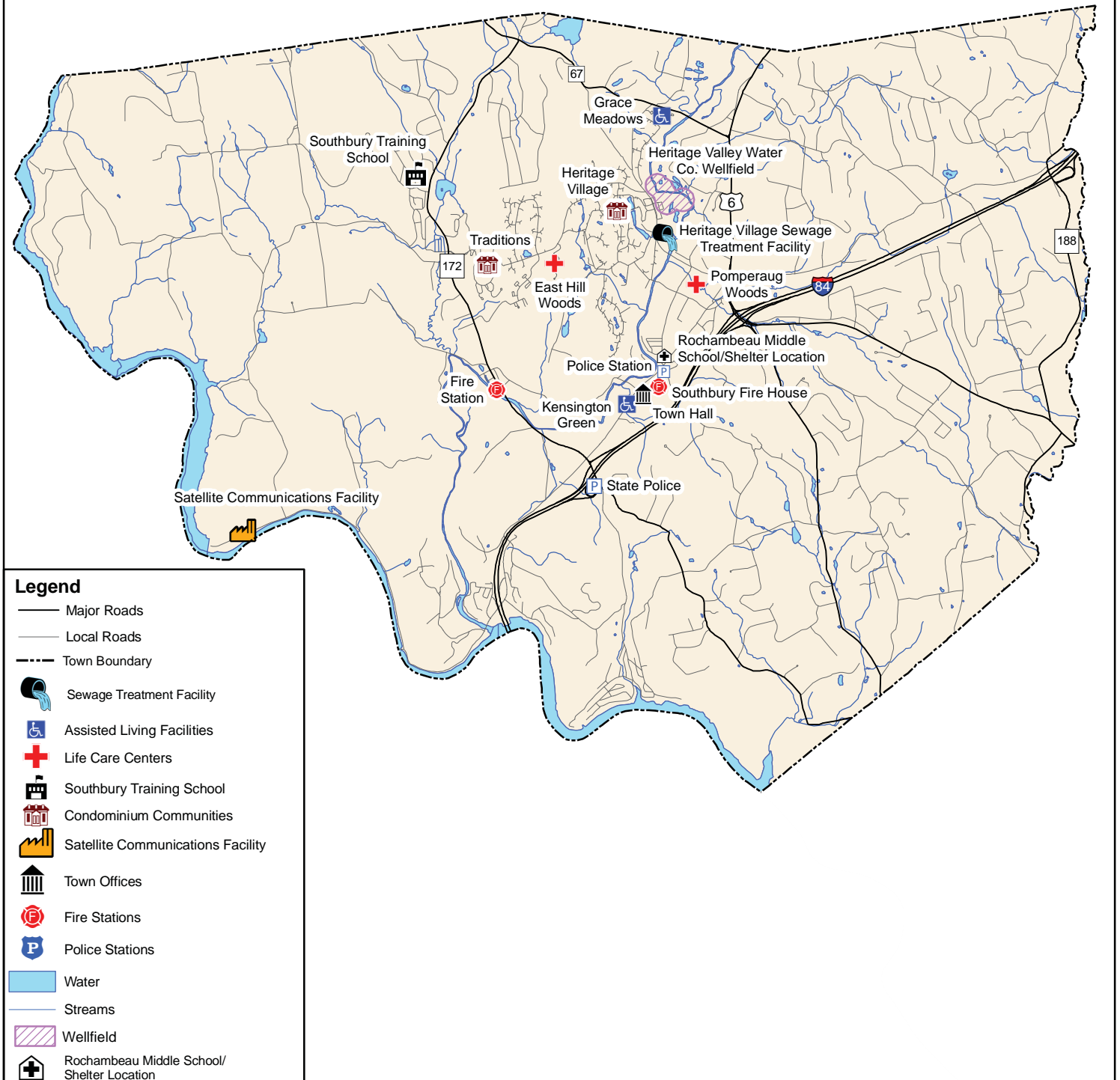
The Town considers its police, fire, medical, governmental, major transportation facilities to be its most important critical facilities, for these are needed to ensure that emergencies are addressed while day-to-day management of Southbury continues. Age-restricted, State facilities, life care centers, assisted / disabled living communities, a national defense satellite/communications facility, sewage treatment plants, and the Heritage Village Water Company wellfield are included with critical facilities, as these house populations of individuals and utilities that would require special assistance or are needed during an emergency. A list of critical facilities is provided in Table 2-4. A map of critical facilities is shown in Figure 2-9. Shelters, transportation, communications, and utilities are described in more detail below.

**Table 2-4**  
**Critical Facilities in Southbury**

Type	Name	Address	Located in Floodplain?
Active Adult Condominiums	Heritage Village	Heritage Village	No
Clustered Housing	Traditions	Route 172	No
Connecticut Department of Development Services	Southbury Training School	1461 S Britain Road	No
Assisted Living Community	Kensington Green	655 Main St. South	No
Disabled / Low Income Housing	Grace Meadows	Route 67	No
Life Care Community	East Hill Woods	611 East Hill Road	No
Life Care Community	Pomperaug Woods	80 Heritage Road	No
Sewer	Southbury Training School STP	Whale Pass/S. Britain Road	Yes
Sewer	Heritage Village STP	Heritage Village	No
Sewer	Pomperaug Woods STP	Pomperaug Woods	No
Sewer	IBM (Southbury) STP	150 Kettletown Road	No
Water	Heritage Village Water Company Wellfield	Heritage Village	100-year
Fire Department & Shelter	Southbury Fire Dept.	461 Main Street South	No
Police Department	Southbury Police Dept.	421 Main Street South	No
National Defense and Communications	Vizada Americas Satellite Services Facility	2120 River Road	500-year
Senior Center	Southbury Senior Center	561 Main Street South	No
Rochambeau Middle School	Shelter	100 Peter Road	No

*Source: Council of Governments Central Naugatuck Valley; Town of Southbury*

# Figure 2-9: Southbury Critical Facilities



Source: "Roads", c1984 - 2008 Tele Atlas, Rel. 04/08.  
 "Town Boundary", DEP  
 "Facilities", Southbury  
 For general planning purposes only. Delineations may not be exact.  
 August 2008



0 0.5 1 Miles



COUNCIL OF GOVERNMENTS  
 CENTRAL NAUGATUCK VALLEY

## *Shelters*

Emergency shelters are considered to be an important subset of critical facilities, as they are needed most in emergency situations. Southbury has two American Red Cross approved shelter facilities. The first is the community center in Heritage Village which is available to that population, and the second is Rochambeau Middle School. These buildings have been designated as public shelter facilities by meeting specific American Red Cross guidelines.

However, the facilities at Rochambeau Middle School are considered by the Town to be insufficient to shelter the remainder of Southbury's growing population. Thus, Southbury has two buildings that can be used as emergency shelters. The first is the Senior Center located at 561 Main Street South. The second shelter, the Southbury Fire House, is located at 461 Main Street South. The central locations of both these shelters make them easily accessible from most locations in Town. In addition, the Walzer Family Jewish Community Campus, home to both the B'nai Israel and Beth El congregations, is located in Southbury at 444 Main Street. It is reportedly the largest Jewish center in New England and potentially could be used to house additional shelterees during an extreme natural hazard event.

In case of an extended power outage, it is anticipated that 10-20% of the population would relocate, although not all of those relocating would necessarily utilize the shelter facilities. Many communities only intend to use these facilities on a temporary basis for providing shelter until hazards such as hurricanes diminish. Southbury encourages residents to shelter in place whenever possible. Regionally-located mass care facilities operated and paid for by the American Red Cross may be available during recovery operations when additional sheltering services are necessary.

## **Transportation**

The Town of Southbury does not have any hospitals or medical centers. Instead, residents use the nearby facilities in the City of Danbury and the City of Waterbury. As a means of accessing these facilities, the Town has convenient access on Interstate 84 west to Danbury and east to Waterbury.

Evacuation routes are regionally defined by the Regional Evacuation Plan. No local evacuation plan exists. During a major evacuation, Interstate 84 would presumably be the most effective means of evacuating Southbury. However, Routes 172, 67, and 6 are the main arterial roads and would also offer evacuation routes.

On a small scale, evacuation routes are reportedly determined on a case-case basis. There is frequent need to evacuate residents along Pomperaug Trail and Flood Bridge Road. Prior to a flood, both the Town Police and the Town Fire Departments warn the residents of the danger. Both departments monitor the level of the Pomperaug River.

Berkshire Road is a long dead end and, because of its close orientation with the Pomperaug River, is noted as high priority to create connectivity with other roadways. This is important for emergency vehicles and options for transit if evacuation is needed.

Finally, many private roads and trails (including Hillside Road, Heritage Village and Berkshire Estates) are too narrow for emergency vehicular transit. They present the possibility of access problems during emergencies in the area.

## **Communications**

The Town of Southbury has established the CodeRED Emergency Notification System in an effort to streamline emergency notifications to residents of the Town. This system allows Town of Southbury personnel to telephone all or targeted areas of the Town in

case of an emergency situation that requires immediate action. The system is capable of dialing 50,000 phone numbers per hour. It then delivers a recorded message to a person or an answering machine, making three attempts to connect to any number.

The Town has also created an Emergency Management Department and, for long-term planning, the Town has a Local Emergency Preparedness Commission who accomplishes tasks related to emergency planning.

### **Utilities**

Water service is a critical component of hazard mitigation, especially with regard to fighting fires. It is also necessary for everyday residential, commercial, and industrial use. The Heritage Village Water Company provides potable and fire fighting water to the majority of the central and northeastern section of Town, while the Aquarion Water Company provides the same services to a relatively small section of the extreme south-central portion of Town and Southbury Training School provides water service to itself.

The Fire Department uses alternative water supplies to fight fires in the less developed areas of Southbury, including fire ponds and underground water tanks. Depending upon the circumstances at the time of a fire emergency, the Fire Department transports as much water in its response vehicles as is allowed. This is discussed further in Section 10.0.

Sewer service is an often overlooked critical facility. The Southbury Training School, Heritage Village, and Pomperaug Woods Sewage Treatment Plants are located in the north-central section of Town, and the IBM Southbury Sewage Treatment Plant is located centrally in Southbury. These sewage treatment plants serve portions of the Town where large concentrations of residents or working populations are found.

### **Public Works Department**

The Public Works Department is a critical municipal department related to hazard mitigation because it maintains, repairs, and constructs stormwater systems and roadways. The Department is responsible for maintaining stormwater systems for proper drainage and flood mitigation, as well as clearing snow and ice and maintaining access for emergency vehicles.

Likewise, the Public Works Department believes that establishment of working inter-municipal agreements with other public works departments in nearby communities would allow for sharing of resources when disasters affect one community more than others. This Plan therefore recommends that these types of agreements be pursued.

### **Potential Impacts from Natural Hazards**

By virtue of their locations near watercourses, public water supply wellfields and wastewater treatment plants are often in or near floodplains. The Southbury Training School Sewage Treatment Plant is located in the 100-year floodplain, but reportedly does not have regular issues with flooding. The three other sewage treatment plants in Southbury are located outside of floodplains. The Heritage Village Water Company wellfield is located in the 100-year floodplain of the Pomperaug River and the water utility must take precautions to prevent contamination from floodwaters.

In general, municipal facilities and shelters are sited outside floodplains and are centrally-located to be as accessible as possible to the majority of the population.

## **3.0 INLAND FLOODING**

### **3.1 Setting**

According to FEMA, most municipalities in the United States have at least one clearly recognizable flood-prone area around a river, stream, or large body of water. These areas are outlined as Special Flood Hazard Areas (SFHA) and delineated as part of the National Flood Insurance Program (NFIP). Flood-prone areas are addressed through a combination of floodplain management criteria, ordinances, and community assistance programs sponsored by the NFIP and individual municipalities.

Many communities also have localized flooding areas outside the SFHA. These floods tend to be shallower and chronically reoccur in the same area due to a combination of factors. Such factors include ponding, poor drainage, inadequate storm sewers, clogged culverts or catch basins, sheet flow, obstructed drainageways, sewer backup, or overbank flooding from small streams.

Flooding is a substantial natural hazard in the Town of Southbury. The Pomperaug River and the Housatonic River pass through and border the Town, respectively. The seven primary drainage basins in the Town are the Housatonic River, the Shepaug River, the Hesseky Brook, the Pomperaug River, Eightmile River, Transylvania Brook, and Kettletown Brook. A thorough discussion of these drainage areas was included in Section 2.5.

Prior to various regulations, cottages and homes were constructed on floodplains along the Pomperaug River and Housatonic River. Some of these homes and cottages are regularly flooded during sustained precipitation events. Additionally, some homes along the Pomperaug River experience flooding during ice jam events, as explained in Section 4.0. Localized nuisance flooding along tributaries and, more commonly, along roadways

resulting from inadequate drainage and other factors is also an inland flooding issue that the Town regularly faces.

### 3.2 **Hazard Assessment**

Flooding represents the most common and costly natural hazard in Connecticut. The state typically experiences floods in the early spring due to snowmelt and in the late summer/early autumn due to frontal systems and tropical storms, although localized flooding caused by thunderstorm activity can be significant. Flooding can occur as a result of other natural hazards, including hurricanes, summer storms, winter storms, and ice jams. Flooding can also occur as a result of dam failure, which is discussed in Section 9.0, and may also cause landslides and slumps in affected areas.

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by FEMA as the base flood for purposes of floodplain management and to determine the need for insurance. This flood has a one percent chance of being equaled or exceeded each year. The risk of having a flood of this magnitude or greater increases when periods longer than one year are considered. For example, FEMA notes that a structure located within a 100-year flood zone has a 26% change of suffering flood damage during the term of a 30-year mortgage. Similarly, a 500-year flood has a 0.2 percent chance of occurring in a given year. The 500-year floodplain indicates areas of moderate flood hazard.

***Floodplains*** are lands along watercourses that are subject to periodic flooding; ***floodways*** are those areas within the floodplains that convey floodwaters. Floodways are subject to water being carried at relatively high velocities and forces. The ***floodway fringe*** contains those areas of the 100-year floodplain that are outside the floodway and are subject to inundation but do not convey the floodwaters.

Flooding presents several safety hazards to people and property. Floodwaters cause massive damage to the lower levels of buildings, destroying business records, furniture, and other sentimental papers and artifacts. In addition, floodwaters can prevent



emergency and commercial egress by blocking streets, deteriorating municipal drainage systems, and diverting municipal staff and resources.

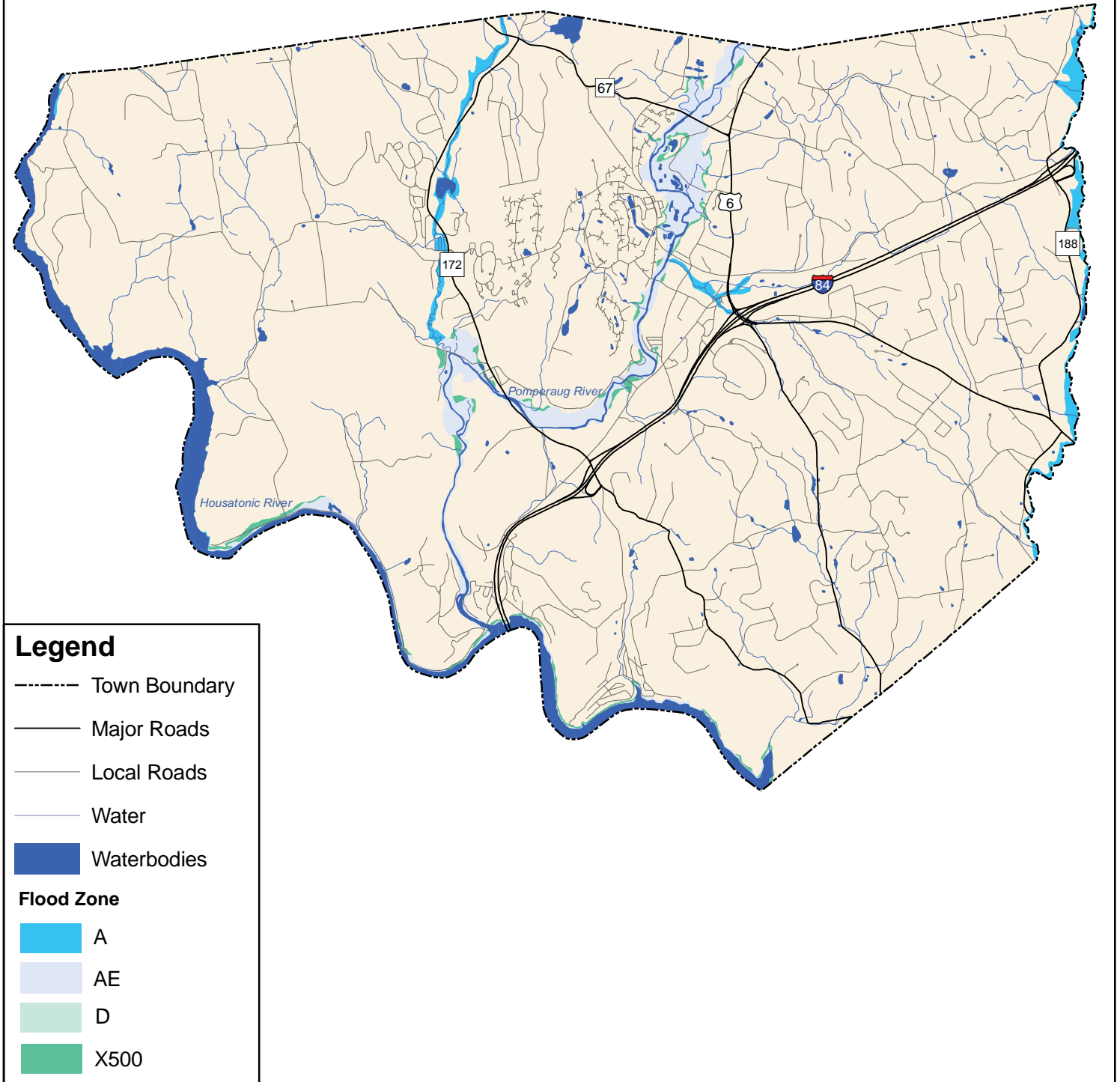
Furthermore, damp conditions trigger the growth of mold and mildew in flooded buildings, contributing to allergies, asthma, and respiratory infections. Snakes and rodents are forced out of their natural habitat and into closer contact with people, and ponded water following a flood presents a breeding ground for mosquitoes. Gasoline, pesticides, and other aqueous pollutants can be carried into areas and buildings by flood waters and soak into soil, building components, and furniture.

SFHAs in Southbury are delineated on Flood Insurance Rate Maps (FIRM) and Flood Insurance Studies (FIS). An initial Flood Hazard Boundary Map was identified on February 8, 1974. The FIRM delineates areas within Southbury that are vulnerable to flooding and was originally published on March 28, 1980. The FIS was originally published on March 28, 1980 and has not been updated. The Town's FIRM was last updated on December 11, 1981. Refer to Figure 3-1 for the areas of Southbury susceptible to flooding based on FEMA flood zones. Table 3-1 describes the various zones depicted on the FIRM panels for Southbury.

**Table 3-1**  
**FIRM Zone Descriptions**

<b>Zone</b>	<b>Description</b>
A	An area inundated by 100-year flooding, for which no base flood elevations (BFEs) have been determined.
AE	An area inundated by 100-year flooding, for which BFEs have been determined.
Area Not Included	An area that is located within a community or county that is not mapped on any published FIRM.
X	An area that is determined to be outside the 100- and 500-year floodplains.
X500	An area inundated by 500-year flooding; an area inundated by 100-year flooding with average depths of less than 1 foot or with drainage areas less than 1 square mile; or an area protected by levees from 100-year flooding.

# Figure 3-1: FEMA Flood Zones in Southbury



In some areas of Southbury, flooding occurs from heavy rains with a much higher frequency than those areas mapped by FEMA. This nuisance flooding occurs from heavy rains, and often in different areas than those depicted on the FIRM panels. These frequent flooding events occur in areas with insufficient drainage; where conditions may cause flashy, localized flooding; and where poor maintenance may exacerbate drainage problems. These areas are discussed in Sections 3.3 and 3.5.

During large storms, the recurrence interval level of a flood discharge on a tributary tends to be greater than the recurrence interval level of the flood discharge on the main channel downstream. In other words, a 500-year flood event on a tributary may only contribute to a 50-year flood event downstream. This is due to the distribution of rainfall and the greater hydraulic capacity of the downstream channel to convey floodwaters. Dams and other flood control structures can also reduce the magnitude of peak flood flows. Such dams are located on the Shepaug River and the Housatonic River.

The recurrence interval level of a precipitation event also generally differs from the recurrence interval level of the associated flood. For example, on January 27, 1996, heavy rains totaling one to two inches led to flooding along the Pomperaug River near Southbury, which led to impassable roads and evacuations along Flood Bridge Road. Flood events can also be mitigated or exacerbated by in-channel and soil conditions, such as low or high flows, the presence of frozen ground, or a deep or shallow water table, as can be seen in the following historic record.

### **3.3 Historic Record**

In every season of the year, the Town of Southbury has experienced various degrees of flooding. Melting snow combined with early spring rains have caused frequent spring flooding. Numerous flood events have occurred in late summer to early autumn resulting from storms of tropical origin moving northeast along the Atlantic coast. Winter floods result from the occasional thaw, particularly during years of heavy snow, periods of

rainfall on frozen ground, and the development and jamming of ice masses along the Pomperaug River. Other flood events have been caused by excessive rainfalls upon saturated soils, yielding greater than normal runoff.

The flood of record at the USGS gauge on the Pomperaug River in Southbury was recorded on August 19, 1955, when the instantaneous discharge reached 29,400 cubic feet per second with a stage of 21.8 feet. The August 1955 flood resulted in the total loss of 36 lives in the region and caused over \$193 million dollars in physical damages in the State.

According to the NCDC Storm Events Database, there have been seven urban/small stream flooding events, 23 flash flood, and 32 flooding events in New Haven County since August of 1993. The following are examples of floods in and around the Town of Southbury as described in the NCDC Storm Events Database, and based on correspondence with municipal officials.

- ❑ August 21, 1994: Torrential rainfall (one to five inches) in New Haven County for a three hour period produced a damaging flash flood event. Over the preceding ten days, three to five inches of rain had fallen on the region. Extensive damage occurred to road systems and bridges due to runoff from the region's small streams. Damage from the flash flood event totaled \$2.4 million. Due to flooding along the Pomperaug River, a state of emergency was declared in Southbury where roads were closed and minor damage was reported.
- ❑ January 27, 1996: The Pomperaug River began to flood as heavy rains (one to two inches) fell in northern New Haven County. In the Town of Southbury, numerous roads became impassable and some residents along Flood Bridge Road were evacuated from their residences.

- ❑ April 16, 1996: Heavy rain and strong southeast winds moved across New Haven County as rainfall continued for a period of twelve hours. The twelve hour event produced a range of total rainfall amounts between 2.83 inches (reported in the Town of Oxford) to 6.10 inches (reported in the Town of East Haven). A total of 547 homes and 28 businesses were damaged from the storm. The total un-insured flood damage was approximately \$1.5 million according to preliminary damage assessments by the Connecticut Office of Emergency Management and the Federal Emergency Management Agency.
- ❑ September 16, 1999: Torrential rainfall preceding the remnants of Tropical Storm Floyd caused widespread urban, small stream, and river flooding. In New Haven County, rainfall amounts were as high as 6.18 inches at Ansonia. Serious widespread flooding of low-lying and poor drainage areas resulted in the closure of many roads and basement flooding across Fairfield, New Haven, and Middlesex Counties.
- ❑ October 7-15, 2005: The sustained heavy rainfall of October 2005 caused widespread flooding including dam failures throughout Connecticut (See Section 9.3). The Pomperaug River in Southbury peaked at over 1,900 cubic feet per second on October 15, after rising over five feet in stage over the previous week. The Pomperaug Trail and River Trail neighborhoods experienced varying degrees of flooding, with the structure at 155 River Trail suffering major structural and foundation damage.
- ❑ April 23, 2006: Small creeks in the Town of Southbury flooded as a result of 3.48 inches of rainfall. Road closures, evacuations, injuries and deaths were reported as a result of the rain event.
- ❑ April 15-16, 2007: The nor'easter of April 2007 caused a flood on the Pomperaug River with a peak flow of 7,000 cfs, on the order of the 10-year flood event. Homes on Flood Bridge Road were inundated and yards on River Trail were flooded.

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

The Town of Southbury has in place a number of measures to prevent flood damage. These include regulations, codes, and ordinances preventing encroachment and development near floodways. Developments in floodplains are no longer allowed as the Town has approved an ordinance which prohibits further development within these areas.

The Town of Southbury Zoning Enforcement Officer serves as the NFIP administrator and oversees the enforcement of NFIP regulations with the assistance of the Building Official and Emergency Management Director. The Town has completed at least one update to its flood hazard regulations (as noted above), and currently has no plans to enroll in the Community Rating System. The Town Planning and Zoning Commission uses the 100-year flood lines from the FIRM and FIS delineated by FEMA as the official maps and report for determining special flood hazard areas. Ordinances require that all structures in flood hazard areas have their lowest floor be above established flood elevations. Site plan standards require that all proposals be consistent with the need to minimize flood damage, that public facilities and utilities be located and constructed to minimize flood damage, and that adequate drainage is provided. The Southbury Inland Wetlands Commission also reviews new developments and existing land uses on and near wetland courses.

Regulations, codes, and ordinances that apply to flood hazard mitigation in conjunction with and in addition to NFIP regulations include:

❑ ***Flood Damage Prevention and Control Ordinance*** (Section 6 of Southbury Code).

This section of the Town code promotes the public health, safety and general welfare and minimizes public and private losses due to flood conditions by establishing standards and elevations for construction and renovations in flood hazard areas.

- ❑ ***Flood Plain District*** (Section 5 of Southbury Zoning Regulations). This section defines the boundaries of the flood plain district and states that no building or structure within the boundaries of the district may be constructed, moved, or substantially improved without a Flood Hazard Area Permit obtained from the Building Official of the Town of Southbury in accordance with the *Flood Damage Prevention and Control Ordinance* listed above. This requirement has terms which the project must meet in order to be in compliance with the ordinance. New construction is prohibited within the 100-year floodplain.
  
- ❑ ***Drainage*** (Section 7.2.6 of Southbury Zoning Regulations). This section outlines the Town's provision to manage storm water, which includes the collection and disposal thereof in an attempt to:
  - ⇒ *avoid storm water flow across sidewalks;*
  - ⇒ *protect water courses and wetlands from pollution, erosion and sedimentation;*
  - ⇒ *avoid an amount of discharge and time of concentration of flow beyond the capacity of downstream drainage channels; and*
  - ⇒ *avoid downstream flooding.*

This section also calls for the improvement of existing watercourses, channels, and additional drainage systems on lots or downstream of lots.

- ❑ ***Drainage*** (Section 7.2.6 of Southbury Zoning Regulations). This section outlines the design standards for stormwater and other non-sanitary drainage facilities, including location, suitable receiving water bodies, design specifications for pipes, manholes, and culverts, and the use of underdrains.
  
- ❑ ***Wetlands and Water Courses*** (Section 7.2.7 of Southbury Zoning Regulations). This section calls for site development plans to provide protection of all wetlands and

watercourses, which includes floodplains in their natural state, unless prior modification approval has been given.

- ❑ ***Soil Erosion and Sedimentation Control*** (Section 7.2.16 of Southbury Zoning Regulations). This section calls for a provision be made for soil erosion and sediment control in accordance with the standards of the Town of Southbury Soil Erosion Sediment Control Ordinance.
- ❑ ***Setbacks and Slopes*** (8.7.4 of Southbury Zoning Regulations). This section states that no earth removal or placement shall occur within 50 feet of an abutting property line without written approval from abutting property owner. However, this practice may occur at approximate grade and within 50 feet of an abutting street line. Finished slopes cannot exceed 25% grade or some lesser slope that is necessary to provide stability, safety, and the opportunity for future reuse and development.
- ❑ ***Natural Features*** (Section 4.8 of Southbury Subdivision Regulation) specifies that a subdivision should avoid filling or excavation or other encroachment upon wetlands, water courses, floodplains, and other land subject to potential flooding.
- ❑ ***Terrain*** (Section 4.9.1 of Southbury Subdivision Regulation) specifies that each lot shall be capable of accommodating [permitted buildings]...with driveway access, parking spaces and suitable sites for on-site sewage disposal and water supply, without disturbing wetlands and water courses.
- ❑ ***Special Flood Hazard Areas/Floodways*** (Section 4.23 of Southbury Subdivision Regulation) specifies that when a subdivision includes land in a Special Flood Hazard Area or floodway, the lots, streets, drainage and other improvements shall be reasonably safe from flood damage and shall capable of use without danger from flooding.



❑ ***Aquifer Protection Area Regulations.*** The Southbury Training School and Heritage Village Water Company each operate a public water supply wellfield in the Town of Southbury. The Southbury Training School wellfield is located along Transylvania Brook within its delineated floodplain. Likewise, the Heritage Village Water Company wellfield is located along the Pomperaug River within its delineated floodplain.

⇒ The Southbury Training School wellfield has a final DEP-approved aquifer protection area (APA). The Southbury Water Pollution Control Authority has been designated the official Aquifer Protection Agency. As such, the Authority has developed APA Regulations. These regulations are a zoning overlay and control land use and development in the affected part of the Town located within the APA. Therefore, the APA Regulations indirectly provide a level of protection against development of certain commercial and industrial properties in or near floodplains in this portion of Southbury.

⇒ The Heritage Village Water Company wellfield has a preliminary aquifer protection area (APA). After formal APA mapping has been developed by Heritage Village Water Company, the Town will be required to apply the APA regulations as a zoning overlay in this part of Southbury, potentially affecting a much more developed area as compared to the Southbury Training School APA. Therefore, the APA Regulations will indirectly provide a level of protection against development of certain commercial and industrial properties in or near floodplains in this central location in Southbury.

### **Structural and Maintenance Projects**

The Town of Southbury Public Works Department is in process of receiving a \$204,000 grant to stabilize the banks of the Pomperaug River in June of 2008. The location of the bank stabilization project is along a stretch of the Pomperaug River near River Trail that

regularly experiences erosion and flooding during sustained rainfall events. The Town's objective for the streambank stabilization project is to preserve several private properties that have become threatened by erosion over a period of time, although flooding may not be directly addressed. A project with a similar objective was undertaken in 2007 in the neighboring Town of Woodbury.

There are ongoing discussions among Town residents about the possibilities of raising homes above established flood elevations or moving homes entirely out of floodplains in several areas within Town, with focus on the Pomperaug River. The Town has yet to consider involvement in this issue. To date, homes in Southbury have not been elevated with assistance from the Town or FEMA.

The Southbury Public Works Department is in charge of the maintenance of the Town's drainage systems, and performs clearing of public streets, bridges, culverts, and other structures as needed. Drainage and other flooding related complaints are typically routed to the Public Works Department. The Department records these complaints and uses the documents to identify potential problems and plan maintenance and upgrades to infrastructure prior to extensive precipitation events.

### **Emergency Services**

The Town's Police and Fire Departments regularly monitor the stage of the Pomperaug River and combine forces to provide advanced notice to residents in the floodplain surrounding the river of potential flooding problems. The Town can access the Automated Flood Warning System to monitor precipitation totals. The Connecticut DEP installed the Automated Flood Warning System in 1982 to monitor rainfall totals as a mitigation effort for flooding throughout the state.

The National Weather Service issues a flood watch or a flash flood watch for an area when conditions in or near the area are favorable for a flood or a flash flood, respectively.

A flash flood watch or flood watch does not necessarily mean that flooding will occur. The National Weather Service issues a flood warning or a flash flood warning for an area when parts of the area are either currently flooding, highly likely to flood, or when flooding is imminent.

The Town of Southbury can access the ***National Weather Service*** website at <http://weather.noaa.gov/> to obtain the latest flood watches and warnings before and during precipitation events.

As explained in Section 2.9, the Town of Southbury has instituted the CodeRED Emergency Notification System. This system allows the Town to telephone all or targeted areas of the Town in case of an emergency situation that requires immediate action.

The system is capable of dialing 50,000 phone numbers per hour. It then delivers a recorded message to a person or an answering machine, making three attempts to connect to any number.

In summary, the Town of Southbury primarily attempts to mitigate flood damage and flood hazards by restricting and prohibiting by Town ordinance various building activities in flood-prone areas. This process is carried out through the Zoning Commission, the Planning Commission, and the Inland Wetlands Commission. All watercourses are to be encroached minimally or not at all to maintain the existing flood carrying capacity. When regulations cannot address existing structures, the Town's focus is on emergency preparation and notification.

### **3.5 Vulnerabilities and Risk Assessment**

This section discusses specific areas at risk to flooding within the Town. Major land use classes and critical facilities within these areas are identified. According to the FEMA Flood Insurance Rate Maps, 1,596 acres of land in Southbury are located within the 100-year flood boundary. Based on correspondence with the State of Connecticut NFIP Coordinator, ten repetitive loss properties are listed in the Town of Southbury. Two are no longer considered by FEMA to be repetitive loss properties and one is a duplicate

listing, such that seven are considered active repetitive loss properties. One of the seven properties is also classified as a Severe Repetitive Loss property. Details are provided on the next page.

Additionally, indirect and nuisance flooding occurs near streams and rivers throughout Southbury due to inadequate drainage and other factors. Specific areas susceptible to flooding were identified by Town personnel and observed by Milone & MacBroom, Inc. staff during field inspections as described in Section 1.5.

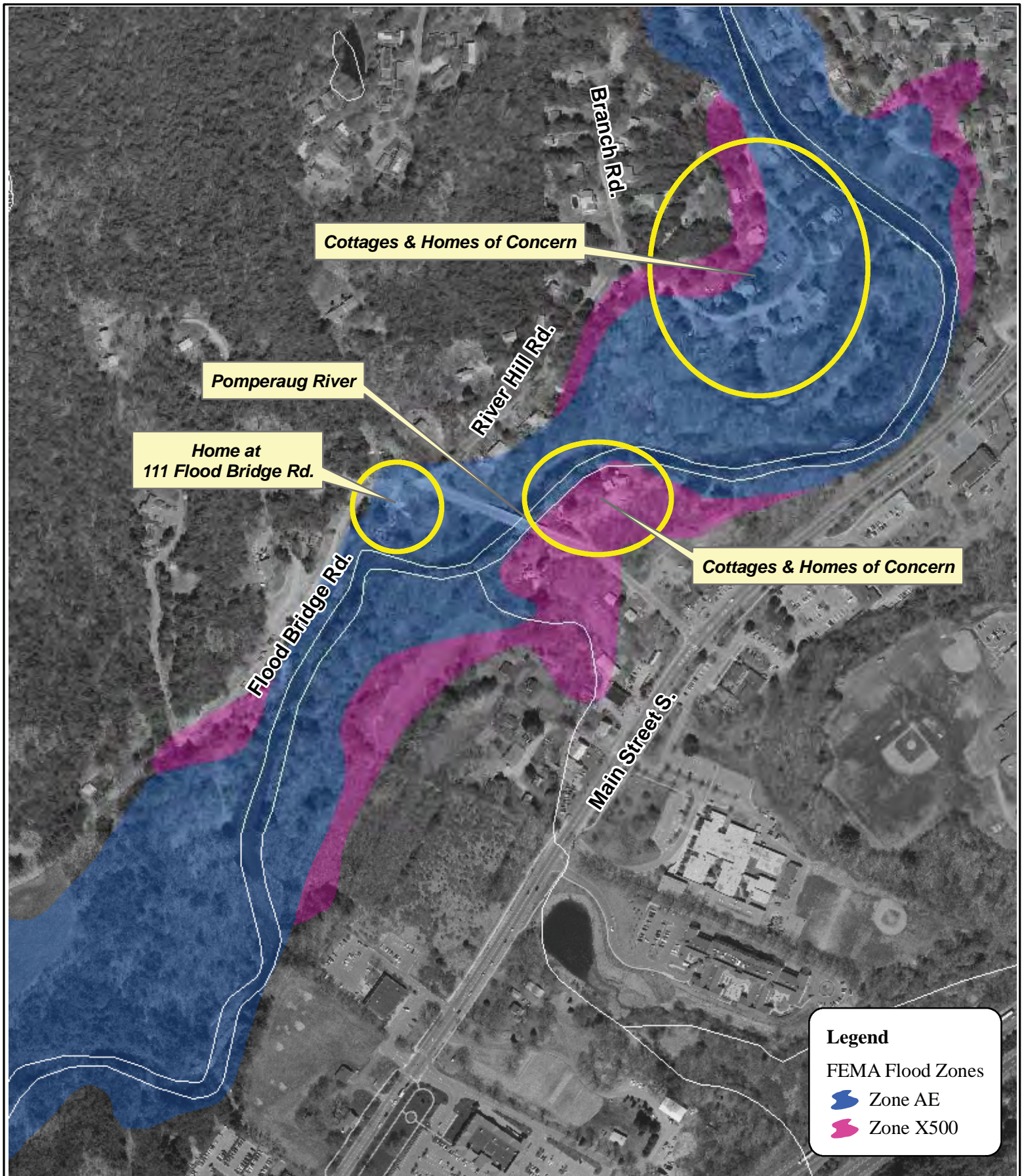
There are two major waterways in the Town of Southbury. The Housatonic River forms the southern Town boundary at Lakes Zoar and Lillinonah. The second major waterway, the Pomperaug River, flows generally from north to south through the center of the Town. The secondary waterways include Eightmile River, Jeremy Brook, Bullet Hill Brook and Transylvania Brook. These four watercourses and the remaining small watercourses are streams and brooks which are significant for water supply, conservation purposes, and play a role in flooding events, but are not sufficient recreational resources.

The areas with the highest vulnerability to flood events are concentrated along the Pomperaug River. Other areas are vulnerable due to large amounts of rainfall in conjunction with snowmelt, ice jams, and due to undersized road culverts and/or storm drains. The areas listed below were collected from residents at the public information meeting and from Town personnel at the public information meeting and the data collection meeting.

### **Primary Areas of Concern**

- ⇒ Flood Bridge Road and River Hill Road – Approximately 20 homes and cottages located along Flood Bridge Road, north of Flood Bridge Road, and along the lower portion of River Hill Road at Branch Road experience flooding during sustained storm events, including as recently as April 2007. Figure 3-2 depicts





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### Flood Bridge Road Study Area

MMI#: 2937-02  
MXD: H:\Figure3-2.mxd  
SOURCE: CT DEP



### Southbury Natural Hazard Pre-disaster Mitigation Plan

LOCATION:

**Southbury, CT**

Map By: BAM

Date: Oct. 2008

Scale: 1:4,800

SHEET:

**Figure 3-2**

this area. These homes are located within the 100 and 500-year floodplains of the Pomperaug River, and some are believed to be adjacent to the floodway. Three properties addressed on Flood Bridge Road are listed as Repetitive Loss properties as follows:

- ⇒ *111 Flood Bridge Road*
- ⇒ *175 Flood Bridge Road*
- ⇒ *Flood Bridge Road off Main Street (no number provided)*

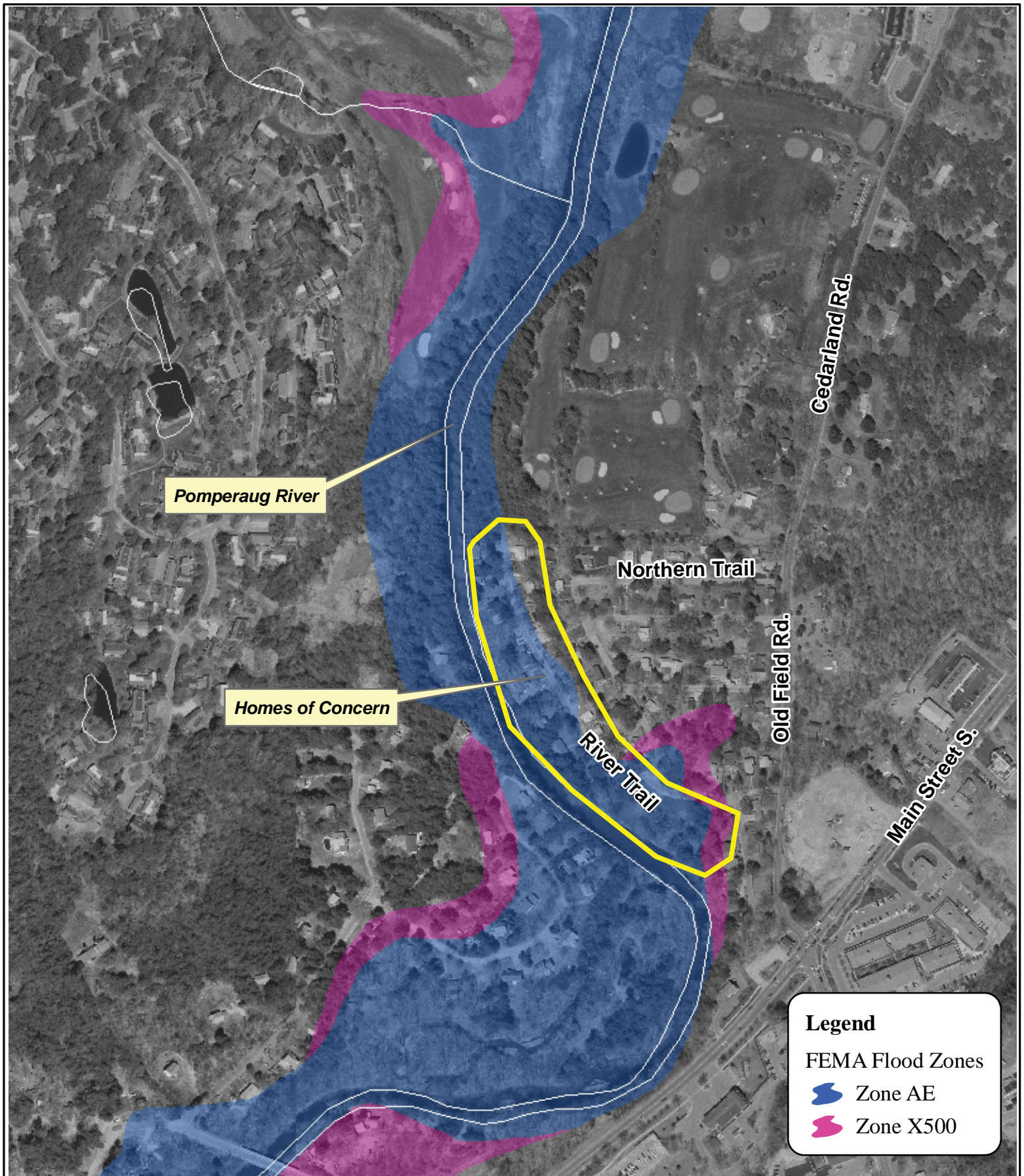
The property at 111 Flood Bridge Road is a Severe Repetitive Loss property, with total payments under NFIP of \$129,492 as of August 2008 and an average payment per flood event of more than \$18,000. The owner of the home at 111 Flood Bridge Road has expressed interest in being bought out by the Town.

- River Trail – Homes located along River Trail experience flooding during sustained storm events, including as recently as April 2007. These homes are located within the 100-year floodplain of the Pomperaug River. Figure 3-3 depicts this area. Four properties addressed on River Trail are listed as Repetitive Loss properties as follows:

- ⇒ *95 River Trail*
- ⇒ *105 River Trail*
- ⇒ *145 River Trail*
- ⇒ *155 River Trail*

Residents of the River Trail neighborhood are not interested in being bought out and relocating. However, one resident reports that his basement floods and is therefore vented, and his foundation has been damaged. The first floor is believed to be six inches above flood levels. Another resident recently spent \$14,000 to repair flood damages in April 2007; flood levels in her house have reached a depth of three feet on





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MMI#: 2937-02  
MXD: H:\Figure3-3.mxd  
SOURCE: CT DEP



### River Trail Study Area

**Southbury Natural Hazard  
Pre-disaster Mitigation Plan**

**LOCATION:**

**Southbury, CT**

**Map By: BAM**

**Date: Oct. 2008**

**Scale: 1:4,800**

**SHEET:**

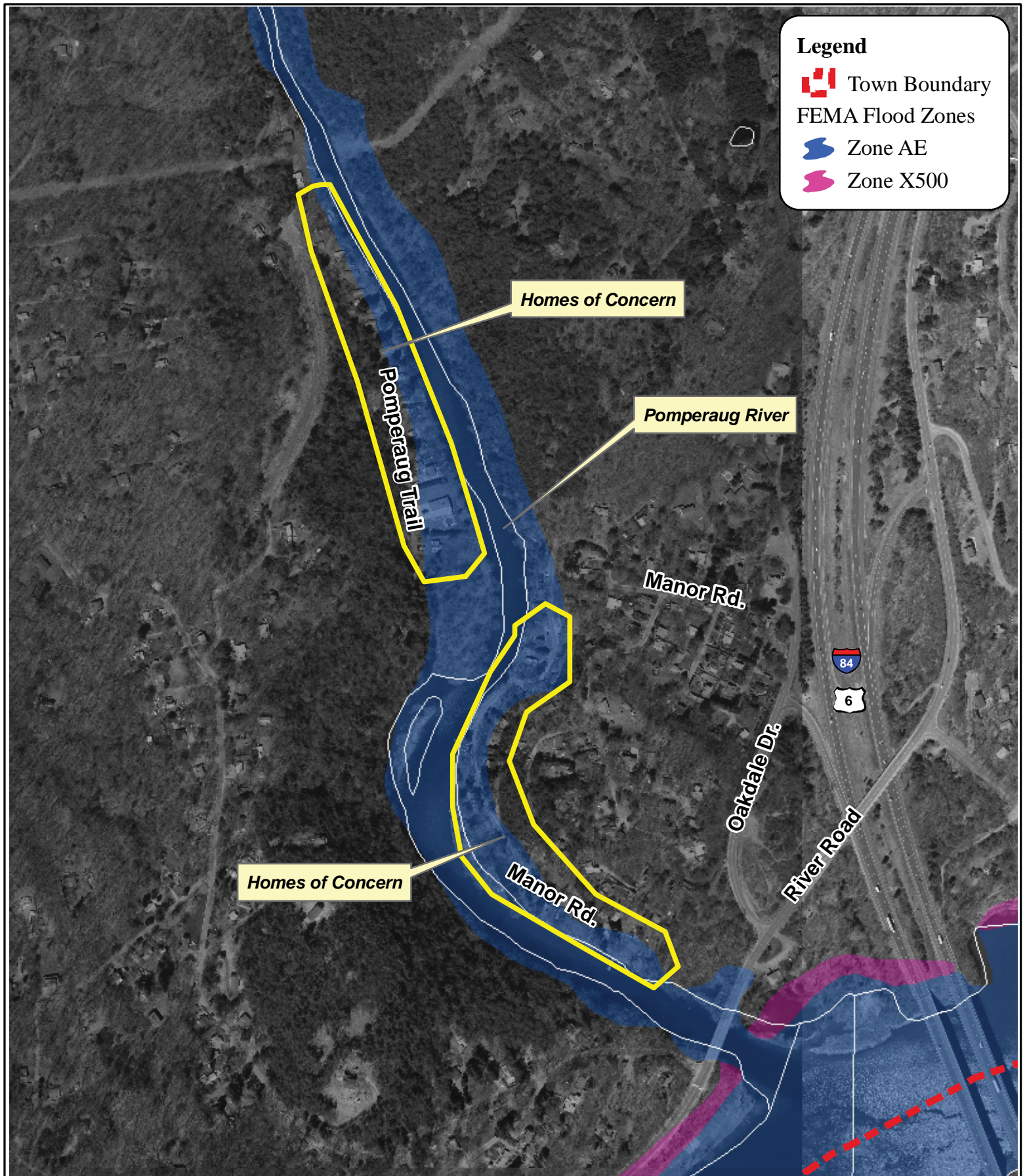
**Figure 3-3**






the first floor. River Trail has a dead end and only one entrance/exit at Old Field Road. During a flooding event, this can be problematic for evacuations.



- ❑ Lower Pomperaug River – Manor Road and Pomperaug Trail – The approximately 30 homes located along Manor Road on the east side of the river, and Pomperaug Trail on the west side of the river, are within or adjacent to the 100-year floodplain and are often flooded by the overtopping of Pomperaug River's banks. Figure 3-4 depicts this area. Flooding typically takes place during sustained precipitation events in the early spring, late summer/early fall or winter when the ground is covered with snow and ice. Additionally, Pomperaug Trail and Manor Road are under constant threat of flooding associated with ice jams, discussed in Section 4.0. These roads are long and have dead ends, having only one entrance/exit. During a flooding event, this can be problematic for evacuations.
  
- ❑ River Road – Various sections of the road are closed at times throughout the course of the year due to flooding issues including the clogging of culverts, undersized culverts, and the overtopping of small unnamed streams that flow into the Housatonic River from Flat Hill. Between South Flat Hill Road and Purchase Brook Road, flooding of River Road occurs on a normal basis. Sections of this road have experienced roadway subsidence and the development of sinkholes. The Town covers the costs associated with repairs to the roadway. River Road provides the primary access to the satellite communications facility. In addition, River Road becomes a detour route or informal bypass whenever the section of I-84 between Exits 13 and 11 is closed. Therefore, the road is very important to the Town and the region.





**Legend**

-  Town Boundary
- FEMA Flood Zones
-  Zone AE
-  Zone X500

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	<p>MMI#: 2937-02          MXD: H:\Figure3-4.mxd          SOURCE: CT DEP</p>	<p>N    <b>Southbury Natural Hazard Pre-disaster Mitigation Plan</b></p>	<p>Map By: BAM          Date: Oct. 2008          Scale: 1:6,000</p>	<p><b>SHEET:</b>   <b>Figure 3-4</b></p>

### **Secondary Areas of Concern**

- ❑ Hulls Hill Road/Jeremy Swamp Road Intersection – The intersection is at a low elevation and road closures are common due to flooding in the roadway. Flooding at this intersection occurs due to the overtopping of the Jeremy Brook watercourse. The culvert currently in place is insufficient in capacity for large scale rain events. Serious flooding has occurred in the past and residents have been evacuated when large scale precipitation events have become imminent or have been ongoing.
- ❑ Spruce Brook Road Near Route 172 – This area experiences mainly road flooding during large scale precipitation events. However, there has been residential damage reported to the Town. The road and residents in the area may benefit from an increase in the elevation and replacement of the existing bridge over Transylvania Brook.
- ❑ Lakeside Road and Lee Farm Drive – Flooding occurs in association with the insufficient capacity and clogging of storm drainage systems. This is a densely-populated area along Lee Brook and near the Lake Zoar shoreline. The clogging of the storm systems has historically caused nuisance flooding for residences.
- ❑ Community House Road – This roadway has a history of flooding during heavy rain storms. Bullet Hill Brook, the minor watercourse which the roadway is oriented along, sometimes overtops during these events.
- ❑ Route 172 Bridge over the Pomperaug River – Due to the low elevation of the bridge at this location, flooding is a common occurrence during large scale rain events.
- ❑ Route 172 at "Hay Fever Farm" – The road becomes inundated during large scale rainfall events.



- ❑ River Road between Purchase Brook Road and South Flat Hill Road – Whenever flooding is expected, the road is shut-down and the traffic is re-routed. This is a common occurrence during the rainy season of the spring.
- ❑ Little Fox Lane – This roadway has one way in/out and has historically had nuisance flooding associated with an unnamed watercourse.
- ❑ Flagg Swamp Road – This is a dirt road that extends from Southbury to Roxbury. This road is orientated along the watercourse associated with Flagg Swamp, and nuisance flooding can occur.

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

A number of measures can be taken to reduce the impact of a flood event. These include measures that prevent increases in flood losses by managing new development, measures that reduce the exposure of existing development to flood risk, and measures to preserve and restore natural resources. These are listed below under the categories of *prevention, property protection, structural projects, public education and awareness, natural resource protection, and emergency services.*

#### **3.6.1 Prevention**

Prevention of damage from flood losses often takes the form of floodplain regulations and redevelopment policies. These are usually administered by building, zoning, planning, and/or code enforcement offices through capital improvement programs and through zoning, subdivision, and wetland regulations and ordinances.

It is important to promote coordination among the various departments that are responsible for different aspects of flood mitigation. Coordination and cooperation

among departments should be reviewed every few years as specific responsibilities and staff changes.

Municipal departments should identify areas for acquisition to maintain flood protection. Acquisition of heavily damaged structures after a flood may be an economical and practical means to accomplish this. Policies can also include the design and location of utilities to areas outside of flood hazard areas, and the placement of utilities underground.

Planning and Zoning: Zoning ordinances should regulate development in flood hazard areas. Flood hazard areas should reflect a balance of development and natural areas.

Floodplain Development Regulations: Development regulations encompass subdivision regulations, building codes, and floodplain ordinances.

Site plan and new subdivision regulations should include the following:

- ❑ Requirements that every lot have a buildable area above the flood level;
- ❑ Construction and location standards for the infrastructure built by the developer, including roads, sidewalks, utility lines, storm sewers, and drainage ways; and
- ❑ A requirement that developers dedicate open space and flood flow, drainage, and maintenance easements.

Building codes should ensure that the foundation of structures will withstand flood forces and that all portions of the building subject to damage are above or otherwise protected from flooding.

Floodplain ordinances should at minimum follow the requirements of the National Flood Insurance Program for subdivision and building codes. These could be included in the ordinances for zoning and building codes, or could be addressed in a separate ordinance.

According to the FEMA, communities are encouraged to use different, more accurate base maps to expand upon the FIRMs published by FEMA. This is because many FIRMs were originally created using United States Geological Survey quadrangle maps with 10-foot contour intervals, but most municipalities today have contour maps of one or two-foot intervals that show more recently constructed roads, bridges, and other anthropologic features. Another approach is to record high-water marks and establish those areas inundated by a recent severe flood to be the new regulatory floodplain.

Adoption of a different floodplain map is allowed under NFIP regulations as long as the new map covers a larger floodplain than the FIRM. Reductions in floodplain area can only be accomplished through revised FEMA-sponsored engineering studies or Letters of Map Change (LOMC). It should be noted that the community's map will not affect the current FIRM or alter the SFHA used for setting insurance rates or making map determinations; it can only be used by the community to regulate floodplain areas. The FEMA Region I office has more information on this topic; contact information can be found in Section 12.

**Stormwater Management Policies:** Development and redevelopment policies to address the prevention of flood losses must include effective stormwater management policies. Developers should be required to build detention and retention facilities where appropriate. Infiltration can be enhanced to reduce runoff volume, including the use of swales, infiltration trenches, vegetative filter strips, and permeable paving blocks. Generally, post-development stormwater should not leave a site at a rate higher than under pre-development conditions.

Standard engineering practice is to avoid the use of detention measures if the project site is located in the lower one-third of the overall watershed. The effects of detention are least effective and even detrimental if used at such locations because of the delaying effect of the peak discharge from the site that typically results when detention measures are used. By detaining stormwater in close proximity of the stream in the lower reaches

of the overall watershed, the peak discharge from the site will occur later in the storm event, which will more closely coincide with the peak discharge of the stream, thus adding more flow during the peak discharge during any given storm event. Due to its geography, Southbury contains a range of upper to lower parts of several watersheds. Developers should be required to demonstrate whether detention or retention will be the best management practice for stormwater at specific sites in regards to the position of each project site in the surrounding watershed.

Drainage System Maintenance: An effective drainage system must be continually maintained prior to, during, and following precipitation events in order to maintain efficiency and functionality. Maintenance should include programs to clean out blockages caused by overgrowth and debris. Culverts should be monitored, and repaired and improved when necessary. The use of Geographic Information System (GIS) technology can greatly aid the identification and location of problem areas.

Education and Awareness: Other prevention techniques include the promotion of awareness of natural hazards among citizens, property owners, developers, and local officials. Technical assistance for local officials, including workshops, can be helpful in preparation for dealing with the massive upheaval that can accompany a severe flooding event. Research efforts to improve knowledge, develop standards, and identify and map hazard areas will better prepare a community to identify relevant hazard mitigation efforts.

The Town of Southbury *Inland Wetlands & Watercourses Commission* (IWC) administers the wetland regulations, the Town of Southbury *Zoning Commission* (ZC) administers the Zoning regulations, and the Town of Southbury *Planning Commission* (PC) administers the Subdivision regulations. The regulations simultaneously restrict development in floodplains, wetlands, and other flood prone areas. The Zoning Enforcement Officer and the IWC (or their agents) are charged with ensuring that

development follows the floodplain management regulations and inland wetlands regulations.

Based on the above guidelines and the existing roles of the IWC, the PC, the ZC, and the, Zoning Enforcement Officer, one specific preventive measure is recommended. A checklist should be developed that cross-references the bylaws, regulations, and codes related to flood damage prevention that may be applicable to a proposed project. This will streamline the permitting process and ensure maximum education of a developer or applicant. This could be provided to an applicant at any Town department. An example is included as Appended Table 3.

### **3.6.2 Property Protection**

Steps should be taken to protect existing public and private properties. Non-structural measures for public property protection include acquisition and relocation of properties at risk for flooding, purchase of flood insurance, and relocating valuable belongings above flood levels to reduce the amount of damage caused during a flood event.

Structural flood protection techniques applicable to property protection include the construction of barriers, dry floodproofing, and wet floodproofing techniques. Barriers include levees, floodwalls, and berms, and are useful in areas subject to shallow flooding. These structural projects are discussed in Section 3.6.6 below.

For dry floodproofing, walls may be coated with compound or plastic sheathing. Openings such as windows and vents should be either permanently closed or covered with removable shields. Flood protection should only be two to three feet above the top of the foundation

***Dry floodproofing*** refers to the act of making areas below the flood level water-tight.

***Wet floodproofing*** refers to intentionally letting floodwater into a building to equalize interior and exterior water pressures.

because building walls and floors cannot withstand the pressure of deeper water.

Wet floodproofing should only be used as a last resort. Furniture and electrical appliances should be moved away from advancing floodwaters.

All of the above *property protection* mitigation measures may be useful for Town of Southbury residents to prevent damage from inland and nuisance flooding. The Zoning Enforcement Officer should consider outreach and education in these areas. It is possible that homeowners on Flood Bridge Road, River Hill Road, River Trail, Manor Drive, and Pomperaug Trail could benefit from floodproofing.

### **3.6.3 Emergency Services**

A natural hazard pre-disaster mitigation plan addresses actions that can be taken before a disaster event. In this context, emergency services that would be appropriate mitigation measures for flooding include:

- ☐ Forecasting systems to provide information on the time of occurrence and magnitude of flooding;
- ☐ A system to issue flood warnings to the community and responsible officials; and
- ☐ Emergency protective measures, such as an Emergency Operations Plan outlining procedures for the mobilization and position of staff, equipment, and resources to facilitate evacuations and emergency flood-water control.
- ☐ Implementing an emergency notification system that combines database and GIS mapping technologies to deliver outbound emergency notifications to geographic areas; or specific groups of people, such as emergency responder teams. It is recognized that CodeRED provides this service.



Based on the above guidelines, a number of specific proposals for improved *emergency services* are recommended to prevent damage from inland and nuisance flooding. These are common to all hazards in this plan, and are listed in Section 11.1.

#### **3.6.4 Public Education and Awareness**

The objective of public education is to provide an understanding of the nature of flood risk, and the means by which that risk can be mitigated on an individual basis. Public information materials should encourage individuals to be aware of flood mitigation techniques, including discouraging the public from changing channel and detention basins in their yards, and dumping in or otherwise altering watercourses and storage basins. Individuals should be made aware of drainage system maintenance programs and other methods of mitigation. The public should also understand what to expect when a hazard event occurs, and the procedures and time frames necessary for evacuation.

Based on the above guidelines, a number of specific proposals for improved *emergency services* are recommended to prevent damage from inland and nuisance flooding. These are common to all hazards in this plan, and are listed in Section 11.1.

#### **3.6.5 Natural Resource Protection**

Floodplains can provide a number of natural resources and benefits, including storage of flood waters, open space and recreation, water quality protection, erosion control, and preservation of natural habitats. Retaining the natural resources and functions of floodplains can not only reduce the frequency and consequences of flooding, but also minimize stormwater management and non-point pollution problems. Through natural resource planning, these objectives can be achieved at substantially reduced overall costs.

Projects that improve the natural condition of areas or restore diminished or destroyed resources can re-establish an environment in which the functions and values of these resources are again optimized.

Administrative measures which assist such projects include the development of land reuse policies focused on resource restoration and review of community programs to identify opportunities for floodplain restoration.

***Measures for preserving floodplain functions and resources typically include:***

- ☐ Adoption of floodplain regulations to control or prohibit development that will alter natural resources;
- ☐ Development and redevelopment policies focused on resource protection;
- ☐ Information and education for both community and individual decision-makers; and
- ☐ Review of community programs to identify opportunities for floodplain preservation.

Based on the above guidelines, the following general *natural resource protection* mitigation measures are recommended to help prevent damage from inland and nuisance flooding:

- ☐ Pursue the acquisition of additional open space properties.
- ☐ Selectively pursue conservation objectives listed in the Plan of Conservation and Development or more recent planning studies and documents.
- ☐ Continue to regulate development in protected and sensitive areas, including steep slopes, wetlands and floodplains.

The following specific recommendations are offered for *natural resource protection*:

- ☐ Subject to a favorable FEMA cost-benefit analysis, apply for a grant to acquire the property at 111 Flood Bridge Road.
- ☐ Consider purchasing residences along Flood Bridge Road, River Hill Road, River Trail, Manor Drive, and Pomperaug Trail. These homes must also qualify for

purchase based on the FEMA cost-benefit analysis. It is understood that owners along River Trail are not currently interested in relocation.

### **3.6.6 Structural Projects**

Structural projects include the construction of new structures or modification of existing structures (e.g. floodproofing) to lessen the impact of a flood event. Stormwater controls such as drainage systems, detention dams and reservoirs, and culverts should be employed to lessen floodwater runoff. On-site detention can provide temporary storage of stormwater runoff. Barriers such as levees, floodwalls, and dikes physically control the hazard to protect certain areas from floodwaters. Channel alterations can be made to confine more water to the channel and accelerate flood flows. Care should be taken when using these techniques to ensure that problems are not exacerbated in other areas of the impacted watersheds. Individuals can protect private property by raising structures, and constructing walls and levees around structures.

Based on the above guidelines, the following specific *structural* mitigation measures are recommended to prevent damage from flooding:

- ☐ Increase the conveyance capacity of the culvert for Jeremy Brook under Hulls Hill Road at the intersection with Jeremy Swamp Road.
- ☐ Upgrade the drainage systems along, and the cross culverts beneath, River Road in order to prevent flooding in multiple locations due to clogging of storm drains and the incapacity of culverts.
- ☐ Install and repair storm drains and drainage systems on Lakeside Road and Lee Farm Road.
- ☐ Increase the elevation and replace the bridge over Transylvania Brook at Spruce Brook Road.

- ❑ Work with CTDOT to elevate portions of Route 172 and replace the Route 172 bridge over the Pomperaug River in order to mitigate flooding problems along this state roadway.

### 3.7 **Summary of Recommended Mitigation Measures, Strategies, and Alternatives**

The proposed mitigation strategies for addressing inland flooding are listed below.

#### **Prevention**

- ❑ Streamline the permitting process and ensure maximum education of a developer or applicant. Develop a checklist that cross-references the bylaws, regulations, and codes related to flood damage prevention that may be applicable to the proposed project. This list could be provided to an applicant at any Town department.
- ❑ Consider joining FEMA's Community Rating System.
- ❑ Continue to require Flood Hazard Area Permits for activities within SFHAs.
- ❑ Consider requiring buildings constructed in flood prone areas to be protected to the highest recorded flood level, regardless of being within a defined SFHA.
- ❑ After Map Mod has been completed, consider restudying local flood prone areas and produce new local-level regulatory floodplain maps using more exacting study techniques, including using more accurate contour information to map flood elevations provided with the FIRM.

#### **Property & Natural Resource Protection**

- ❑ Pursue the acquisition of additional municipal open space properties inside SFHAs and set those aside as greenways, parks, or other non-residential, non-commercial or non-industrial use.
- ❑ Selectively pursue conservation recommendations listed in the Plan of Conservation and Development and other studies and documents.

- ❑ Continue to regulate development in protected and sensitive areas, including steep slopes, wetlands, and floodplains.
- ❑ Subject to a favorable FEMA cost-benefit analysis, apply for a grant to acquire the property at 111 Flood Bridge Road.
- ❑ Consider purchasing residences along Flood Bridge Road, River Hill Road, River Trail, Manor Drive, and Pomperaug Trail. These homes must also qualify for purchase based on the FEMA cost-benefit analysis. It is understood that owners along River Trail are not currently interested in relocation.
- ❑ Work with homeowners on Flood Bridge Road, River Hill Road, River Trail, Manor Drive, Pomperaug Trail, and other areas to educate them about the benefits of floodproofing.

#### Structural Projects

- ❑ Increase the conveyance capacity of the culvert for Jeremy Brook under Hulls Hill Road at the intersection with Jeremy Swamp Road.
- ❑ Upgrade the drainage systems along, and the cross culverts beneath, River Road in order to prevent flooding in multiple locations due to clogging of storm drains and the incapacity of culverts.
- ❑ Install and repair storm drains and drainage systems on Lakeside Road and Lee Farm Road.
- ❑ Increase in the elevation and replace the bridge over Transylvania Brook at Spruce Brook Road.
- ❑ Work with CTDOT to elevate portions of Route 172 and replace the Route 172 bridge over the Pomperaug River in order to mitigate for flooding problems along this state roadway.

In addition, mitigation strategies important to all hazards are described in Section 11.1

## **4.0 ICE JAMS**

### **4.1 Setting**

According to the Connecticut Department of Emergency Management and Homeland Security "Advisor" (Vol. 3, Issue 1) an ice jam is an accumulation of ice in a river that restricts water flow and may cause backwater that floods low-lying areas upstream from the jam. Areas below the ice jam can also be affected when the jam releases, sending water and ice downstream. Ice jam damages can affect homes, buildings, roads, bridges and the environment (e.g., through erosion, sedimentation, bank scour or tree scarring, etc.).

Ice jams have historically been concentrated in a small area of Southbury near the confluence of the Housatonic and Pomperaug Rivers. The neighborhoods which are under highest threat by ice jams include those along Manor Road and Pomperaug Trail.

### **4.2 Hazard Assessment**

An ice jam is defined by the National Weather Service as a stationary accumulation of ice that restricts or blocks streamflow. When an ice jam occurs, water level rise can occur on the scale of several feet per hour or even per minute, depending upon antecedent conditions and location.

Because ice jams occur in the winter, winter storm conditions often magnify complications and risks associated with ice jam flooding. Ice jams can additionally bring forth scouring, river bed erosion, river bank erosion, and damages to river bank and shoreline stabilizations. These effects then have the possibility of increasing the area's susceptibility to future flooding events.

There are three different types of ice jams; freezup jams, breakup jams, and combination jams. Freezup jams typically occur during early to midwinter and are composed primarily of frazil ice with a small component of fragmented ice. This type of ice jam forms when some hydraulic occurrence slows the movement of the frazil, causing the ice to cease its downstream movement. The ice then forms an "arch" accumulating across the river.

Breakup jams occur when fragmented ice is broken up due to a significant rainfall event or snowmelt. The pieces flow to a point where some hydraulic condition prohibits the fragmented ice from moving further downstream, where the pieces of ice gather and inhibit water flow downstream past that point.

Lastly, combination jams are simply a combination of freezup and breakup jams. Any combination of the sequence of events above is possible. It is likely that all three types of ice jams occur at this location in the Town of Southbury. The hydraulic conditions presented at this location (namely, the sudden flattening of the profile of the Pomperaug River at the Housatonic River) allow for all three circumstances to arise.

The development of an ice jam in this area of the Town of Southbury is considered a likely event each year, and could cause significant damage to the Town, its residents, and its infrastructure.

#### **4.3 Historic Record**

Through research efforts by the United States Army Corps of Engineers (ACOE) Engineering Research and Development Center Cold Regions Research and Engineering Laboratory (CRREL), records of ice jams occurrences across the continental United States have been most confidently accounted for since the 1930s when the United States Geologic Survey (USGS) first installed stream gages. These records and others are compiled online (<https://rsgis.crrel.usace.army.mil/icejam/>) at ACOE CRREL's Ice Jam

Information Clearinghouse, which contains historical and the most current data, as well as related information about the processes involved in ice jam formation and mitigation.

The CRREL database includes 132 records of jams in Connecticut dating back to 1902. The database indicates that Connecticut experiences both freezeup and breakup type events. Although limited data exists regarding historic damages associated with ice jams, twelve well-documented ice jams in Connecticut since 1961 indicate that typical damages include road closures, bridge damages, evacuation, residential and commercial damage.

The Pomperaug River is considered the third most-susceptible river in the state with regard to ice jams, after the Shetucket River and the Salmon River, and well ahead of the Connecticut River. The most significant recent ice jam occurred in 1993. Private property was reportedly flooded and damaged.

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

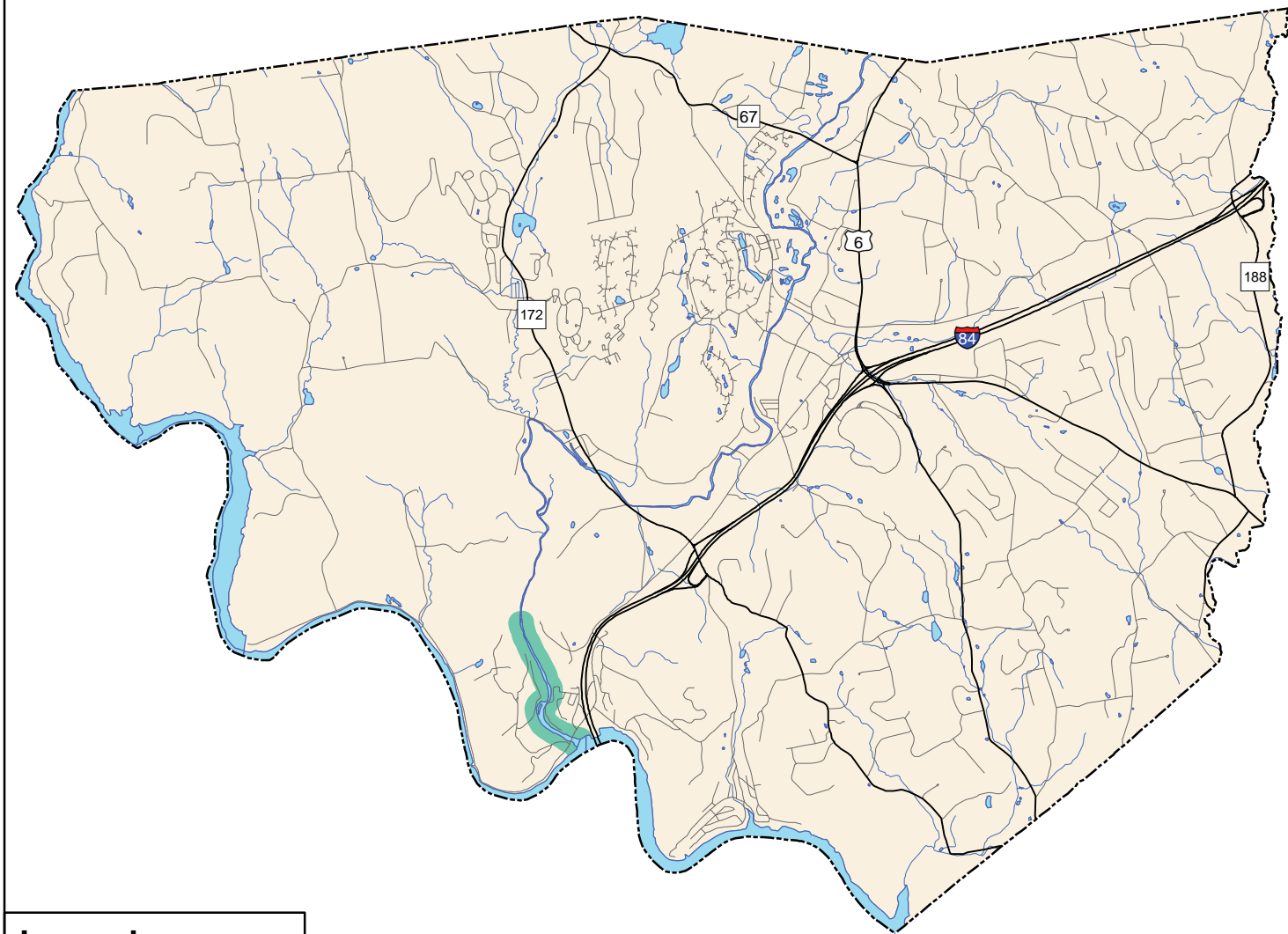
Existing mitigation measures appropriate for flooding have been discussed in Section 3.0. These include ordinances, codes, and regulations that have been enacted to minimize flood damage. In addition, structural projects such as streambank protection along the Pomperaug River have protected certain areas. Programs, policies, and mitigation measures that are *specifically* applicable to ice jams are not addressed within Town of Southbury regulations.

#### **4.5 Vulnerabilities and Risk Assessment**

The Town of Southbury will continue to experience ice jams along the lower Pomperaug River, as the hydraulic conditions at this location will continue to present favorable ice jam forming conditions. This area is depicted on Figure 4-1.



# Figure 4-1: Location of Ice Jams in Southbury



## Legend

- Town Boundary
- Major Roads
- Local Roads
- Streams
- Waterbodies
- Ice Jams



The neighborhoods within the Town of Southbury vulnerable to flooding as a result of ice jams include those along Manor Road and Pomperaug Trail. Because flood waters can carry ice, extensive damage to the landscape, the riverbed and riverbanks, and residential housing is possible. Streets often become flooded and have the potential to become littered with fallen branches, poles, residential materials, and/or tree limbs, preventing egress.

The Town of Southbury can evacuate on the order of 50 to 100 people in the area of Town mentioned above that is prone to flooding as a result of ice jams. The Town of Southbury continuously monitors the river's stage and ice conditions to determine when to evacuate residents in this area.

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

Many potential mitigation measures for ice jams include those appropriate for flooding. These were presented in Section 3.6. However, instream structural projects are possible for preventing ice jams. The most recent such project was undertaken along the Salmon River in East Haddam, Connecticut.

The Salmon River problem is similar to the Pomperaug River problem. During the winter months, ice jams at the tidal reach of the Salmon River; this is analogous to the backwater part of the Pomperaug River. The jamming causes the flooding of residential properties. To mitigate downstream ice jam flooding, the U.S. Army Corps of Engineers CRREL designed a pier-type ice control structure to retain the breakup ice. The project involved the construction of a 125-foot long concrete pier ice control structure across the main channel of the river. The structure consists of nine monoliths, two-feet wide by ten-feet thick, 15 to 18 feet high and spaced 14 feet on center. The project was executed on February 22, 2005 and the total cost of the project was \$1.8 million.

#### 4.7 Summary of Recommended Mitigation Measures, Strategies, and Alternatives

Recommendations for mitigation of ice jams include the following:

- ❑ Continuously monitor the stretch of the Pomperaug River that is prone to ice jams near Manor Road and Pomperaug Trail. If ice jam conditions appear to be imminent, then proper evacuations or other preventive safety measures will need to be taken. The CodeRED system can be used to facilitate warnings and evacuations.
- ❑ As explained in Section 3.7, consider purchasing residences along Manor Drive and Pomperaug Trail (these homes must also qualify for purchase based on the FEMA cost-benefit analysis) and work with homeowners on Manor Drive and Pomperaug Trail to educate them about the benefits of floodproofing.
- ❑ Evaluate options for instream structural projects and commence a dialog with DEP and the Army Corps of Engineers about potential funding for such projects. On an annual basis, monitor the criteria for PDM grants and evaluate if ice jam mitigation projects might qualify.

In addition, important recommendations that apply to all hazards are listed in Section 10.1.

## **5.0 HURRICANES**

### **5.1 Setting**

Hazards associated with tropical storms and hurricanes include winds, heavy rains, and inland flooding. While only some of the areas of Southbury are susceptible to flooding damage caused by hurricanes, wind damage can occur anywhere in the Town.

Hurricanes therefore have the potential to affect any area within the Town of Southbury. A hurricane striking the Town of Southbury is considered a possible event each year that could cause critical damage to the Town and its infrastructure (please refer to Appended Table 1).

### **5.2 Hazard Assessment**

Hurricanes are a class of tropical cyclones which are defined by the National Weather Service as non-frontal, low pressure large scale systems that develop over tropical or subtropical water and have definite organized circulations. Tropical cyclones are categorized based on the speed of the sustained (1-minute average) surface wind near the center of the storm. These categories are: Tropical Depression (winds less than 39 mph), Tropical Storm (winds 39-74 mph, inclusive) and Hurricanes (winds at least 74 mph).

The geographic areas affected by tropical cyclones are called tropical cyclone basins. The Atlantic tropical cyclone basin is one of six in the world and includes much of the North Atlantic Ocean, the Caribbean Sea, and the Gulf of Mexico. The official Atlantic hurricane season begins on June 1 and extends through November 30 of each year, although occasionally hurricanes occur outside this period.

Inland Connecticut is vulnerable to hurricanes despite moderate hurricane occurrences when compared with other areas within the Atlantic Tropical Cyclone basin. Since

hurricanes tend to weaken within 12 hours of landfall, inland areas are less susceptible to hurricane wind damages than coastal areas in Connecticut; however, the heaviest rainfall often occurs inland. Therefore, inland areas are vulnerable to inland flooding during a hurricane.

A hurricane Watch is an advisory for a specific area stating that a hurricane poses a threat to coastal and inland areas. Individuals should keep tuned to local television and radio for updates. A hurricane Warning is then issued when the dangerous effects of a hurricane are expected in the area within 24 hours.

### **The Saffir / Simpson Scale**

The Saffir / Simpson Hurricane Scale, which has been adopted by the National Hurricane Center, categorizes hurricanes based upon their intensity, and relates this intensity to damage potential. The Scale uses the sustained surface winds (1-minute average) near the center of the system to classify hurricanes into one of five categories. The Saffir / Simpson scale is provided below.

A ***Hurricane Watch*** is an advisory for a specific area stating that a hurricane poses a threat to coastal and inland areas. Individuals should keep tuned to local television and radio for updates.

A ***Hurricane Warning*** is then issued when the dangerous effects of a hurricane are expected in the area within 24 hours.

❑ **Category 1:** Winds 74-95 mph (64-82 kt or 119-153 km/hr). Storm surge generally 4-5 ft above normal. No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Some damage to poorly constructed signs, coastal road flooding, and minor pier damage.

⇒ Hurricane Diane was a Category 1 hurricane when it made landfall in North Carolina in 1955, and weakened to a tropical storm before reaching the Connecticut shoreline.

- ⇒ Hurricane Agnes of 1971 was a Category 1 hurricane when it hit Connecticut.
- ⇒ Hurricanes = of 1995 and Danny of 1997 were Category 1 hurricanes at peak intensity.
  
- **Category 2:** Winds 96-110 mph (83-95 kt or 154-177 km/hr). Storm surge generally 6-8 feet above normal. Some roofing material, door, and window damage of buildings. Considerable damage to shrubbery and trees with some trees blown down. Considerable damage to mobile homes, poorly constructed signs, and piers. Coastal and low-lying escape routes flood two to four hours before arrival of the hurricane center. Small craft in unprotected anchorages break moorings.
  
- ⇒ Hurricane Bonnie of 1998 was a Category 2 hurricane when it hit the North Carolina coast.
- ⇒ Hurricane Georges of 1998 was a Category 2 hurricane when it hit the Florida Keys and the Mississippi Gulf Coast.
- ⇒ Hurricane Bob was a Category 2 hurricane when it made landfall in southern New England and New York in August of 1991.
- ⇒ Hurricane Ike was a strong Category 2 hurricane when it struck Galveston and Houston in September 2008.
  
- **Category 3:** Winds 111-130 mph (96-113 kt or 178-209 km/hr). Storm surge generally 9-12 ft above normal. Some structural damage to small residences and utility buildings with a minor amount of curtainwall failures. Damage to shrubbery and trees with foliage blown off trees and large trees blown down. Mobile homes and poorly constructed signs are destroyed. Low-lying escape routes are cut by rising water three to five hours before arrival of the center of the hurricane. Flooding near the coast destroys smaller structures with larger structures damaged by battering from floating debris. Terrain continuously lower than five feet above mean sea level may be flooded inland eight miles (13 km) or more. Evacuation of low-lying residences within several blocks of the shoreline may be required.

- ⇒ The Great New England Hurricane of 1938 was a Category 3 hurricane when it hit New York and southern New England.
- ⇒ The Great Atlantic Hurricane of 1944 was a Category 3 hurricane when it made landfall in North Carolina, Virginia, New York, and southern New England.
- ⇒ Hurricane Carol of 1954 was a Category 3 hurricane when it struck Connecticut, New York, and Rhode Island.
- ⇒ Hurricane Connie of 1955 was a Category 3 hurricane when it made landfall in North Carolina.
- ⇒ Hurricane Gloria of 1985 was a Category 3 hurricane when it made landfall in North Carolina and New York, and weakened to a Category 2 hurricane before reaching Connecticut.
- ⇒ Hurricanes Roxanne of 1995 and Fran of 1996 were Category 3 hurricanes at landfall on the Yucatan Peninsula of Mexico and in North Carolina, respectively.
- ⇒ Hurricane Katrina of August 2005 was a Category 3 hurricane when it struck Louisiana and Mississippi.
- ⇒ Hurricane Rita of September 2005 reached Category 3 as it struck Louisiana.
- ⇒ Hurricane Wilma of October 2005 was a Category 3 hurricane when it made landfall in southwestern Florida.

- ❑ **Category 4:** Winds 131-155 mph (114-135 kt or 210-249 km/hr). Storm surge generally 13-18 ft above normal. More extensive curtainwall failures with some complete roof structure failures on small residences. Shrubs, trees, and all signs are blown down. Complete destruction of mobile homes. Extensive damage to doors and windows. Low-lying escape routes may be cut by rising water three to five hours before arrival of the center of the hurricane. Major damage to lower floors of structures near the shore. Terrain lower than 10 ft above sea level may be flooded requiring massive evacuation of residential areas as far inland as six miles (10 km).

- ⇒ Hurricane Donna of 1960 was a Category 4 hurricane when it made landfall in southwestern Florida, and weakened to a Category 2 hurricane when it reached Connecticut.
  - ⇒ Hurricane Luis of 1995 was a Category 4 hurricane while moving over the Leeward Islands.
  - ⇒ Hurricanes Felix and Opal of 1995 also reached Category 4 status at peak intensity.
- **Category 5:** Winds greater than 155 mph (135 kt or 249 km/hr). Storm surge generally greater than 18 ft above normal. Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. All shrubs, trees, and signs blown down. Complete destruction of mobile homes. Severe and extensive window and door damage. Low-lying escape routes are cut by rising water three to five hours before arrival of the center of the hurricane. Major damage to lower floors of all structures located less than 15 ft above sea level and within 500 yards of the shoreline. Massive evacuation of residential areas on low ground within 5-10 miles (8-16 km) of the shoreline may be required.
- ⇒ Hurricane Andrew was a Category 5 hurricane when it made landfall in southeastern Florida in 1992.
  - ⇒ Hurricane Mitch of 1998 was a Category 5 hurricane at peak intensity over the western Caribbean.
  - ⇒ Hurricane Gilbert of 1988 was a Category 5 hurricane at peak intensity and is one of the strongest Atlantic tropical cyclones of record.

Table 5-1 lists the hurricane characteristics mentioned above as a function of category, as well as the expected central pressure.



**Table 5-1**  
**Hurricane Characteristics**

Category	CENTRAL PRESSURE		WIND SPEED		SURGE Feet	Damage Potential
	Millibars	Inches	MPH	Knots		
1	>980	>28.9	74-95	64-83	4-5	Minimal
2	965-979	28.5-28.9	96-110	84-96	6-8	Moderate
3	945-964	27.9-28.5	111-130	97-113	9-12	Extensive
4	920-644	27.2-27.9	131-155	114-135	13-18	Extreme
5	<920	<27.2	>155	>135	>18	Catastrophic

The Saffir / Simpson Hurricane Scale assumes an average, uniform coastline for the continental United States and was intended as a general guide for use by public safety officials during hurricane emergencies. It does not reflect the effects of varying localized bathymetry, coastline configuration, astronomical tides, barriers or other factors that may modify storm surge heights at the local level during a single hurricane event. For inland communities such as the Town of Southbury, the coastline assumption is not applicable.

According to Connecticut's 2007 Natural Hazard Mitigation Plan Update, a moderate Category 2 hurricane is expected to strike Connecticut once every ten years, whereas a Category 3 or Category 4 hurricane is expected before the year 2040. These frequencies are based partly on the historic record, described in the next section.

### **5.3 Historic Record**

Through research efforts by NOAA's National Climate Center in cooperation with the National Hurricane Center, records of tropical cyclone occurrences within the Atlantic Cyclone Basin have been compiled from 1851 to present. These records are compiled in NOAA's Hurricane database (HURDAT), which contains historical data in the process of being reanalyzed to current scientific standards, as well as the most current hurricane data. During HURDAT's period of record, 29 hurricanes and 67 tropical storms have passed within a 150 mile radius of Newport, Rhode Island.

Since 1900, eight direct hits and two hurricanes that did not make landfall (but passed close to the shoreline) were recorded along the Connecticut coast, of which there were four Category 3, two Category 2, and two Category 1 hurricanes (two of the ten struck Connecticut before the Saffir / Simpson scale was developed). Of the four Category 3 hurricanes, two occurred in September and two occurred in August.

The most devastating hurricane to strike Connecticut, and believed to be the strongest hurricane to hit New England in recorded history, was believed to be a Category 3 hurricane. Dubbed the "Long Island Express of September 21, 1938", this name was derived from the unusually high forward speed of the hurricane, estimated to be 70 mph. The hurricane made landfall at Long Island, New York and moved quickly northward over Connecticut into northern New England.

The majority of damage was caused from storm surge and wind damage. Surges of 10 to 12 feet were recorded along portions of the Long Island and Connecticut Coast, and heavy winds flattened forests, destroyed nearly 5,000 cottages, farms, and homes, and damaged an estimated 15,000 more throughout New York and southern New England. Overall, the storm left an estimated 700 dead and caused physical damages in excess of 300 million 1938 United States dollars (USD).

The "Great Atlantic Hurricane" hit the Connecticut coast in September 1944. This Category 3 hurricane brought rainfall in excess of six inches to most of the state and rainfall in excess of eight to ten inches in Fairfield County. Most of the wind damage from this storm occurred in southeastern Connecticut. Injuries and storm damage were lower in this hurricane than in 1938 because of increased warning time and the fewer structures located in vulnerable areas due to the lack of rebuilding after the 1938 storm.

Another Category 3 hurricane, Hurricane Carol, struck in August of 1954 shortly after high tide and produced storm surges of 10 to 15 feet in southeastern Connecticut.

Rainfall amounts of six inches were recorded in New London, and wind gusts peaked at over 100 mph. Near the coast, the combination of strong winds and storm surge damaged or destroyed thousands of buildings, and the winds toppled trees that left most of the eastern part of the state without power. Overall damages were estimated at \$461 million (1954 USD), and 60 people died as a direct result of the hurricane. Western Connecticut was largely unaffected by Hurricane Carol due to the compact nature of the storm.

The following year, back-to-back hurricanes Connie and Diane caused torrential rains and record-breaking floods in Connecticut. Hurricane Connie was a declining tropical storm when it hit Connecticut in August of 1955, producing heavy rainfall of four to six inches across the state. The saturated soil conditions exacerbated the flooding caused by Diane five days later, a Category 1 hurricane and the wettest tropical cyclone on record for the Northeast. Diane produced 14 inches of rain in a 30-hour period, causing destructive flooding conditions along nearly every major river system in the state. The Mad and Still Rivers in Winsted, the Naugatuck River, the Farmington River, and the Quinebaug River in northeastern Connecticut caused the most damage. The flood waters caused over 100 deaths, an estimated \$200 million in damages (1955 USD), and left 86,000 unemployed. For comparison, the total property taxes levied by all Connecticut municipalities in 1954 amounted to \$194.1 million.

More recently, flooding and winds associated with hurricanes have caused extensive shoreline erosion and related damage. In September of 1985, hurricane Gloria passed over the coastline as a Category 2 hurricane. The hurricane struck at low tide, resulting in low to moderate storm surges along the coast. The storm produced up to six inches of rain and heavy winds which damaged structures and uprooted trees. Over 500,000 people suffered significant power outages.

Hurricane Bob, a Category 2 hurricane making landfall in 1991, caused storm surge damage along the Connecticut coast, but was more extensively felt in Rhode Island and Massachusetts. Heavy winds were felt across eastern Connecticut with gusts up to 100

mph recorded, and the storm was responsible for six deaths in the state. Total damage in southern New England was approximately \$1.5 billion (1991 USD).

The most recent tropical cyclone to impact Connecticut was tropical storm Floyd in 1999. Floyd is the storm of record in the Connecticut Natural Hazard Mitigation Plan and is discussed in more detail in Section 3.3. Tropical Storm Floyd caused power outages throughout New England and at least one death in Connecticut.

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

Existing mitigation measures appropriate for flooding have been discussed in Section 3.0. These include ordinances, codes, and regulations that have been enacted to minimize flood damage.

Wind loading requirements are addressed through the state building code. The Connecticut Building Code was amended in 2005 and adopted with an effective date of December 31, 2005. The new code specifies the design wind speed for construction in all the Connecticut municipalities, with the addition of split zones for some towns. For example, for towns along the Merritt Parkway such as Fairfield and Trumbull, wind speed criteria are different north and south of the Parkway in relation to the distance from the shoreline. Effective December 31, 2005, the design wind speed for Southbury is 95 miles per hour. The Town of Southbury has adopted the Connecticut Building Code as its building code.

Tree limbs and trees may fall during heavy wind events, potentially damaging structures, utility lines, and vehicles. The Town of Southbury Department of Public Works performs annual tree maintenance near roadways. Connecticut Light & Power also performs tree maintenance, but landowners are primarily responsible for conducting tree maintenance on private property. The Town attempts to close roads at convenient intersections rather than at the location of the downed tree or branch. Additionally, all

utilities in new subdivisions must be placed underground, whenever possible, in order to mitigate storm-related damages.

As explained in Section 2.9, the Town of Southbury has space designated to for shelter of evacuees. The Town of Southbury has designated the Southbury Fire House and the Southbury Senior Center as the two shelters in Town. In addition, the Town has additional space available that could be used as additional shelter space if needed. As hurricanes generally pass an area within a day's time, additional shelters can be set up following the storm as needed for long-term evacuees.

As discussed previously, the Town of Southbury has instituted the CodeRED Emergency Notification System. However, this feature is relatively new to the Town of Southbury. The Town therefore also relies on radio and television to spread information on the location and availability of shelters.

Prior to a hurricane, the Town ensures that warning/notification systems and communication equipment is working properly and prepares for the possible evacuation of susceptible areas.

## **5.5 Vulnerabilities and Risk Assessment**

It is generally believed that New England is long overdue for another major hurricane strike. Recall that according to the 2007 Connecticut Natural Hazard Mitigation Plan Update, a moderate Category 2 storm is expected to strike the state once per decade. The Town of Southbury is less vulnerable to hurricane damage than coastal towns in Connecticut because it does not need to deal with the effects of storm surge.

The Town of Southbury is vulnerable to hurricane damage from wind and flooding, and from any tornadoes accompanying the storm. Areas of known and potential flooding problems are discussed in Section 3.0, and tornadoes will be discussed in Section 6.0.

Hurricane-force winds can easily destroy poorly constructed buildings and mobile homes. Debris such as signs, roofing material, and small items left outside become flying missiles in hurricanes. Extensive damage to trees, towers, aboveground and underground utility lines (from uprooted trees), and fallen poles cause considerable disruption for residents. Streets may be flooded or blocked by fallen branches, poles, or trees, preventing egress. Downed power lines can also start electrical fires, so adequate fire protection is important.

As the residents and businesses of the State of Connecticut become more dependent on the internet and mobile communications, the impact of hurricanes on commerce will continue to increase. A major hurricane has the potential of causing complete disruption of power and communications for up several weeks, rendering electronic devices and those that rely on utility towers and lines inoperative. According to the Connecticut DEP, this is a significant risk which cannot be quantitatively estimated.

As the Town of Southbury is not affected by storm surge, hurricane sheltering needs have not been calculated by the Army Corps of Engineers for the Town. Under limited emergency conditions, a high percentage of evacuees will seek shelter with friends or relatives rather than go to established shelters. During extended power outages, it is believed that only 10% to 20% of the affected population of Southbury will relocate. The Town of Southbury determines sheltering need based upon areas damaged within the Town, but encourages residents to shelter in place whenever possible.

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

Many potential mitigation measures for hurricanes include those appropriate for inland flooding. These were presented in Section 3.6. However, hurricane mitigation measures must also address the effects of heavy winds that are inherently caused by hurricanes. Mitigation for wind damage is therefore emphasized in the subsections below.

### **5.6.1 Prevention**

Although hurricanes and tropical storms cannot be prevented, a number of methods are available to continue preventing damage from the storms, and perhaps to mitigate damage. The following actions have been identified as potential preventive measures:

- ❑ Continue Town-wide tree limb inspection and maintenance programs to ensure that the potential for downed power lines is diminished.
- ❑ Continue location of utilities underground in new developments or as related to redevelopment.
- ❑ Continue to review the Emergency Operations Plan for the Town and update when necessary.

### **5.6.2 Property Protection**

Potential mitigation measures include designs for hazard-resistant construction and retrofitting techniques. These may take the form of increased wind and flood resistance for structures, as well as the use of storm shutters over exposed glass and the inclusion of hurricane straps to hold roofs to buildings. Compliance with the amended Connecticut Building Code for wind speeds is necessary. Literature should be made available by the Building Department to developers during the permitting process regarding these design standards.

### **5.6.3 Public Education and Awareness**

The public should be made aware of evacuation routes and available shelters. A number of specific proposals for improved *public education* are recommended to prevent damage and loss of life during hurricanes. These are common to all hazards in this plan, and are listed in Section 11.1.



#### **5.6.4 Emergency Services**

The Emergency Operation Plan of the Town of Southbury includes guidelines and specifications for communication of hurricane warnings and watches, as well as for a call for evacuation. The public needs to be made aware in advance of a hurricane event of evacuation routes and the locations of public shelters. In addition, the Town of Southbury should identify and prepare additional facilities for evacuation and sheltering needs. The Town should also review its mutual aid agreements and update as necessary to ensure help is available as needed.

#### **5.6.5 Structural Projects**

Structural projects for wind damage mitigation are not possible.

#### **5.7 Summary of Recommended Mitigation Measures, Strategies, and Alternatives**

Recommendations for mitigation of hurricane and tropical storm winds include the following:

- ☐ Increase tree limb maintenance and inspections, especially along Route 172, Route 67 and other evacuation routes. Increase inspections of trees on private property near power lines and Town right-of-ways;
- ☐ Continue to require that utilities be placed underground in new developments and pursue funding to place them underground in existing developed areas; and
- ☐ Review potential evacuation plans to ensure timely migration of people seeking shelter in all areas of Town.

In addition, important recommendations that apply to all hazards are listed in Section 11.1.

## **6.0 SUMMER STORMS & TORNADOES**

### **6.1 Setting**

Like hurricanes and winter storms, summer storms and tornadoes have the potential to affect any area within the Town of Southbury. 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. The entire Town of Southbury is therefore susceptible to summer storms (including heavy rain, flash flooding, wind, hail, and lightning) and tornadoes.

Based on the historic record, it is considered highly likely that a summer storm that includes lightning will impact the Town of Southbury each year, although lightning strikes have a limited effect. Strong winds and hail are considered likely to occur during such storms but also generally have limited effects. A tornado is considered a possible event in New Haven County each year that could cause significant damage to a small area (refer to Appended Table 2).

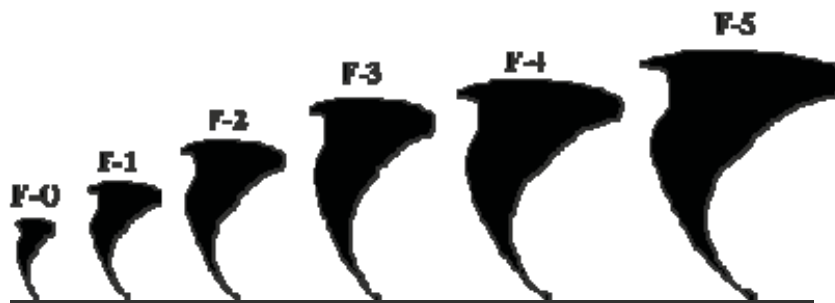
### **6.2 Hazard Assessment**

Heavy wind (including tornadoes and downbursts), lightning, heavy rain, hail, and flash floods are the primary hazards associated with summer storms. Flooding caused by heavy rainfall was covered in Section 3.0 of this plan and will not be discussed in detail here.

## **Tornadoes**

Tornadoes are spawned by certain thunderstorms. NOAA defines a tornado as "a violently rotating column of air extending from a thunderstorm to the ground." The Fujita scale was accepted as the official classification system for tornado damage for many years following its publication in 1971. The Fujita scale rated the intensity of a tornado by examining the damage caused by the tornado after it has passed over a man-made structure. The scale ranked tornadoes using the now-familiar notation of F0 through F6, increasing with wind speed and intensity. The following graphic of the Fujita scale is provided by FEMA. A description of the scale follows in Table 6-1.

### **Fujita Tornado Scale**



**Table 6-1**  
**Fujita Scale**

<b>F-Scale Number</b>	<b>Intensity</b>	<b>Wind Speed</b>	<b>Type of Damage Done</b>
F0	Gale tornado	40-72 mph	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.
F1	Moderate tornado	73-112 mph	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	Significant tornado	113-157 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.

**Table 6-1 (Continued)**  
**Fujita Scale**

<b>F-Scale Number</b>	<b>Intensity</b>	<b>Wind Speed</b>	<b>Type of Damage Done</b>
F3	Severe tornado	158-206 mph	Roof and some walls torn off well constructed houses; trains overturned; most trees in forest uprooted
F4	Devastating tornado	207-260 mph	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated
F5	Incredible tornado	261-318 mph	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.
F6	Inconceivable tornado	319-379 mph	These winds are very unlikely. The small area of damage they might produce would probably not be recognizable along with the mess produced by F4 and F5 winds that would surround the F6 winds. Missiles, such as cars and refrigerators, would do serious secondary damage that could not be directly identified as F6 damage. If this level is ever achieved, evidence for it might only be found in some manner of ground swirl pattern, for it may never be identifiable through engineering studies.

According to NOAA, weak tornadoes (F0 and F1) account for approximately 69% of all tornadoes. Strong tornadoes (F2 and F3) account for approximately 29% of all tornadoes. Violent tornadoes (F4 and above) are rare but extremely destructive, and account for only 2% of all tornadoes.

The Enhanced Fujita Scale was released by NOAA for implementation on February 1, 2007. According to the NOAA web site, the Enhanced Fujita Scale was developed in response to a number of weaknesses to the Fujita Scale that were apparent over the years, including the subjectivity of the original scale based on damage, the use of the worst damage to classify the tornado, the fact that structures have different construction depending on location within the United States, and an overestimation of wind speeds for F3 and greater.

The Enhanced Fujita scale is still a set of wind estimates based on damage. Its uses three-second gusts estimated at the point of damage based on a judgment of eight levels of damage to 28 specific indicators. Table 6-2 relates the Fujita and enhanced Fujita scales.

**Table 6-2**  
**Enhanced Fujita Scale**

<b>Fujita Scale</b>			<b>Derived EF Scale</b>		<b>Operational EF Scale</b>	
<i>F Number</i>	<i>Fastest 1/4-mile (mph)</i>	<i>3 Second Gust (mph)</i>	<i>EF Number</i>	<i>3 Second Gust (mph)</i>	<i>EF Number</i>	<i>3 Second Gust (mph)</i>
0	40-72	45-78	0	65-85	0	65-85
1	73-112	79-117	1	86-109	1	86-110
2	113-157	118-161	2	110-137	2	111-135
3	158-207	162-209	3	138-167	3	136-165
4	208-260	210-261	4	168-199	4	166-200
5	261-318	262-317	5	200-234	5	Over 200

The historic record of tornadoes is discussed in Section 6.3. The pattern of occurrence in Connecticut is expected to remain unchanged according to the Connecticut Natural Hazards Mitigation Plan (2007). The highest relative risk for tornadoes in the state are Litchfield and Hartford Counties, followed by New Haven, Fairfield, Tolland, Middlesex, Windham, and finally New London County. By virtue of its location in New Haven County and adjacent to Litchfield County, the Town of Southbury is therefore at a relatively higher risk of tornadoes compared to the rest of the state.

### **Lightning**

Lightning is a circuit of electricity that occurs between the positive and negative charges within the atmosphere or between the atmosphere and the ground. In the initial stages of development, air acts as an insulator between the positive and negative charges.

However, when the potential between the positive and negative charges becomes too great, a discharge of electricity (lightning) occurs.

In-cloud lightning occurs between the positive charges near the top of the cloud and the negative charges near the bottom. Cloud to cloud lightning occurs between the positive charges near the top of the cloud and the negative charges near the bottom of a second cloud. Cloud to ground lightning is the most dangerous. In summertime, most cloud to ground lightning occurs between the negative charges near the bottom of the cloud and positive charges on the ground.

According to NOAA's National Weather Service, lightning reportedly kills an average of 80 people per year in the United States, in addition to an average of 300 lightning injuries per year. Most lightning deaths and injuries occur outdoors with 45% of lightning casualties occurring in open fields and ballparks, 23% under trees, and 14% involving water activities. Only 15 lightning-related fatalities occurred in Connecticut between 1959 and 2005, and only one occurred between 1998 and 2007. Most recently, on June 8, 2008, lightning struck a pavilion at Hammonasset Beach in Madison, Connecticut, injuring five and killing one.

Thunderstorms occur 18 to 35 days each year in Connecticut. According to a report by meteorologist Joe Furey on Fox 61 News, 2008 was an abnormal year for thunderstorms, with 20 days of thunderstorm activity occurring by the end of July. In general, thunderstorms in Connecticut are more frequent in the western and northern parts of the state, and less frequent in the southern and eastern parts. Although lightning is usually associated with thunderstorms, it can occur on almost any day. The likelihood of lightning strikes in the Southbury area is very high during any given thunderstorm, although no single area of the Town is at higher risk of lightning strikes.

### **Downbursts**

A downburst is a severe localized wind blasting down from a thunderstorm. They are more common than tornadoes in Connecticut. These "straight line" winds are distinguishable from tornadic activity by the pattern of destruction and debris.



Depending on the size and location of these events, the destruction to property may be significant. Downbursts may be categorized as microbursts (affecting an area less than 2.5 miles in diameter) or macrobursts (affecting an area at least 2.5 miles in diameter).

It is difficult to find statistical data regarding frequency of downburst activity. However, downburst activity is, on occasion, mistaken for tornado activity in Connecticut, indicating that it is a relatively uncommon yet persistent hazard. The risk to the Town of Southbury is believed to be low to moderate for any given year.

Downbursts may be categorized as ***microbursts*** (affecting an area less than 2.5 miles in diameter) or ***macrobursts*** (affecting an area at least 2.5 miles in diameter).

### **Hail**

Hailstones are chunks of ice that grow as updrafts in thunderstorms keep them in the atmosphere. Most hailstones are smaller in diameter than a dime, but stones weighing more than a pound have been recorded. While crops are the major victims of hail, it is also a hazard to vehicles and property.

Hailstorms typically occur in at least one part of Connecticut each year during a severe thunderstorm. As with thunderstorms, hailstorms are more frequent in the northwest and western portions of the state, and less frequent in the southern and eastern portions. Overall, the risk of at least one hailstorm occurring in the Town of Southbury is moderate in any given year.

## **6.3 Historic Record**

The National Climatic Data Center (NCDC) lists 13 tornado events in New Haven County since 1950. This includes one F4 rated tornado, two F3 rated tornadoes, three F2 rated tornadoes, three F1 rated tornadoes, two F0 rated tornadoes, and two undefined

tornadoes. Property damages from tornados in the County totaled approximately 280 million dollars. Table 6-3 lists the tornado events for New Haven County.

**Table 6-3**  
**Tornado Events in New Haven County Since 1950**

<b>Date</b>	<b>Fujita Tornado Scale</b>	<b>Property Damage</b>	<b>Wind Speed</b>
October 24, 1955	F2	\$3,000	113 – 157 mph
August 29, 1959	F-	\$0	Unknown
May 24, 1962	F3	\$2,500,000	158 – 206 mph
July 29, 1971	F3	\$250,000	158 – 206 mph
September 18, 1973	F2	\$0	113 – 157 mph
July 28, 1982	F1	\$3,000	73 – 112 mph
July 10, 1989	F2	\$25,000,000	113 – 157 mph
July 10, 1989	F4	\$250,000,000	207 – 260 mph
May 29, 1995	F-	\$10,000	Unknown
May 29, 1995	F1	\$50,000	73 – 112 mph
July 23, 1995	F0	\$0	40 – 72 mph
July 3, 1996	F1	\$2,000,000	73 – 112 mph
May 31, 2002	F0	\$0	40 – 72 mph

A limited selection of summer storm damage in and around the Town of Southbury, taken from the NCDC Storm Events database, is listed below:

- ❑ July 28, 1995 – Thunderstorm winds downed several trees and power lines when a thunderstorm moved through the Town of Southbury.
- ❑ October 21, 1995 – A squall line generated thunderstorms that downed several trees and power lines. Vehicles were also damaged by the falling trees.
- ❑ July 15, 1997 – Severe thunderstorms produced high winds, hail, and heavy rain throughout New Haven County. High winds downed trees and power lines in the Town of Southbury, and lightning struck one house in Town.
- ❑ June 30, 1998 – During the afternoon and evening, severe thunderstorms produced high winds including three weak tornadoes, large hail, and frequent lightning across the state.
- ❑ September 16, 1999 – In addition to the flooding damages described in Section 3.3, the remnants of Tropical Storm Floyd also produced wind gusts up to 60 miles per

- hour in New Haven County, causing widespread downing of trees and power lines. Significant power outages were reported.
- ❑ June 27, 2000 – Severe thunderstorms brought about high winds which downed tree limbs in Southbury.
  - ❑ May 31, 2002 – In the evening, a professional meteorologist confirmed the occurrence of an F0 tornado in the Town of Southbury. Tornadic damages were observed near Exit 14 off Interstate 84. Large trees were splintered, uprooted and caused traffic blocks. The tornado snaked across the interstate, flattening trees, shrubs and bushes.
  - ❑ August 21, 2004 – Trees were downed in the communities surrounding the Town of Southbury as a result of thunderstorms accompanied by 50 mph wind gusts.
  - ❑ July 28, 2006 – Severe thunderstorms produced high winds up to 50 mph that downed many trees and power lines across the state.
  - ❑ June 5, 2007 – Hail accumulation of up to one inch deep was reported and car windshields were damaged throughout the area. Hail up to 1.75 inches in diameter and damaging winds accompanied the severe thunderstorms. The Connecticut DOT plowed the roadways to clear hail accumulation.
  - ❑ July 19, 2007 – Trees and power lines were downed along Poverty Road in the Town of Southbury. Severe weather occurred across the area.
  - ❑ July 19, 2008 – Many trees were downed on Luther Drive, Fishrock Road, and South Georges Hill as a result of numerous thunderstorms which developed across the area.

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

Warning is the primary method of existing mitigation for tornadoes and thunderstorm-related hazards. Tables 6-4 and 6-5 list the National Oceanic and Atmospheric Administration (NOAA) Watches and Warnings, respectively, as pertaining to actions to be taken by emergency management personnel in connection with summer storms and tornadoes.

**Table 6-4  
NOAA Weather Watches**

<b>Weather Condition</b>	<b>Meaning</b>	<b>Actions</b>
Severe Thunderstorm	Severe thunderstorms are possible in your area.	Notify personnel, and watch for severe weather.
Tornado	Tornadoes are possible in your area.	Notify personnel, and be prepared to move quickly if a warning is issued.
Flash Flood	It is possible that rains will cause flash flooding in your area.	Notify personnel to watch for street or river flooding.

**Table 6-5  
NOAA Weather Warnings**

<b>Weather Condition</b>	<b>Meaning</b>	<b>Actions</b>
Severe Thunderstorm	Severe thunderstorms are occurring or are imminent in your area.	Notify personnel and watch for severe conditions or damage (i.e. downed power lines and trees). Take appropriate actions listed in town emergency plans.
Tornado	Tornadoes are occurring or are imminent in your area.	Notify personnel, watch for severe weather and ensure personnel are protected. Take appropriate actions listed in emergency plans.
Flash Flood	Flash flooding is occurring or imminent in your area.	Watch local rivers and streams. Be prepared to evacuate low-lying areas. Take appropriate actions listed in emergency plans.

Aside from warnings, several other methods of mitigation for wind damage are employed in the Town of Southbury.

Continued location of utilities underground is an important method of reducing wind

damage to utilities and the resulting loss of services. The Connecticut Building Codes

A ***severe thunderstorm watch*** is issued by the National Weather Service when the weather conditions are such that a severe thunderstorm (winds greater than 58 miles per hour, or hail three-fourths of an inch or greater) is likely to develop.

A ***severe thunderstorm warning*** is issued when a severe thunderstorm has been sighted or indicated by weather radar.

include guidelines for Wind Load Criteria that are specific to each municipality, as explained in Section 5.0. In addition, specific mitigation measures address debris removal and tree trimming.

In the Town of Southbury, the local utilities are responsible for tree branch removal and maintenance. In addition, all new developments in the Town must place utilities underground wherever possible. The Public Works Department also performs annual tree maintenance on municipal right of ways.

Municipal responsibilities relative to tornado mitigation and preparedness include:

- ☐ Developing and disseminating emergency public information and instructions concerning tornado safety, especially guidance regarding in-home protection and evacuation procedures, and locations of public shelters.
- ☐ Designate appropriate shelter space in the community that could potentially withstand tornado impact.
- ☐ Periodically test and exercise tornado response plans.
- ☐ Put emergency personnel on standby at tornado 'watch' stage.

## **6.5 Vulnerabilities and Risk Assessment**

The central and southern portions of the United States are at higher risk for lightning and thunderstorms than is the northeast. However, more deaths from lightning occur on the East Coast than elsewhere, according to FEMA. Lightning-related fatalities have declined in recent years due to increased education and awareness.

Most thunderstorm damage is caused by straight-line winds exceeding 100 mph. Straight-line winds occur as the first gust of a thunderstorm or from the downburst from a thunderstorm, and have no associated rotation. The Town of Southbury is particularly

susceptible to damage from high winds due to its high elevation and heavily treed landscape.

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. Most downed power lines in Southbury are detected quickly and any associated fires are quickly extinguished. However, it is important to have adequate water supply for fire protection to ensure this level of safety is maintained.

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

Both the FEMA and the NOAA websites contain valuable information regarding preparing for and

***More information is available at:***

FEMA – <http://www.fema.gov/library/>  
NOAA – <http://www.nssl.noaa.gov/NWSTornado/>

protecting oneself during a tornado, as well as information on a number of other natural hazards. Available information from FEMA includes:

- ☐ Design and construction guidance for creating and identifying community shelters;
- ☐ Recommendations to better protect your business, community, and home from tornado damage, including construction and design guidelines for structures;
- ☐ Ways to better protect property from wind damage;
- ☐ Ways to protect property from flooding damage; and
- ☐ Construction of safe rooms within homes.

NOAA information includes a discussion of family preparedness procedures and the best physical locations during a storm event. Although tornadoes pose a legitimate threat to public safety, their occurrence is considered too infrequent to justify the construction of tornado shelters. Residents should be encouraged to purchase a NOAA weather radio containing an alarm feature.

The implementation of an emergency notification system would be beneficial in warning residents of an impending tornado. A community warning system that relies on radios and television is less effective at warning residents during the night when the majority of the community is asleep. This fact was evidenced most recently by the severe storm that struck Lake County, Florida on February 2, 2007. This powerful storm that included several tornadoes struck at about 3:15 AM. According to National Public Radio, local broadcast stations had difficulty warning residents due to the lack of listeners and viewers and encouraged those awake to telephone warnings into the affected area.

Specific mitigation steps that can be taken to prevent property damage and protect property are given below.

### **Prevention**

- ☐ Continue or increase tree limb inspection programs to ensure that the potential for downed power lines is minimized.
- ☐ Continue to place utilities underground.

### **Property Protection**

- ☐ Require compliance with the amended Connecticut Building Code for wind speeds.
- ☐ Provide for the Building Department to make literature available during the permitting process regarding appropriate design standards.

## **6.7 Summary of Recommended Mitigation Measures, Strategies, and Alternatives**

The following actions are recommended to mitigate for winds, hail, tornadoes, and downbursts:



- ☐ Increase tree limb maintenance and inspections.
- ☐ Standardize a tree maintenance program for the Town.
- ☐ Continue outreach regarding dangerous trees on private property.
- ☐ Continue to require that utilities be placed underground in new developments and pursue funding to place them underground in existing developed areas.
- ☐ Continue to require compliance with the amended Connecticut Building Code for wind speeds.
- ☐ Provide for the Building Department or the Planning or Zoning Commissions to make literature available during the permitting process regarding appropriate design standards.

In addition, important recommendations that apply to all hazards are listed in Section 11.1.

## 7.0 WINTER STORMS

### 7.1 Setting

Similar to summer storms and tornadoes, winter storms have the potential to affect any area of the Town of Southbury. However, unlike summer storms, winter events and the hazards that result (wind, snow, and ice) have more widespread geographic extent. The entire Town of Southbury is susceptible to winter storms. In general, winter storms are considered highly likely to occur each year (major storms are less frequent), and the hazards that result (nor'easter winds, snow, and blizzard conditions) can potentially have a significant effect over a large area of the Town (refer to Appended Tables 1 and 2).

### 7.2 Hazard Assessment

This section focuses on those effects commonly associated with winter storms, including those from blizzards, ice storms, heavy snow, freezing rain and extreme cold. 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 include loss of power and heat.

According to the *National Weather Service*, approximately 70% of winter deaths related to snow and ice occur in automobiles, and approximately 25% of deaths occur from people being caught in the cold. In relation to deaths from exposure to cold, 50% are people over 60 years old, 75% are male, and 20% occur in the home.

The classic winter storm in New England is the nor'easter, which is caused by a warm moist, low pressure system moving up from the south colliding with a cold, dry high pressure system moving down from the north. The nor'easter derives its name from the northeast winds typically accompanying such storms, and such storms tend to produce a

large amount of precipitation. Severe winter storms can produce an array of hazardous weather conditions, including heavy snow, blizzards, freezing rain and ice pellets, and extreme cold. The National Weather Service defines a blizzard as having winds over 35 mph with snow and blowing snow that reduces visibility to less than one-quarter mile for at least three hours.

Connecticut experiences at least one severe winter storm every five years, although a variety of small and medium snow and ice storms occur nearly every winter. The likelihood of a nor'easter occurring in any given winter is therefore considered high, and the likelihood of other winter storms occurring in any given winter is very high.

The Northeast Snowfall Impact Scale (NESIS) was developed by Paul Kocin and Louis Uccellini (Kocin and Uccellini, 2004) and is used by NOAA to characterize and rank high-impact Northeast snowstorms. These storms have wide areas of snowfall with accumulations of ten inches and above. NESIS has five categories: Extreme, Crippling, Major, Significant, and Notable. The index differs from other meteorological indices in that it uses population information in addition to meteorological measurements, thus giving an indication of a storm's societal impacts.

NESIS values are calculated within a geographical information system (GIS). The aerial distribution of snowfall and population information are combined in an equation that calculates a NESIS score, which varies from around one for smaller storms to over ten for extreme storms. The raw score is then converted into one of the five NESIS categories. The largest NESIS values result from storms producing heavy snowfall over large areas that include major metropolitan centers. Table 7-1 presents the NESIS categories, their corresponding NESIS values, and a descriptive adjective.

**Table 7-1**  
**NESIS Categories**

Category	NESIS Value	Description
1	1—2.499	Notable
2	2.5—3.99	Significant
3	4—5.99	Major
4	6—9.99	Crippling
5	10.0+	Extreme

### 7.3 **Historic Record**

Seven major winter nor'easters have occurred in Connecticut during the past 30 years (in 1979, 1983, 1988, 1992, 1996, 2003, and 2006). The 1992 nor'easter, in particular, caused the third-highest tides ever recorded in Long Island Sound and damaged 6,000 coastal homes. Inland areas received up to four feet of snow. Winter Storm Ginger in 1996 caused up to 27 inches of snow 24 hours and shut down the State of Connecticut for an entire day. The nor'easter which occurred on February 12 and 13, 2006 resulted in 18 to 24 inches of snow across Connecticut and was rated on NESIS as a Category 3 "Major" storm across the northeast. This storm ranked 20<sup>th</sup> out of 33 major winter storms ranked by NESIS for the northeastern United States since 1956, and produced 21 inches of snow in Seymour and 23 inches of snow in Waterbury.

The most damaging winter storms are not always nor'easters. According to the NCDC, there have been 135 snow and ice events in the State of Connecticut between 1993 and March 2008, causing over \$18 million in damages. Notably, heavy snow in December 1996 caused \$6 million in property damage. Snow removal and power restoration for a winter storm event spanning March 31 and April 1, 1997 cost \$1 million. On March 5, 2001, heavy snow caused \$5 million in damages, followed by another heavy snow event four days later that caused an additional \$2 million in damages. The last documented

winter storm event that qualified as a blizzard was Winter Storm Ginger in January of 1996. These events were recorded for various counties throughout the state.

Catastrophic ice storms are less frequent in Connecticut than the rest of New England due to the close proximity of the warmer waters of the Atlantic Ocean and Long Island Sound. The most severe ice storm in Connecticut on record was Ice Storm Felix on December 18, 1973. This storm resulted in two deaths and widespread power outages throughout the state. An ice storm in November of 2002 that hit Litchfield and western Hartford Counties resulted in \$2.5 million dollars in public sector damages.

Additional examples of recent winter storms to affect New Haven County, taken from the NCDC database, include:

- ❑ March 13 to 14, 1993 – A powerful storm caused blizzard conditions and up to 21 inches of snow in Litchfield County, with less snowfall occurring in New Haven County. 40,000 power outages and \$550,000 in property damage was reported throughout Connecticut.
- ❑ December 23, 1994 – An unusual snow-less late December storm caused gale force winds across the state. The high winds caused widespread power outages affecting up to 130,000 customers statewide. Numerous trees and limbs were blown down, damaging property, vehicles, and power lines to a total of five million dollars in damages. Peak wind gusts of up to 64 miles per hour were reported.
- ❑ January 12, 1995 – Light snow and sleet changed to light freezing rain, coating highways with ice. Up to 200 accidents occurred on state highways.
- ❑ April 9, 1996 – A late winter storm produced heavy wet snow across most of southern Connecticut. The weight of the snow caused numerous trees and power lines to fall. Snowfall amounts ranged from three to 14 inches across New Haven County.
- ❑ April 1, 1997 – A low pressure system produced morning rain and afternoon wet snow during the afternoon. Strong gusty winds up to 40 mph combined with the wet snow to cause power lines and trees to fall.

- ❑ December 29, 1997 – A low pressure system produced sustained winds of 30 to 40 mph with gusts up to 59 knots, with damage to trees and power lines reported in the Town of Ansonia and the Borough of Naugatuck.
- ❑ January 15, 1998 – An ice storm caused widespread and numerous traffic accidents across northern New Haven County, with at least one-half inch of ice accumulating on trees and power lines. Several roads were closed due to severe icing.
- ❑ March 15, 1999 – Light rain changed to wet snow that became heavy overnight, downing numerous tree limbs and power lines across the region. Snowfall amounts in New Haven County ranged from eight to 11 inches.
- ❑ January 25, 2000 – A winter storm produced up to two inches of snow per hour in northern New Haven County, which changed into sleet and freezing rain as the storm progressed. Snowfall was measured at 6.3 inches in the Town of Beacon Falls and seven inches in the City of Waterbury, and the snow was accompanied by wind gusts up to 45 mph.
- ❑ December 12, 2000 – High winds produced peak wind gusts of up to 58 mph in northern New Haven County, downing many trees onto houses, cars, power lines, and streets and causing significant property damage and power outages in the Borough of Naugatuck and the City of Waterbury.
- ❑ December 30, 2000 – Heavy snow at rates of one to two inches per hour mixed with high winds to produce near blizzard conditions. 12 inches of snow was reported at the Borough of Naugatuck.
- ❑ February 5, 2001 – A winter storm produced bands of heavy wet snow across New Haven County, with amounts ranging from ten to 20 inches reported. The heavy snow caused numerous fallen tree limbs that snapped power lines, power outages, and caused many traffic accidents.
- ❑ November 27, 2002 – Bands of heavy snow passed over northern New Haven County, producing seven inches of snow in the Town of Beacon Falls and nine inches in the City of Waterbury.
- ❑ December 5, 2003 – A winter storm produced occasionally heavy snow with accumulations of up to 13 inches in the Town of Oxford. Wind gusts of at least 35

- mph combined with the snow to create "white-out" conditions that caused major widespread impacts to mass transit across the entire region.
- ❑ January 28, 2004 – A winter storm produced six inches of snow in the Borough of Naugatuck and eight inches of snow in the City of Waterbury.
  - ❑ February 25, 2005 – A winter storm produced snow amounts of five to 10 inches across the state. Six inches were reported as snow accumulation in the Town of Southbury.
  - ❑ March 8, 2005 – A strong arctic cold front intensified as it swept across Connecticut, causing rain to change to snow and temperatures to fall from the 40s to the 20s, and produced northwest winds up to 55 mph. Near blizzard conditions occurred for a short time, with snowfall amounts ranging from three to six inches. The sudden drop in temperature resulted in a "flash-freeze" across roads that resulted in hundreds of vehicle accidents.
  - ❑ March 12, 2005 – A band of heavy snow oriented from south to north across New Haven County produced snowfall rates in excess of two inches per hour. Snowfall amounts ranged from five to nine inches.
  - ❑ March 24, 2005 – A late winter storm produced six inches of snow in the Town of Beacon Falls.
  - ❑ December 9, 2005 – A winter storm produced six to 12 inches of snow across Connecticut. Ten inches were reported as having accumulated in the Town of Southbury.
  - ❑ January 9, 2008 – Gusty winter winds caused a partial collapse of a building under construction in the Town of Oxford.

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

Existing programs applicable to flooding and wind are the same as those discussed in Sections 3.0 and 5.0. Programs that are specific to winter storms are generally those related to preparing plows, sand and salt trucks; tree-trimming to protect power lines; and other associated snow removal and response preparations.



It is almost a guarantee that winter storms will occur annually in Connecticut. In response, it is important for municipalities to budget fiscal resources towards snow management. The Town ensures that all warning/notification and communications systems are ready before a storm, and ensures that appropriate equipment and supplies, especially snow removal equipment, are in place and in good working order. The Town also prepares for the possible evacuation and sheltering of some populations which could be impacted by the upcoming storm (especially the elderly and special needs persons).

The Town of Southbury primarily uses Town staff for plowing operations. The Connecticut Department of Transportation plows Interstate 84, Route 6, Routes 67, and Route 172. The Department of Public Works has a list of priority snow plow routes. During emergencies, a plow vehicle can be dispatched ahead of an emergency vehicle. The Town should continue to discourage the creation of cul-de-sacs whenever a feasible connection to a through street can be created. This policy presents residents and emergency personnel with two means of egress into neighborhoods in the Town, ensuring that residents will not be cut off from critical facilities during times of need.

## **7.5 Vulnerabilities and Risk Assessment**

As mentioned for summer storms, the heavily treed landscape in close proximity to densely populated residential areas in the Town of Southbury poses problems in relation to blizzard condition damage. Tree limbs and some building structures may not be suited to withstand high wind and snow loads. Ice can damage or collapse power lines, render steep gradients impassable for motorists, undermine foundations, and cause "flood" damage from ice freezing water pipes in basements.

In addition, winter storms present additional problems for motorists all over the state. As the population of Connecticut and its dependence on transportation continues to increase, the vulnerability of the state to winter storms also increases. There is a high propensity

for traffic accidents during heavy snow and even light icing events. Roads may become impassable, inhibiting the ability of emergency equipment to reach trouble spots and the accessibility to medical and shelter facilities. Stranded motorists, especially senior and/or handicapped citizens, are at particularly high risk of injury or death during a blizzard. After a storm, snow piled on the sides of roadways can inhibit line of sight and reflect a blinding amount of sunlight, making driving difficult. When coupled with slippery road conditions, poor sightlines and heavy glare create dangerous driving conditions.

A few areas in the Town of Southbury have been identified by Town personnel as having problems with ice during the winter months. Icing causes difficult driving conditions throughout the hillier sections of Town such as Berkshire Road and Pascoe Drive. These roadways are not easily traveled upon when ice accumulates. Icing due to poor drainage also occurs along Pomperaug Trail.

As for other winter hazards, drifting snow is not as large a problem in Southbury as other areas, but it still occurs. This problem is mitigated through municipal plowing efforts. Ice jams are a significant problem along the stretch of the Pomperaug River near Manor Road. Refer to Section 4.0 for a discussion of ice jams.

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

Potential mitigation measures for flooding caused by nor'easters include those presented in Section 3.6. Winter storm mitigation measures must also address blizzard, snow, and ice hazards. These are emphasized below. Note that structural projects are generally not applicable to hazard mitigation for wind, blizzard, snow, and ice hazards.

### **7.6.1 Prevention**

Cold air, wind, snow, and ice cannot be prevented from impacting any particular area. Thus, mitigation should be focused on property protection and emergency services (discussed below) and prevention of damage as caused by breakage of tree limbs.

Previous recommendations for tree limb inspections and maintenance in Sections 5.0 and 6.0 are thus applicable to winter storm hazards, as well. As mentioned previously, utilities in Southbury should continue to be placed underground where possible. This can occur in connection with new development and also in connection with redevelopment work. Underground utilities cannot be damaged by heavy snow, ice, and winter winds.

### **7.6.2 Property Protection**

Property can be protected during winter storms through the use of shutters, storm doors, and storm windows. Where flat roofs are used on structures, snow removal is important as the heavy load from collecting snow may exceed the bearing capacity of the structure. Heating coils may be used to remove snow from flat roofs, and pipes should be adequately insulated to protect against freezing and bursting. All of these recommendations should apply to new construction, although they may also be applied to existing buildings during renovations. Finally, as recommended in previous sections, compliance with the amended Connecticut Building Code for wind speeds is necessary.

### **7.6.3 Public Education and Awareness**

The public is typically more aware of the hazardous effects of snow, ice, and cold weather than they are with regard to other hazards discussed in this plan. Nevertheless, people are still stranded in automobiles, get caught outside their homes in adverse weather conditions, and suffer heart failure while shoveling during each winter in

Connecticut. Public education should therefore focus on safety tips and reminders to individuals about how to prepare for cold and icy weather, including stocking homes, preparing vehicles, and taking care of themselves during winter storms.

#### **7.6.4 Emergency Services**

Emergency services personnel and departments such as Police and Fire should identify areas which may be difficult to access during winter storm events and devise contingency plans to continue servicing those areas during moderate storms. The creation of through streets with new developments increases the amount of egress for residents and emergency personnel into neighborhoods.

Available shelters should also be advertised and their locations known to the public prior to a storm event. Finally, mutual aid agreements with surrounding municipalities should be reviewed and updated as necessary to ensure help will be available when needed.

#### **7.7 Summary of Recommended Mitigation Measures, Strategies, and Alternatives**

Most of the recommendations in Sections 3.6 and 4.6 for mitigating flooding are suitable for mitigation of flooding caused by winter storms. These are not repeated in this subsection. The following recommendations are applicable to other aspects of winter storms such as winds, snow, and ice:

- ☐ Increase tree limb maintenance and inspections.
- ☐ Continue to require that utilities be placed underground in new developments and pursue funding to place them underground in existing developed areas.
- ☐ Review and post evacuation plans to ensure timely migration of people seeking shelter in all areas of the Town of Southbury.

- ❑ Post a list of Town sheltering facilities and snow plowing prioritization in the Town Hall and on the Town's website so residents can best plan how to access critical facilities during a winter storm event.
- ❑ Continue to encourage two modes of egress into every neighborhood by the creation of through streets.

In addition, important recommendations that apply to all hazards are listed in Section 11.1.

## **8.0 EARTHQUAKES**

### **8.1 Setting**

The entire Town of Southbury is susceptible to earthquakes. However, even though earthquakes have the potential to occur anywhere both in the Town and in the northeastern United States, the effects may be felt differently in some areas based on the type of geology. In general, earthquakes are considered a hazard that is possible to occur, but that may cause significant effects to a large area of the Town (refer to Appended Table 1).

### **8.2 Hazard Assessment**

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 phone lines, and often cause landslides, flash floods, fires, avalanches, and tsunamis. Earthquakes can occur at any time without warning.

The underground point of origin of an earthquake is called its focus; the point on the surface directly above the focus is the epicenter. The magnitude and intensity of an earthquake is determined by the use of the Richter scale and the Mercalli scale, respectively.

The Richter scale defines the magnitude of an earthquake. Magnitude is related to the amount of seismic energy released at the hypocenter of the earthquake. It is based on the amplitude of earthquake waves recorded on instruments which have a common calibration. The magnitude of an earthquake is thus represented by a single, instrumentally determined value recorded by a seismograph, which record the varying amplitude of ground oscillations.

The magnitude of an earthquake is determined from the logarithm of the amplitude of recorded waves. Being logarithmic, each whole number increase in magnitude represents a tenfold increase in measured strength. Earthquakes with a magnitude of about 2.0 or less are usually called micro-earthquakes, and are generally only recorded locally. Earthquakes with magnitudes of 4.5 or greater are strong enough to be recorded by seismographs all over the world.

The effect of an earthquake on the Earth's surface is called the intensity. The Modified Mercalli Intensity Scale consists of a series of key responses such as people awakening, movement of furniture, damage to chimneys, and total destruction. This scale, composed of 12 increasing levels of intensity that range from imperceptible shaking to catastrophic destruction, is designated by Roman numerals. It is an arbitrary ranking based on observed effects.

*The following is a description of the 12 levels of Modified Mercalli intensity from the USGS.*

- I. Not felt except by a very few under especially favorable conditions.
- II. Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing.
- III. Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration similar to the passing of a truck. Duration estimated.
- IV. Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
- V. Felt by nearly everyone; many awakened. Some dishes and windows broken. Unstable objects overturned. Pendulum clocks may stop.
- VI. Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
- VII. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
- VIII. Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
- IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
- X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
- XI. Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
- XII. Damage total. Lines of sight and level are destroyed. Object thrown in the air.



Unlike seismic activity in California, earthquakes in Connecticut are not associated with specific known faults. Instead, earthquakes with epicenters in Connecticut are referred to as being intra-plate activity. Bedrock in Connecticut - New England in general – is highly capable of transmitting seismic energy; thus, the area impacted by an earthquake in Connecticut can be four to 40 times greater than that of California. In addition, population density is up to 3.5 times greater in Connecticut than in California, potentially putting a greater number of people at risk.

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

### 8.3 **Historic Record**

According to the USGS Earthquake Hazards Program, Connecticut is a region of very minor seismic activity. This assessment is based on lack of historical and instrumental reports of strong earthquakes. However, earthquakes do occur in this region. The New England states regularly register seismic events.

According to the Northeast Region Emergency Consortium, there were 137 recorded earthquakes in Connecticut between 1568 and 1989. The most severe earthquake in Connecticut's history occurred at East Haddam on May 16, 1791. Stone walls and chimneys were toppled during this quake. Additional instances of seismic activity occurring in and around Connecticut includes is provided below, based on information provided in USGS documents, the Connecticut Natural Hazards Mitigation Plan (2007), other municipal hazard mitigation plans, and newspaper articles.

- ❑ A devastating earthquake near Three Rivers, Quebec on February 5, 1663 caused moderate damage in parts of Connecticut.

- ❑ Strong earthquakes in Massachusetts in November 1727 and November 1755 were felt strongly in Connecticut.
- ❑ In April 1837, a moderate tremor occurred at Hartford, causing alarm but little damage.
- ❑ In August 1840, another moderate tremor with its epicenter 10 to 20 miles north of New Haven shook Hartford buildings but caused little damage.
- ❑ In October 1845, an Intensity V earthquake occurred in Bridgeport. An Intensity V earthquake would be approximately 4.3 on the Richter scale.
- ❑ On June 30, 1858, New Haven and Derby were shaken by a moderate tremor.
- ❑ On July 28, 1875, an early morning tremor caused Intensity V damage throughout Connecticut and Massachusetts.
- ❑ The second strongest earthquake to impact Connecticut occurred near Hartford on November 14, 1925. No significant damage was reported.
- ❑ The Timiskaming, Ontario earthquake of November 1935 caused minor damage as far south as Cornwall, Connecticut. This earthquake affected one million square miles of Canada and the United States.
- ❑ An earthquake near Massena, New York in September 1944 produced mild effects in Hartford, Meriden, New Haven, and Middletown, Connecticut.
- ❑ An Intensity V earthquake was reported in Stamford in March of 1953, causing shaking but no damage.
- ❑ On November 3, 1968, another Intensity V earthquake in southern Connecticut caused minor damage in Madison and Chester.
- ❑ Recent earthquake activity has been recorded near New Haven in 1988, 1989, and 1990 (2.0, 2.8, and 2.8 in magnitude, respectively), in Greenwich in 1991 (3.0 magnitude), and on Long Island in East Hampton, New York in 1992.
- ❑ The most recent earthquake to occur in Connecticut occurred on March 11, 2008. It was a 2.0 magnitude with its epicenter three miles northwest of the center of Chester.

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

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

Due to the infrequent nature of damaging earthquakes, land use policies in the Town of Southbury do not directly address earthquake hazards. However, the Town of Southbury is deliberate about regulating land use on steep slopes. Section 1.2.15 of the Subdivision Regulations defines steep slopes as those portions of land with slope/topography in excess of 25%. Section 4.11.9 regulates the maximum grade for any street as not exceeding 10% for local residential streets, 8% for throughfares, and 3% for turnarounds.

Likewise, Section 8.7 of Southbury Zoning Regulations (Setbacks and Slopes) states that no earth removal or placement shall occur within 50 feet of an abutting property line without written approval from abutting property owner. Finished slopes cannot exceed 25% grade or some lesser slope that is necessary to provide stability, safety, and the opportunity for future reuse and development.

#### **8.5 Vulnerabilities and Risk Assessment**

According to the USGS, Connecticut is at a low risk for experiencing a damaging earthquake. The USGS has determined that the State of Connecticut has a 10% chance that at some point in a 50-year period an earthquake would cause peak acceleration (ground shaking) values of 4% to 8% of the force of gravity. To appreciate why these values of ground shaking are expressed as a percentage of the force of gravity, note that it requires more than 100% of the force of gravity to throw objects up in the air.

In terms of felt effects and damage, ground motion at the level of several percent of gravity corresponds to the threshold of damage to buildings and houses (an earthquake intensity of approximately V). For comparison, reports of "dishes, windows and doors disturbed" corresponds to an intensity of about IV, or about 2% of gravity. Reports of "some chimneys broken" correspond to an intensity of about VII, or about 10% to 20% of gravity. According to the USGS National Seismic Hazard Mapping Project (2008), an earthquake impacting the Town of Southbury has a 2% chance of exceeding a peak acceleration of 10-12% of the force of gravity in a 50-year period.

According to the FEMA HAZUS-HM Estimated Annualized Earthquake Losses for the United States (2008) document, FEMA used probabilistic curves developed by the USGS for the National Earthquakes Hazards Reduction Program to calculate Annualized Earthquake Losses (AEL) for the United States. Based on the results of this study, FEMA calculated the AEL for Connecticut to be \$11,622,000. This value placed Connecticut 30<sup>th</sup> out of the 50 states in terms of AEL. The magnitude of this value stems from the fact that Connecticut has a large building inventory that would be damaged in a severe earthquake, and takes into account the lack of damaging earthquakes in the historical record.

The ***AEL*** is the expected losses due to earthquakes each year. Note that this number represents a long term average; thus actual earthquake losses may be much greater or non-existent for a particular year.

The current Connecticut Natural Hazard Mitigation Plan (2007) states that "there is a 66% chance that an earthquake of a 2.7 magnitude or greater" will occur in the area of Southbury. According to the previous Connecticut Natural Hazard Mitigation Plan (2004), the State of Connecticut Department of Emergency Management notes the chance that a damaging earthquake of magnitude 5.0 or greater will occur within the state in any one year is 5%, and that the odds of an earthquake of magnitude 6.0 are about one in 300 each year. Therefore, the Town of Southbury is unlikely to experience a damaging

earthquake in any given year. This belief is reinforced by the timeline and damages recorded in the historical record presented in Section 7.3.

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. In addition, artificial fill material has the potential for liquefaction. When

***Liquefaction*** is a phenomenon in which the strength and stiffness of a soil are reduced by earthquake shaking or other rapid loading. It occurs in soils at or near saturation, especially the finer textured soils.

liquefaction occurs, the strength of the soil decreases, reducing the ability of soil to support building foundations or bridges is reduced. Increased shaking and liquefaction can cause greater damage to buildings and structures, and a greater loss of life.

As explained in Section 2.3, several areas of the Town of Southbury are underlain by sand and gravel of glacial meltwater origin. Figure 2-5 depicts surficial materials in the Town. Structures in these areas are at increased risk from earthquakes due to amplification of seismic energy and/or collapse. The best mitigation for future development in areas of sandy material may be application of the most stringent building codes, or possibly the prohibition of certain types of new construction. The areas that are not at lesser risk from unstable soils during an earthquake are the areas in Figure 2-5 underlain by glacial till.

Areas of steep slopes can collapse during an earthquake, creating landslides. Seismic activity can also break utility lines, such as water 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 Plan, dam failure has been addressed separately in Section 9.0.

Problems with mass movement and slides at slopes have indeed occurred in the Town of Southbury. For example, a residence at the end of Lower Fish Rock Road near the Housatonic River is in danger of sliding into the river due to previous disturbance of the ground at this location. These types of problems have led, in part, to the regulations pertaining to development on and near slopes.

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

As earthquakes are difficult to predict and can affect the entire Town of Southbury, potential mitigation can only include adherence to building codes, education of residents, and adequate planning. The following potential mitigation measures have been identified:

- ☐ Consider preventing new residential development in areas prone to collapse.
- ☐ Continue regulating development on and near slopes, and consider setting a prohibition on development of slopes above a certain percentage grade.
- ☐ Continue to require adherence to the state building codes.
- ☐ Ensure that municipal departments have adequate backup facilities in case earthquake damage occurs to municipal buildings.

In addition, important recommendations that apply to all hazards are listed in Section 11.1.

## **9.0 DAM FAILURE**

### **9.1 Setting**

Dam failures can be triggered suddenly, with little or no warning, from other natural disasters such as floods and earthquakes. Dam failures often 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.

With 32 registered dams and potentially several other minor dams in the Town or along its border, dam failure can occur almost anywhere in the Town of Southbury. While flooding from a dam failure generally has a limited geographic extent, the effects are potentially catastrophic. Fortunately, a major dam failure is considered only a possible natural hazard event in any given year (refer to Appended Table 2).

### **9.2 Hazard Assessment**

The Connecticut DEP administers the statewide Dam Safety Program, and designates a classification to each state-registered dam based on its potential hazard.

- ❑ *Class AA* dams are negligible hazard potential dams that upon failure would result in no measurable damage to roadways, land and structures, and negligible economic loss.
- ❑ *Class A* dams are low hazard potential dams that upon failure would result in damage to agricultural land and unimproved roadways, with minimal economic loss.
- ❑ *Class BB* dams are moderate hazard potential dams that upon failure would result in damage to normally unoccupied storage structures, damage to low volume roadways, and moderate economic loss.



- ❑ *Class B* dams are significant hazard potential dams that upon failure would result in possible loss of life, minor damage to habitable structures, residences, hospitals, convalescent homes, schools, and the like, damage or interruption of service of utilities, damage to primary roadways, and significant economic loss.
- ❑ *Class C* dams are high potential hazard dams that upon failure would result in loss of life and major damage to habitable structures, residences, hospitals, convalescent homes, schools, and main highways with great economic loss.

As of 1996, there were 32 DEP-registered dams within the Town of Southbury, of which seven were Class A, one was Class AA, one was Class BB, 12 were Class B, one was Class C, and ten were undefined. The list of Class B and C dams was updated by the DEP in 2007. This updated information is listed in Table 9-1. In addition, Long Meadow Pond Dam is located upstream of the Pomperaug River in the Town of Bethlehem and believed to have the potential to impact the Town of Southbury should it fail. This dam is also listed in Table 9-1.

**Table 9-1**  
**High Hazard Dams that Could Potentially Impact the Town of Southbury**

Number	Name	Town	Class
1006	Long Meadow Pond Dam	Bethlehem	BB
13001	Shepaug Dam	Southbury	C
13002	Paper Mill Pond Dam	Southbury	B
13008	Kettletown Brook Pond Dam	Southbury	B
13011	Middle Hill House Road Pond Dam	Southbury	B
13012	Pomperaug River Dam	Southbury	B
13031	Pierces Colonial Acres Dam	Southbury	B

This section discusses only the possible effects of failure of significant and high hazard (Class B & C) dams. Failure of a Class C dam has the potential for loss of life and property damage totaling millions of dollars. Failure of a Class B dam has the potential for loss of life and minor damage to property and critical facilities. These Class B & C dams are shown on Figures 9-1, 9-2, 9-3, and 9-4.

### Figure 9-1: High Hazard Dams in Southbury

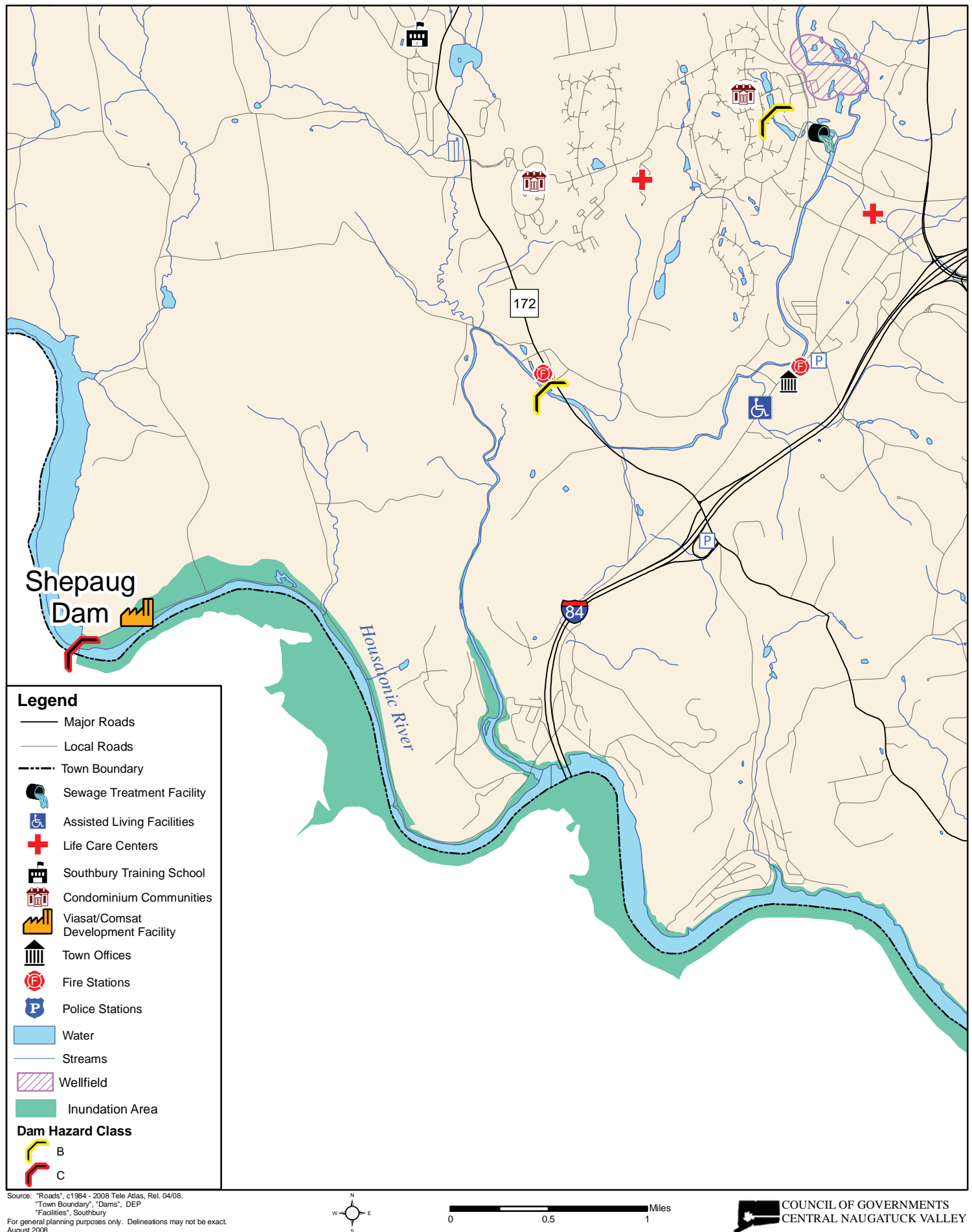
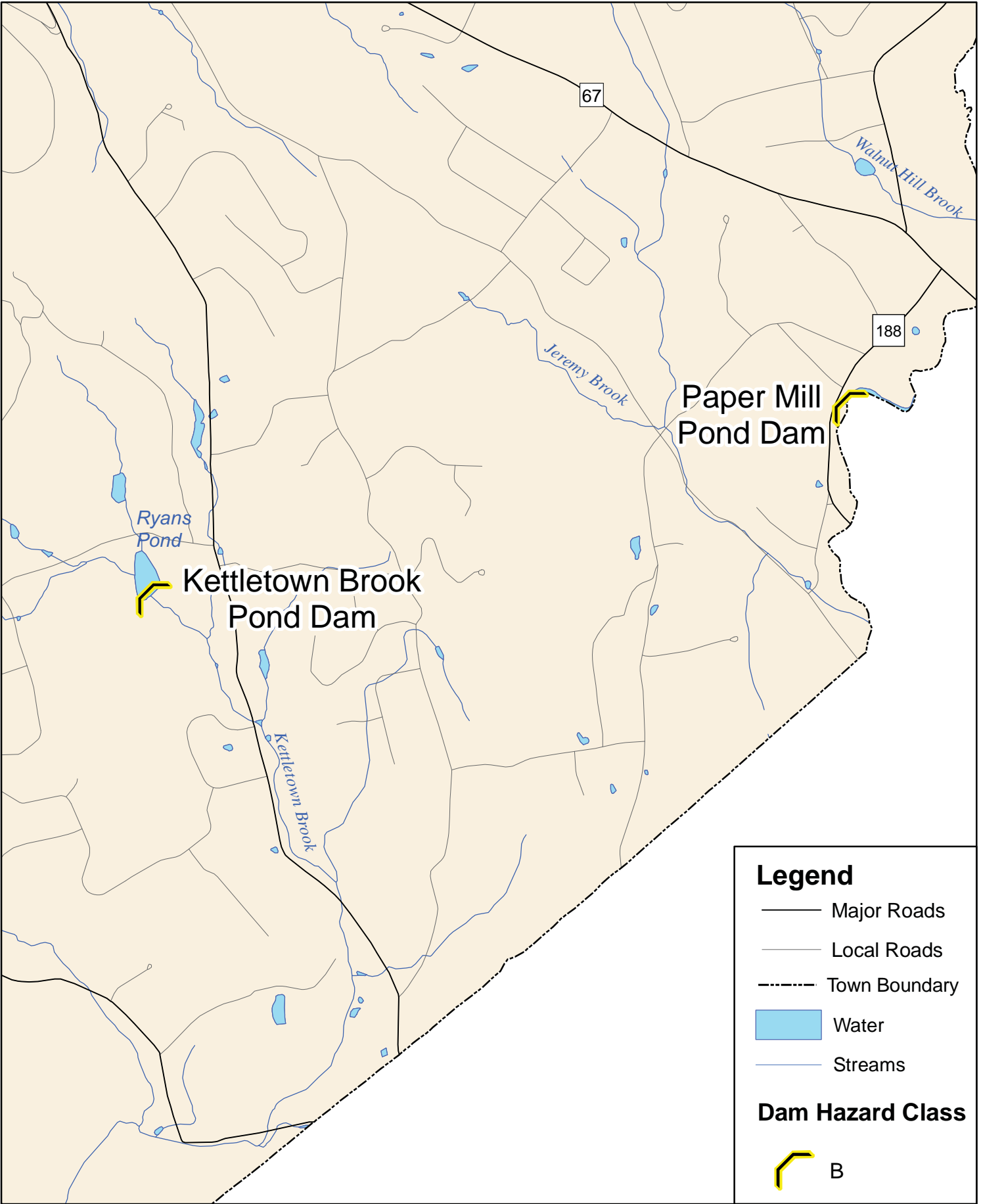
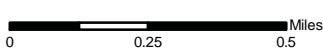


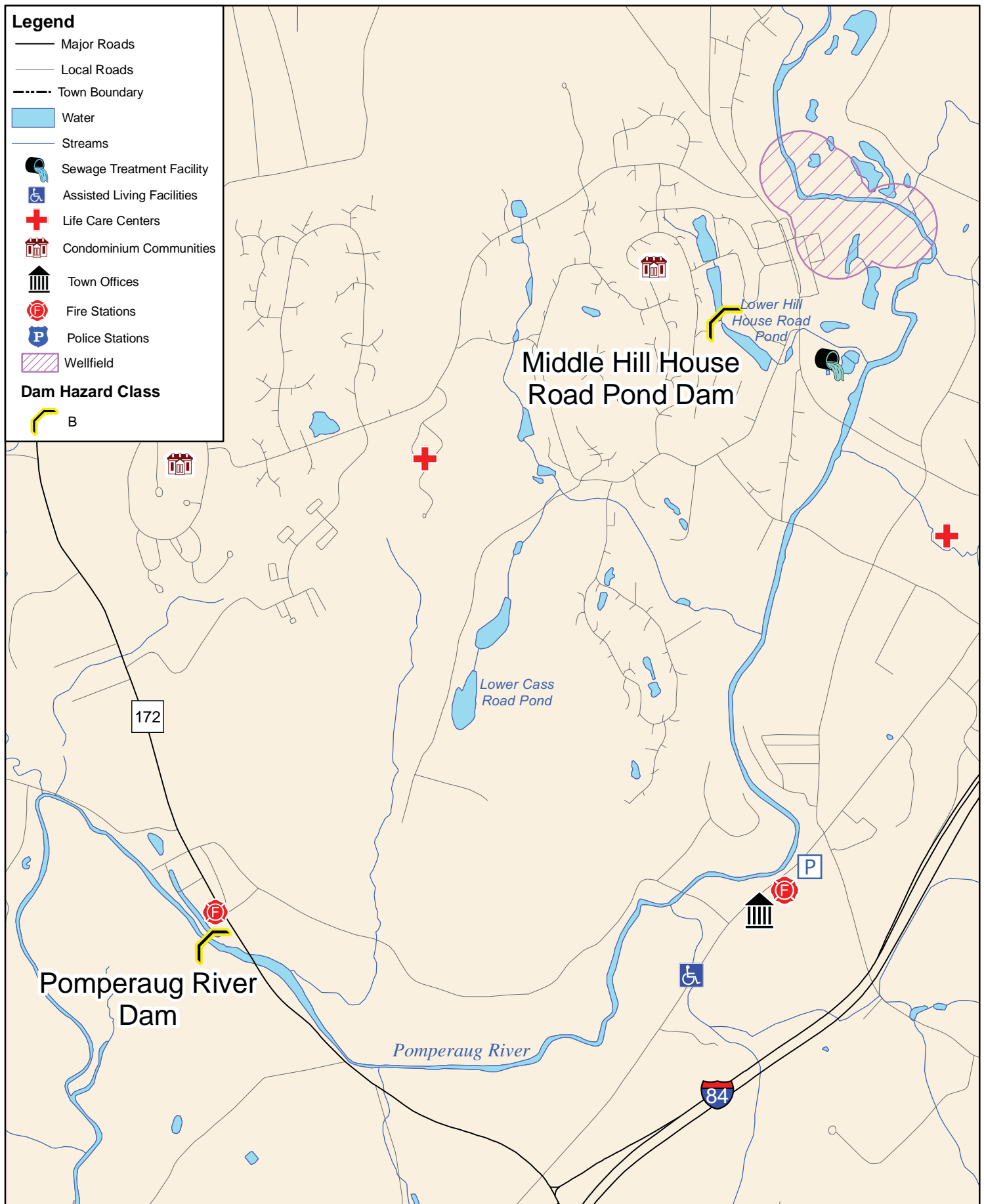
Figure 9-2: High Hazard Dams in Southbury



Source: "Roads", c1984 - 2008 Tele Atlas, Rel. 04/08.  
"Town Boundary", "Dams", DEP  
"Facilities", Southbury  
For general planning purposes only. Delineations may not be exact.  
August 2008



# Figure 9-3: High Hazard Dams in Southbury



Source: "Roads", c1984 - 2008 Tele Atlas, Rel. 04/08.

"Town Boundary", "Dams", DEP

"Facilities", Southbury  
For general planning purposes only. Delineations may not be exact.  
August 2008

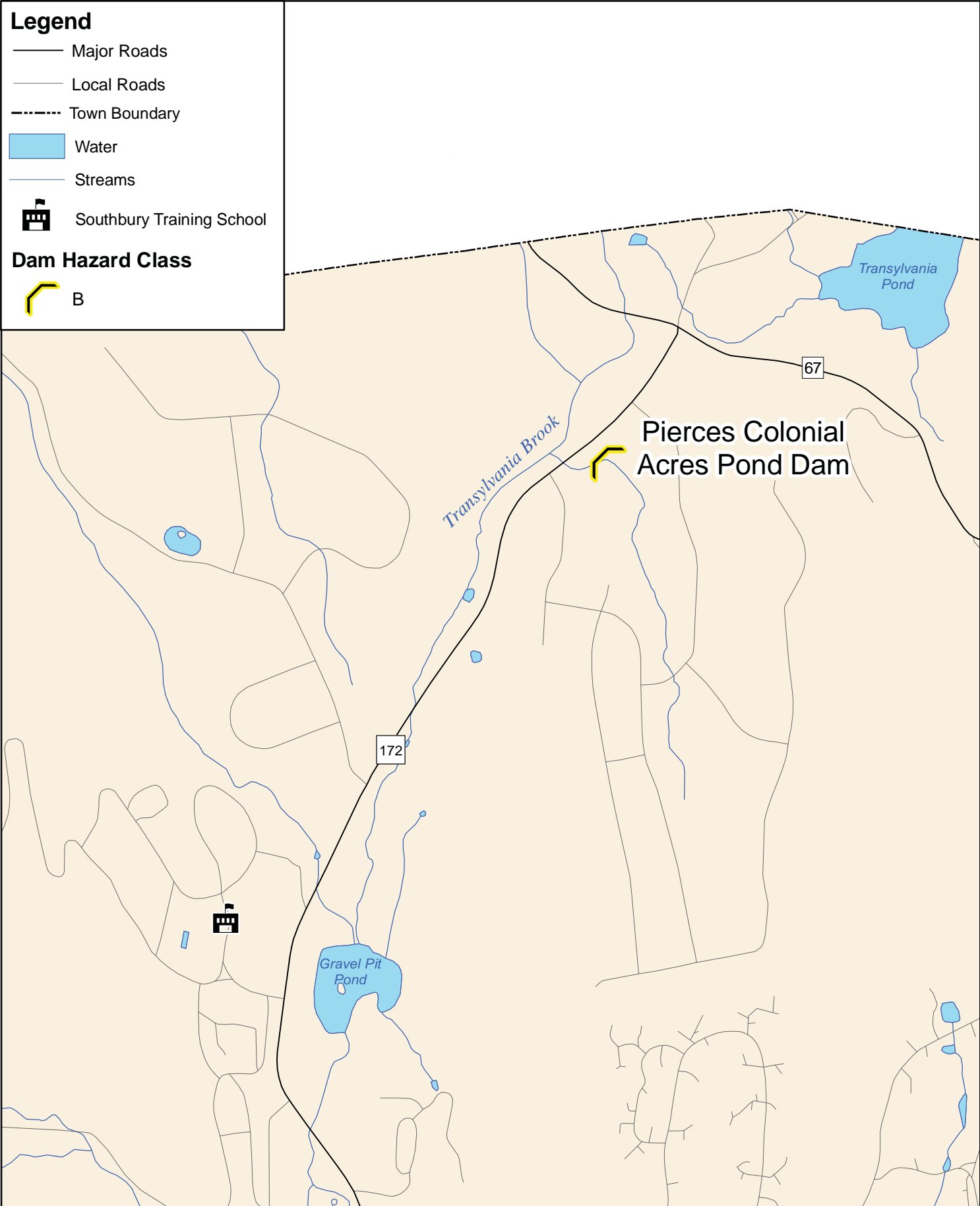


0 0.25 0.5 Miles



COUNCIL OF GOVERNMENTS  
CENTRAL NAUGATUCK VALLEY

Figure 9-4: High Hazard Dams in Southbury



Source: "Roads", c1984 - 2008 Tele Atlas, Rel. 04/08.  
"Town Boundary", "Dams", DEP  
"Facilities", Southbury  
For general planning purposes only. Delineations may not be exact.  
August 2008

There is one Class C dam in the Town of Southbury. This is the Shepaug Dam on the Housatonic River, owned by First Light Power Resources, that impounds Lake Lillinonah. The dam location is depicted on Figure 9-1 along with its downstream inundation area.

### 9.3 **Historic Record**

Approximately 200 notable dam and reservoir failures occurred worldwide in the twentieth century. More than 8,000 people died in these disasters. The following are the two most catastrophic dam failures in Connecticut recent history:

- ❑ 1938 and 1955: Exact numbers of dam failures caused by these floods are unavailable, but Connecticut DEP believes that more dams were damaged in these events than in the 1982 or 2005 flooding events.
- ❑ 1961: Crystal Lake dam in Middletown failed, injuring three and severely damaging 11 homes.
- ❑ 1963: Failure of the Spaulding Pond Dam in Norwich caused six deaths and six million dollars in damage (1963 dollars).
- ❑ June 5-6, 1982: Connecticut experienced a severe flood that caused 17 dams to fail and seriously damaged 31 others. Failure of the Bushy Hill Pond Dam in Deep River caused \$50 million in damages, and the remaining dam failures caused nearly \$20 million in damages.

More recently, the NCDC reports that flash flooding on April 16, 1996 caused three small dams in Middletown and one in Wallingford to breach, and the Connecticut DEP reported that the sustained heavy rainfall from October 7 to 15, 2005 caused 14 complete or partial dam failures and damage to 30 other dams throughout the State. A sample of damaged dams is summarized in Table 9-2.

**Table 9-2**  
**Dams Damaged Due to Flooding from October 2005 Storms**

Number	Name	Location	Class	Damage Type	Ownership
-----	Somerville Pond Dam	Somers	--	Partial Breach	DEP
4701	Windsorville Dam	East Windsor	BB	Minor Damage	Private
10503	Mile Creek Dam	Old Lyme	B	Full Breach	Private
-----	Staffordville Reservoir #3	Union	--	Partial Breach	CT Water Co.
8003	Hanover Pond Dam	Meriden	C	Partial Breach	Meriden
-----	ABB Pond Dam	Bloomfield	--	Minor Damage	Private
4905	Springborn Dam	Enfield	BB	Minor Damage	DEP
13904	Cains Pond Dam	Suffield	A	Full Breach	Private
13906	Schwartz Pond Dam	Suffield	BB	Partial Breach	Private
14519	Sessions Meadow Dam	Union	BB	Minor Damage	DEP

No major dam failures have occurred in the Town of Southbury. According to Town personnel, the dams throughout Town are in varying stages of condition. The following paragraphs provide a description and highlight the general condition of each Class C & B dam based on information available at the Connecticut DEP.

- ❑ Shepaug Dam – This Class C hydroelectric dam was installed in 1955 and is owned by First Light Power Resources. Capable of producing 42,600 kilowatts, the dam has one power-producing unit. The dam is a concrete gravity structure anchored into bedrock. It is 1,412 feet in length and is divided into four sections. The dam's drainage area upstream is approximately 1,391 square miles, with a 293 foot spillway. Lake Lillinonah, covering approximately 1,820 acres lies upstream of the hydroelectric dam.
  
- ❑ Paper Mill Pond Dam – This Class B masonry dam is located on Eightmile River and is founded on ledge. The dam is owned by the Connecticut DEP and has an outlet pipe with a sluice gate. The dam experienced pinhole leaks and leaking from its outlet pipe from 1966 to 1972.
  
- ❑ Kettletown Brook Pond Dam – This Class B dam is owned by Westonbrook Farm LLC. As its name suggests, the dam is located on Kettletown Brook.



- ❑ Middle Hill House Road Pond Dam – This Class B dam has an armory fence, a concrete apron spillway to a lower pond which is a rip rap bottom. The dam is owned by Heritage Village Foundation, Inc. The drain pipe outlet of the dam is four inches and extends from the lower pond under Hillhouse Road. There is a suspended sanitary sewer line that crosses the brook which is located just downstream of the dam. The dam was last inspected in 1990.
  
- ❑ Pomperaug River Dam – This Class B run-of-the-river dam has a metal sluiceway and is currently in generally poor condition. The dam is owned by Berbric Realty Corp. and had repairs to its stone masonry abutment in 1991. The failure of the dam caused flooding at a mill building 800 feet downstream, minor damage to the road 1,400 feet downstream of the dam, and possible damage to the building on the left abutment. There has been no correspondence about the dam since 2005.
  
- ❑ Pierces Colonial Acres Dam – This Class B dam was constructed in 1988 and is owned by Westwood Acres, Inc. The dam is located on an unnamed tributary of Transylvania Brook. The dam consists of a dike of compacted earth fill with an impervious core. The concrete spillway is four feet by four feet in size and is designed for the 100-year flood.

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

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

Dam Inspection Regulations require that over 600 dams in Connecticut be inspected annually. The DEP currently prioritizes inspections of those dams which pose the greatest potential threat to downstream persons and properties. Dams found to be unsafe under the inspection program must be repaired by the owner. Depending on the severity of the identified deficiency, an owner is allowed

***Dams regulated by the DEP*** must be designed to pass the 100-year rainfall event with one foot of freeboard, a factor of safety against overtopping.

***Critical and high hazard dams*** are required to meet a design standard greater than the 100-year rainfall event.

reasonable time to make the required repairs or remove the dam. If a dam owner fails to make necessary repairs to the subject structure, the DEP may issue an administrative order requiring the owner to restore the structure to a safe condition and may refer noncompliance with such an order to the Attorney General's Office for enforcement. As a means of last resort, the DEP Commissioner is empowered by statute to remove or correct, at the expense of the owner, any unsafe structures which present a clear and present danger to public safety.

Owners of Class C dams are required to maintain emergency operations plans. First Light Power Resources is therefore charged with maintaining such a plan for the Shepaug Dam.

## **9.5 Vulnerabilities and Risk Assessment**

By definition, failure of Class C dams may cause catastrophic loss of life and property. The only Class C dam in the Town of Southbury, the Shepaug Dam, presents the highest damage potential to Town residents should it fail.

### **Shepaug Dam**

The Shepaug Dam is owned by the First Light Power Resources. Based on dam failure inundation maps on file at the DEP, a dam failure at full pool height (worst-case scenario)

would cause flooding along the Housatonic River in the Towns of Southbury and Newtown (Figure 8-1). Residents downstream of the Shepaug Dam including those located along River Road, Manor Drive, and Pomperaug Trail would be in serious danger. Additionally, residents in other communities along the river would experience flooding. The satellite communication facility at the end of River Road in Southbury is located adjacent to the dam and could be in serious threat of major damages if the Shepaug Dam failed. Such a failure would cause backwater conditions along the Pomperaug River and the unnamed tributaries that join the Housatonic River along this stretch.

#### *Other Dams in Southbury*

The five additional Class B dams described in Section 9.3 can also have an effect on residents of Southbury. Although Town personnel did not describe these dams as having potential problems or becoming potential threats to residents, review of DEP files indicated that the Pomperaug River Dam is currently in poor condition. Without regular maintenance performed on the existing dams, additional problems and threats may surface.

#### *Long Meadow Pond Dam, Town of Bethlehem*

The Long Meadow Pond dam located in the Town of Bethlehem requires discussion in context of flooding from dam failure. This dam is owned by the Town of Bethlehem and is currently rated below a Class B dam. The dam overtopped during the April 2007 nor'easter, and though the dam sustained some damage, it did not fail. The Connecticut DEP sent the Town of Bethlehem an engineering request letter in October 2007 requiring the Town to retain an engineer to perform a hydraulic and hydrologic analysis of the dam, and to design improvements to allow the dam to safely pass the 100-year storm event.

Should this dam fail, it is likely that floodwaters would continue southwest into the Weekeepeemee River. If the dam failure occurs during heavy rain, the Weekeepeemee could already be flooded, and the additional waters would exacerbate flooding conditions downstream in the Towns of Woodbury and then Southbury, where the Pomperaug River would convey floodwaters from the pond and the Weekeepeemee River.

Residents living along the Pomperaug River in Southbury remain concerned with the Long Meadow Pond dam in Bethlehem. They were notified in 2007 when sandbagging was taking place at the dam, and were displeased that a formal notification and process for evacuation were not available at that time. They recommend that the notification process be improved.

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

The Dam Safety Section of the DEP Inland Water Resources Division is charged with the responsibility for administration and enforcement of Connecticut's dam safety laws. The existing statutes require that permits be obtained to construct, repair, or alter dams, and that existing dams be registered and periodically inspected to assure that their continued operation does not constitute a hazard to life, health, or property.

The Town of Southbury should work with the ACOE and the Connecticut DEP to stay up to date on the evolution of Emergency Operations Plans and Dam Failure Analyses for the significant and high hazard dams in Town. Whenever possible, copies of these documents should be made available at the Town Hall for reference and public viewing.

All Class B and C dams in Town should be regularly inspected by their respective owners, along with regular maintenance as required to keep the dams in safe and functional order. The Town should initiate correspondence with the owners of the five listed Class B dams, including the DEP, with regard to past, future planned, and ongoing maintenance. The Town could consider implementing occasional Town inspections of

Class A, AA, and unranked dams. The Town's inventory and familiarity with all known dams within Southbury is important to maintaining safe and functional working order of all dams.

The Town should consider specifically including dam failure areas in its CodeRED emergency notification system. This technology should be used to warn downstream residents of a potential or impending dam failure and facilitate evacuation.

With regard to Long Meadow Pond Dam, the Town of Bethlehem is pursuing modifications of the dam to pass the 100-year flood event, and is being urged to review and update the Emergency Operations Plan when modifications are completed. Refer to Section 8.0 of the Bethlehem Natural Hazard Pre-Disaster Mitigation Plan for more information. The Town of Southbury should support the Town of Bethlehem's efforts to address repairs to Long Meadow Pond Dam.

In addition, there are several suggested potential mitigation strategies which are applicable to all hazards in this plan. These are outlined in Section 11.1.

## **10.0 WILDFIRES**

### **10.1 Setting**

The ensuing discussion about wildfires is focused on the undeveloped wooded and shrubby areas of Southbury, along with low-density suburban type development found at the margins of these areas known as the wildland interface. Structural fires in higher density areas of the Town are not considered.

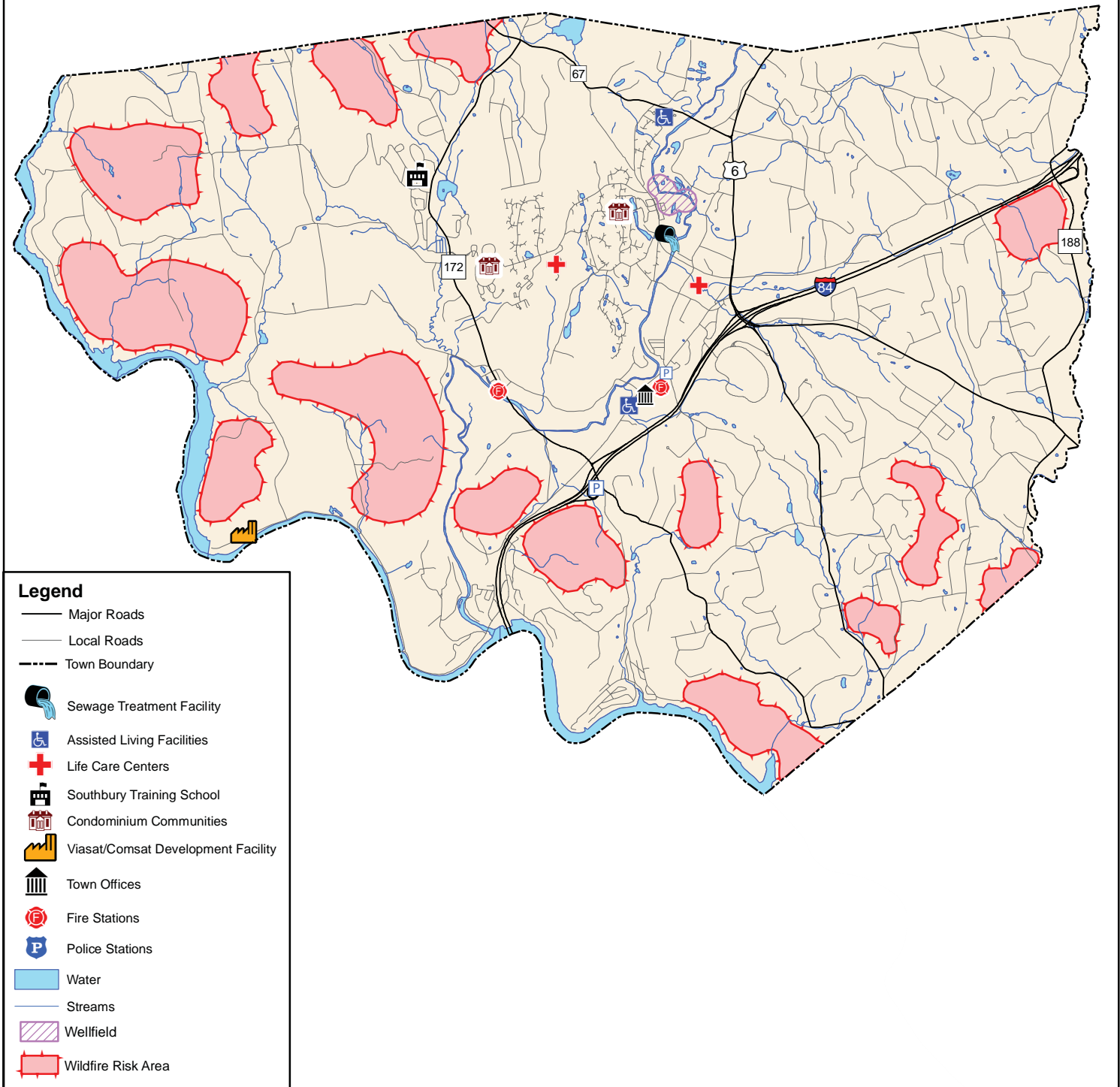
The Town of Southbury is considered a low-risk area for wildfires. Wildfires are of particular concern in wooded areas and other areas with poor access for fire-fighting equipment. Figure 10-1 depicts wildfire risk areas for the Town of Southbury. Hazards associated with wildfires include property damage and loss of habitat. Wildfires are considered a likely event each year, but should they occur are generally contained to a small range with limited damage to non-forested areas.

### **10.2 Hazard Assessment**

Wildfires are well-defined by the Massachusetts Hazard Mitigation Plan as being "highly destructive, uncontrollable fires." Although the term brings to mind images of tall trees engulfed in flames, wildfires can occur as brush and shrub fires, especially under dry conditions. Wildfires are also known as "wildland fires."

Nationwide, humans have caused approximately 90% of all wildfires in the last decade. Accidental and negligent acts include unattended campfires, sparks, burning debris, and irresponsibly discarded cigarettes. The remaining 10% of fires are caused mostly by lightning.

# Figure 10-1: Southbury Wildfire Risk Area



Source: "Roads", c1984 - 2008 Tele Atlas, Ret. 04/08.  
 "Town Boundary", DEP  
 "Facilities", Southbury  
 "Wildfire Area", COGCV  
 For general planning purposes only. Delineations may not be exact.  
 August 2008



0 0.5 1 Miles



Nevertheless, wildfires are also a natural process, and their suppression is now recognized to have created a larger fire hazard, as live and dead vegetation accumulates in areas where fire has been prevented. In addition, the absence of fire has altered or disrupted the cycle of natural plant succession and wildlife habitat in many areas. Consequently, federal, state and local agencies are committed to finding ways, such as prescribed burning to reintroduce fire into natural ecosystems, while recognizing that fire fighting and suppression are still important.

Connecticut has a particular vulnerability to fire hazards where urban development and wildland areas are in close proximity. The "wildland/urban interface" is where many such fires are fought. Wildland areas are subject to fires because of weather conditions and fuel supply. An isolated wildland fire may not be a threat, but the combined effect of having residences, businesses, and lifelines near a wildland area causes increased risk to life and property. Thus, a fire that might have been allowed to burn itself out with a minimum of fire fighting or containment in the past is now fought to prevent fire damage to surrounding homes and commercial areas, as well as smoke threats to health and safety in these areas.

### **10.3 Historic Record**

According to the Connecticut Natural Hazard Mitigation Plan (2007), Connecticut enacted its first state-wide forest fire control system in 1905, when the state was largely rural with very little secondary growth forest. By 1927, the state had most of the statutory foundations for today's forest fire control programs and policies in place, such as the State Forest Fire Warden system, a network of fire lookout towers and patrols, and regulations regarding open burning. The severe fire weather in the 1940's prompted the state legislature to join the Northeastern Interstate Forest Fire Protection Compact with its neighbors in 1949. Today, most of Connecticut's forested areas are secondary growth forests. According to the Connecticut DEP, forest has reclaimed over 500,000 acres of land that was used for agriculture in 1914. However, that new forest has been

fragmented in the past few decades by residential development. The urban/wildland interface is increasing each year as sprawl extends further out from Connecticut's cities.

The technology used to combat wildfires has significantly improved since the early 20<sup>th</sup> century. An improved transportation network, coupled with advances in firefighting equipment, communication technology, and training, has improved the ability of firefighters to minimize damage due to wildfires in the state. For example, radio and cellular technologies have greatly improved fire fighting command capabilities.

According to the Climate of 2008 Wildfire Season Summary presented by the NCDC, an average of 4.6 million acres per year in the United States was burned by wildfires since 1985. This translates to a nationwide mean of 60 acres per fire (at a mean of approximately 77,000 fires per year). The number one cause of wildfires is arson, with about half of all wildfires being intentionally set.

Wildfire statistics for Connecticut are much lower than the national average. According to the USDA Forest Service Annual Wildfire Summary Report for 1994 through 2003, an average of 600 acres per year in Connecticut was burned by wildfires during this period. In general, the fires are small and detected quickly, with most wildfires being contained to less than 10 acres in size.

Traditionally, the highest forest fire danger in Connecticut occurs in the spring from mid-March to mid-May. The worst wildfire year in Connecticut since 1994 occurred during the extremely hot and dry summer of 1999. Over 1,733 acres of Connecticut burned in 345 separate wildfires, an average of about five acres per fire. Only one wildfire occurred between 1994 and 2003 that burned over 300 acres, and a wildfire in 1986 in the Mattatuck State Forest in the nearby Town of Watertown burned 300 acres. More recently, a 30-acre wildfire occurred in Oxford at the south end of the Central Naugatuck Valley region on April 19, 2008.

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

Existing mitigation for wildland fire control is typically focused on Fire Department training and maintaining an adequate supply of equipment. The Town of Southbury typically requires developments outside of the Heritage Village Water Company's existing service area to use water tanks for fire protection. All new development projects are required to include water tanks as part of their projects, while some older, established neighborhoods have tanks. The Town does not promote the use of fire ponds or dry hydrants for fire protection. In addition, new roads and subdivisions are required meet specifications for fire truck access.

Unlike wildfires on the west coast of the United States where the fires are allowed to burn toward development and then stopped, the Southbury Fire Department goes to the fires. This proactive approach of going on the offense is believed to be effective for controlling wildfires. The fire department has some water storage capability, but primarily relies on the Heritage Village Water Company service to fight fires throughout the northeastern portion of Town. In the remainder of the Town, the fire department relies heavily on the use of local water bodies and water tanks within developments to supply fire fighting water.

#### ***10.5 Vulnerabilities and Risk Assessment***

The most common causes of wildfires are arson, lightning strikes, and electrical fires from downed trees hitting electrical lines. Thus, wildfires have the potential to occur anywhere and at any time in both undeveloped and lightly developed areas. The extensive forests and fields covering the state are prime locations for a wildfire. In many areas, structures and subdivisions are built abutting forest borders, creating areas of particular vulnerability. Wildfires are more common in rural areas than in developed areas, as most fires in populated areas are quickly noticed and contained. The likelihood of a severe wildfire developing is lessened by the vast network of water features in the

state, which create natural breaks likely to stop the spread of a fire. During long periods of drought, these natural features may dry up, increasing the vulnerability of the state to wildfires.

According to the Connecticut DEP, the actual forest fire risk in Connecticut is low due to several factors. First, the overall incidence of forest fires is very low. Secondly, as the wildfire/forest fire prone areas become fragmented due to development, the local fire departments have increased access to those neighborhoods for firefighting equipment. Third, the problematic interface areas are site specific such as driveways too narrow to permit emergency vehicles. Finally, trained fire fighters at the local and state level are readily available to fight fires in the state, and inter-municipal cooperation on such instances is common.

Based on the historic record presented in Section 10.3, most wildfires in Connecticut are relatively small. In the drought year of 1999, the average wildfire burned five acres. In comparison, the most extreme wildfires recorded since 1986 each burned 300 acres. Given the availability of fire fighting water in the Town (including the use of nearby water bodies) and the proactive stance regarding fires, it is believed that the low end of this acreage is possible in Southbury as well, with the larger acreage reserved for very infrequent severe events.

The wildfire risk areas presented in Figure 10-1 were defined as being contiguous wooded areas greater than 50 acres in size that have limited access in areas near public water service, and contiguous wooded areas greater than 30 acres in size with limited access in the remainder of the Town. These areas are generally associated with state-owned forests, land trust property, and Town owned open space. As each area borders residential sections of the Town, residents within these risk areas are most vulnerable to fire, heat, and smoke effects of wildfires.

Despite having a considerable amount of forest/urban interface, the overall risk of wildfires occurring in the Town of Southbury is also considered to be low. Such fires fail to spread far due speed of detection and strong fire response. As most of the Town has fire-fighting water available nearby, a large amount of water can be made readily available for firefighting equipment. The Town also has the support of the HVWC and the state to provide access to their owned lands in case of a wildfire.

Recall from Figure 2-7, Figure 2-8, and Figure 2-9 that significant elderly and disabled populations reside in the Town of Southbury. In comparing these figures with the wildfire risk areas presented in Figure 9-1, it appears unlikely that the segments of the population potentially impacted by a wildfire would consist of the elderly and those with disabilities residing in Heritage Village and the Southbury Training School.

Nevertheless, it is important for the Southbury Fire Department to be prepared to assist these special populations and their own emergency services during emergencies such as wildfires.

In summary, the western and south-southwestern parts of Town nearest to development are considered most at risk from wildfires. Additionally, there is concern about those wooded areas in the other heavily forested sections of Town. These areas located in the southern, western, and southeastern portions Southbury present potential access problems for firefighting purposes in the event of a wildfire. The Town has the support of the owners of the open space land to provide access to their lands in the event of a wildfire.

Should a wildfire occur, it seems reasonable to estimate that the average area to burn would be five acres, consistent with the state average during long periods of drought. In the case of an extreme wildfire during a long drought on forested lands, it is estimated that up to 300 acres could burn before containment due to the limited access of those lands. Residential areas bordering such lands would also be vulnerable to wildfire, but would likely be more impacted by heat and smoke than by structure fires due to the strong and timely fire response in the Town.

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

Potential mitigation measures for wildfires include a combination of prevention, education, and emergency planning. Although educational materials are available through the Fire Department, they should be made available at other municipal offices as well. Education of homeowners on methods of protecting their homes is far more effective than trying to steer growth away from potential wildfire areas, especially given that the available land that is environmentally appropriate for development may be forested.

Water system improvements are an important class of potential mitigation for wildfires. The following recommendations could be implemented to mitigate fire risk:

- ❑ The Heritage Village Water Company should continue to extend the public water supply systems into areas that require water for fire protection; any such extension should be supported by additional supply if necessary.
- ❑ The Heritage Village Water Company and Southbury Training School should continue to identify and upgrade those portions of the public water supply systems that are substandard from the standpoint of adequate pressure and volume for fire-fighting purposes.
- ❑ The Town of Southbury should continue to require the installation of water tanks in any new developments within the Town.

Other potential mitigation strategies for preventing wildfires include:

- ❑ Continue to promote inter-municipal cooperation in firefighting efforts;
- ❑ Continue to support public outreach programs to increase awareness of forest fire danger and how to use common firefighting equipment;
- ❑ Continue reviewing subdivision applications to ensure new neighborhoods and driveways are properly sized to allow access of emergency vehicles;

- ❑ Provide outreach programs on how to properly manage burning and campfires on private property;
- ❑ Distribute copies of a booklet such as "Is Your Home Protected from Wildfire Disaster? – A Homeowner's Guide to Wildfire Retrofit" when developers and homeowners pick up or drop off applications;
- ❑ Patrol Town-owned open space and parks to prevent unauthorized campfires;
- ❑ Enforce regulations and permits for open burning; and
- ❑ Continue to place utilities underground.

In addition, specific recommendations that apply to all hazards are listed in Section 10.1.



## **11.0 RECOMMENDATIONS**

### **11.1 Additional Recommendations**

Recommendations that are applicable to two, three, or four hazards were discussed in the applicable subsections of Sections 3.0 through 9.0. For example, placing utilities underground is a recommendation for hurricane, summer storm, winter storm, and wildfire mitigation. A remaining class of recommendations is applicable to all hazards, because it includes recommendations for improving public safety and planning for emergency response. Instead of repeating these recommendations in section after section of this Plan, these are described herein.

Informing and educating the public about how to protect themselves and their property from natural hazards is essential to any successful hazard mitigation strategy. The Local Emergency Planning Commission should be charged with the creation and/or dissemination of informational pamphlets and guides to public locations such as the library, post office, senior center, and town hall. Such pamphlets include "*Are You Ready? An In-Depth Guide to Citizen Preparedness*" co-published by the American Red Cross, FEMA, and the National Ocean & Atmospheric Administration and includes recommendations for dealing with heat waves, hurricanes, tornadoes, thunderstorms, flooding, fire, and winter storms. Other pamphlets include:

- ☐ "*Food & Water in an Emergency*"
- ☐ "*Disaster Supply Kit*"
- ☐ "*Family Disaster Plan*"
- ☐ "*Preparing for Disaster for People with Disabilities and Other Special Needs*", and
- ☐ "*Helping Children Cope with Disaster*"

In addition, the Town should consider adding pages to its website dedicated specifically to citizen education and preparation for natural hazard events.

A community warning system that relies on radios and television is less effective at warning residents during the night when the majority of the community is asleep. Thus the ongoing implementation of CodeRED is a potential boon for emergency response in the Town of Southbury. Databases should be set up at best possible for hazards with a specific geographic extent, particularly dam failure. Residents should also be encouraged to purchase a NOAA weather radio containing an alarm feature. In addition, the Town Emergency Operations Plan should continue to be reviewed and updated on a regular basis, at least once annually.

## ***11.2 Summary of Specific Recommendations***

Recommendations have been presented throughout this document in individual sections as related to each natural hazard. This section lists specific recommendations of the Plan without any priority ranking. Recommendations that span multiple hazards are only reprinted once in this section under the most appropriate hazard event. Refer to the matrix in Appendix A for recommendations with scores based on the STAPLEE methodology described in Section 1.0.

### ***Flooding***

#### ***Prevention***

- ☐ Streamline the permitting process and ensure maximum education of a developer or applicant. Develop a checklist that cross-references the bylaws, regulations, and codes related to flood damage prevention that may be applicable to the proposed project. This list could be provided to an applicant at any Town department.
- ☐ Consider joining FEMA's Community Rating System.
- ☐ Continue to require Flood Hazard Area Permits for activities within SFHAs.

- ❑ Consider requiring buildings constructed in flood prone areas to be protected to the highest recorded flood level, regardless of being within a defined SFHA.
- ❑ After Map Mod has been completed, consider restudying local flood prone areas and produce new local-level regulatory floodplain maps using more exacting study techniques, including using more accurate contour information to map flood elevations provided with the FIRM.

### *Property & Natural Resource Protection*

- ❑ Pursue the acquisition of additional municipal open space properties inside SFHAs and set those aside as greenways, parks, or other non-residential, non-commercial or non-industrial use.
- ❑ Selectively pursue conservation recommendations listed in the Plan of Conservation and Development and other studies and documents.
- ❑ Continue to regulate development in protected and sensitive areas, including steep slopes, wetlands, and floodplains.
- ❑ Subject to a favorable FEMA cost-benefit analysis, apply for a grant to acquire the property at 111 Flood Bridge Road.
- ❑ Consider purchasing residences along Flood Bridge Road, River Hill Road, River Trail, Manor Drive, and Pomperaug Trail. These homes must also qualify for purchase based on the FEMA cost-benefit analysis. It is understood that owners along River Trail are not currently interested in relocation.
- ❑ Work with homeowners on Flood Bridge Road, River Hill Road, River Trail, Manor Drive, Pomperaug Trail, and other areas to educate them about the benefits of floodproofing.

### *Structural Projects*

- ❑ Increase the conveyance capacity of the culvert for Jeremy Brook under Hulls Hill Road at the intersection with Jeremy Swamp Road.

- ❑ Upgrade the drainage systems along, and the cross culverts beneath, River Road in order to prevent flooding in multiple locations due to clogging of storm drains and the incapacity of culverts.
- ❑ Install and repair storm drains and drainage systems on Lakeside Road and Lee Farm Road.
- ❑ Increase in the elevation and replace the bridge over Transylvania Brook at Spruce Brook Road.
- ❑ Work with CTDOT to elevate portions of Route 172 and replace the Route 172 bridge over the Pomperaug River in order to mitigate for flooding problems along this state roadway.

### **Ice Jams**

- ❑ Continuously monitor the stretch of the Pomperaug River that is prone to ice jams near Manor Road and Pomperaug Trail. If ice jam conditions appear to be imminent, then proper evacuations or other preventive safety measures will need to be taken. The CodeRED system can be used to facilitate warnings and evacuations.
- ❑ As explained in Section 3.7, consider purchasing residences along Manor Drive and Pomperaug Trail (these homes must also qualify for purchase based on the FEMA cost-benefit analysis) and work with homeowners on Manor Drive and Pomperaug Trail to educate them about the benefits of floodproofing.
- ❑ Evaluate options for instream structural projects and commence a dialog with DEP and the Army Corps of Engineers about potential funding for such projects. On an annual basis, monitor the criteria for PDM grants and evaluate if ice jam mitigation projects might qualify.

### **Wind Damage Related to Hurricanes, Summer Storms, and Winter Storms**

- ☐ Increase tree limb maintenance and inspections, especially along Route 172, Route 67 and other evacuation routes. Increase inspections of trees on private property near power lines and Town right-of-ways;
- ☐ Continue to require that utilities be placed underground in new developments and pursue funding to place them underground in existing developed areas; and
- ☐ Review potential evacuation plans to ensure timely migration of people seeking shelter in all areas of Town.
- ☐ Standardize a tree maintenance program for the Town.
- ☐ Continue outreach regarding dangerous trees on private property.
- ☐ Continue to require compliance with the amended Connecticut Building Code for wind speeds.
- ☐ Provide for the Building Department or the Planning or Zoning Commissions to make literature available during the permitting process regarding appropriate design standards.

### **Winter Storms**

- ☐ Post a list of Town sheltering facilities and snow plowing prioritization in the Town Hall and on the Town's website so residents can best plan how to access critical facilities during a winter storm event.
- ☐ Continue to encourage two modes of egress into every neighborhood by the creation of through streets.

### **Earthquakes**

- ☐ Consider preventing new residential development in areas prone to collapse.
- ☐ Continue regulating development on and near slopes, and consider setting a prohibition on development of slopes above a certain percentage grade.

- ❑ Continue to require adherence to the state building codes.
- ❑ Ensure that municipal departments have adequate backup facilities in case earthquake damage occurs to municipal buildings.

### **Dam Failure**

- ❑ Work with the ACOE and the Connecticut DEP to stay up to date on the evolution of Emergency Operations Plans and Dam Failure Analyses for the significant and high hazard dams in Town.
- ❑ All Class B and C dams in Town should be regularly inspected by their respective owners, along with regular maintenance as required to keep the dams in safe and functional order.
- ❑ The Town should initiate correspondence with the owners of the five listed Class B dams, including the DEP, with regard to past, future planned, and ongoing maintenance.
- ❑ Consider implementing occasional Town inspections of Class A, AA, and unranked dams.
- ❑ Consider specifically including dam failure areas in the CodeRED emergency notification system. This technology should be used to warn downstream residents of a potential or impending dam failure and facilitate evacuation.
- ❑ With regard to Long Meadow Pond Dam, support the Town of Bethlehem's efforts to address repairs to Long Meadow Pond Dam.

### **Wildfires**

- ❑ The Heritage Village Water Company should continue to extend the public water supply systems into areas that require water for fire protection; any such extension should be supported by additional supply if necessary.
- ❑ The Heritage Village Water Company and Southbury Training School should continue to identify and upgrade those portions of the public water supply systems

that are substandard from the standpoint of adequate pressure and volume for fire-fighting purposes.

- ☐ The Town of Southbury should continue to require the installation of water tanks in any new developments within the Town.
- ☐ Continue to promote inter-municipal cooperation in firefighting efforts;
- ☐ Continue to support public outreach programs to increase awareness of forest fire danger and how to use common firefighting equipment;
- ☐ Continue reviewing subdivision applications to ensure new neighborhoods and driveways are properly sized to allow access of emergency vehicles;
- ☐ Provide outreach programs on how to properly manage burning and campfires on private property;
- ☐ Distribute copies of a booklet such as "Is Your Home Protected from Wildfire Disaster? – A Homeowner's Guide to Wildfire Retrofit" when developers and homeowners pick up or drop off applications;
- ☐ Patrol Town-owned open space and parks to prevent unauthorized campfires;
- ☐ Enforce regulations and permits for open burning; and
- ☐ Continue to place utilities underground.

### ***11.3 Sources of Funding***

The following sources of funding and technical assistance may be available for the priority projects listed above. This information comes from the FEMA website (<http://www.fema.gov/government/grant/index.shtm>). Funding requirements and contact information is given in Section 11.4.

#### **FEMA (Federal Emergency Management Agency) Grants and Assistance Programs**

##### **Buffer Zone Protection Program (BZPP)**

<http://www.fema.gov/government/grant/bzpp/index.shtm>

This grant provides security and risk management capabilities at State and local level for Tier I and II critical infrastructure sites that are considered high-risk/high-



consequence facilities. Each State with a BZPP site is eligible to submit applications for its local communities to participate in and receive funding under the program. The funding for this grant is based on the number, type, and character of the site.

### **Citizen Corps Program National Emergency Technology Guard (NET Guard) Pilot Program**

<http://www.fema.gov/government/grant/netguard/index.shtm>

The purpose of this grant, under the Homeland Security Act of 2002, is to re-establish a communication network in the event that the current information systems is attacked and rendered inoperable. A total of \$80,000 may be available to each applicant provided they are a locality that meets the required criteria.

### **Community Disaster Loan Program**

[http://www.fema.gov/government/grant/fs\\_cdl.shtm](http://www.fema.gov/government/grant/fs_cdl.shtm)

This program provides funds to any eligible jurisdiction in a designated disaster area that has suffered a substantial loss of tax and other revenue. The assistance is in the form of loans not to exceed 25 percent of the local government's annual operating budget for the fiscal year in which the major disaster occurs, up to a maximum of five million dollars.

### **Competitive Training Grants Program (CTGP)**

<http://www.fema.gov/emergency/ctgp/index.shtm>

Funds allocated from this program will be used to bolster training and education for Homeland Security. Applicants, if funded, must deliver innovative training/education programs to its trainees.

### **Emergency Food and Shelter Program**

<http://www.fema.gov/government/grant/efs.shtm>

This program was created in 1983 to supplement the work of local social service organizations, both private and governmental, to help people in need of emergency assistance.

### **Emergency Management Performance Grants**

<http://www.fema.gov/emergency/empg/empg.shtm>

The Emergency Management Performance Grant (EMPG) is designed to assist local and state governments in maintaining and strengthening the existing all-hazards, natural and man-made, emergency management capabilities. Allocations of this fund is authorized by the 9/11 Commission Act of 2007, and grant amount is determined demographically at the state and local level.

**Emergency Operations Center (EOC) Grant Program**

<http://www.fema.gov/government/grant/eoc/index.shtm>

The Emergency Operations Center Grant is designated to support the needed construction, renovation or improvement of emergency operation centers at the State, Local, or Tribal governments. The State Administrative Agency (SAA) is the only eligible entity able to apply for the available funding on behalf of qualified State, local, and tribal EOCs.

**Flood Mitigation Assistance (FMA) Program**

<http://www.fema.gov/government/grant/fma/index.shtm>

The FMA was created as part of the National Flood Insurance Reform Act of 1994 with the goal of reducing or eliminating claims under the NFIP. FEMA provides funds in the form of planning grants for Flood Mitigation Plans and project grants to implement measures to reduce flood losses, including elevation, acquisition, or relocation of NFIP-insured structures. Repetitive loss properties are prioritized under this program. This grant program is administered through the DEP.

**Hazard Mitigation Grant Program (HMGP)**

<http://www.fema.gov/government/grant/hmgp/index.shtm>

The HMGP provides grants to States and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. This grant program is administered through the DEP.

**Homeland Security Grant Program (HSGP)**

<http://www.fema.gov/government/grant/hsgp/index.shtm>

The objective of the FY 2008 HSGP is to enhance the response, preparedness, and recovery of local, State, and tribal governments in the event of a disaster or terrorist attack. Eligible applicants include all 50 states, the District of Columbia, Puerto Rico, American Samoa, Guam, Northern Mariana Islands, and the Virgin Islands. Risk and effectiveness, along with a peer review, determine the amount allocated to each applicant.

**Interoperable Emergency Communications Grant Program**

<http://www.fema.gov/government/grant/iecgp/index.shtm>

Funding through the Interoperable Emergency Communications Grant Program will enable States, Territories, local units of government, and tribal communities to implement their Statewide Communication Interoperability Plans (SCIP) in conjunction with the National Emergency Communications Plan (NECP) to further

enhance interoperability. The only applicants eligible for funding through this grant are State Administration Agencies.

**Intercity Bus Security Grant Program (IBSGP)**

<http://www.fema.gov/government/grant/ibsgp/index.shtm>

The mission of the IBSGP is to maintain the protection of intercity bus systems and public transportation from terrorism. The only eligible grantees for this program are private operators servicing at least 50 trips annually along fixed established routes.

**National Flood Insurance Program (NFIP)**

<http://www.fema.gov/library/viewRecord.do?id=3005>

This program enables property owners in participating communities to purchase insurance as a protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages. Municipalities that join the associated Community Rating System can gain discounts of flood insurance for their residents.

**Pre-Disaster Mitigation Grant Program**

<http://www.fema.gov/government/grant/pdm/index.shtm>

The purpose of the PDM program is to fund communities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. PDM grants are provided to states, territories, Indian tribal governments, communities, and universities, which, in turn, provide sub-grants to local governments. PDM grants are awarded on a competitive basis. This grant program is administered through the DEP.

**Port Security Grant Program (PSGP)**

<http://www.fema.gov/government/grant/psgp/index.shtm>

The goal of the PSGP is to provide protection of critical port infrastructure from terrorism, involving explosive and non-conventional weapons. Protection includes enhancing training, recovery, prevention, management, response and awareness. Those who may apply include owners of federally regulated terminals, facilities, U.S. inspected passenger vessels, state and local agencies, and local stakeholders.

**Public Assistance Grant Program**

<http://www.fema.gov/government/grant/pa/index.shtm>

The Public Assistance Grant Program (PA) is designed to assist State, Tribal and local governments, and certain types of private non-profit organizations in recovering from major disasters or emergencies. Along with helping to recover, this grant also encourages prevention against potential future disasters by strengthening hazard

mitigation during the recovery process. The first grantee to apply and receive the PA would usually be the State, and the State could then allocate the granted funds to the sub-grantees in need of assistance.

### **Regional Catastrophic Preparedness Grant Program (RCPGP)**

<http://www.fema.gov/government/grant/rcp/index.shtm>

The main focus of RCPGP is to strengthen the national preparedness against any catastrophic event within the designated Tier I and Tier II Urban Areas. RCPGP will fund the designated Tier I and II Urban areas only.

### **Repetitive Flood Claims Program**

<http://www.fema.gov/government/grant/rfc/index.shtm>

The Repetitive Flood Claims (RFC) grant program was set into place to assist States or communities with insured properties that have had prior claims to the National Flood Insurance Program (NFIP) but do not meet the requirements for FMA. This grant is provided to eligible States/Tribes/Territories that, in turn, will allocate sub-grants to local governments.

### **Severe Repetitive Loss (SRL) Program**

<http://www.fema.gov/government/grant/srl/index.shtm>

The SRL provides funding to reduce or eliminate the long-term risk of flood damage to SRL structures insured under the NFIP. This program is for residential properties only, and eligible project activities include acquisition and demolition or relocation of the structure with conversion of the property to open space, elevation, minor localized flood reduction projects, and dry flood proofing (historic properties only).

### **Transit Security Grant Program (TSGP)**

<http://www.fema.gov/government/grant/tsgp/index.shtm>

The purpose of TSGP is to bolster security and safety for public transit infrastructure within Urban Areas throughout the United States. Applicable grantees include only the state Governor and the designated State Administrative Agency (SAA) appointed to obligate program funds to the appropriate transit agencies.

### **Trucking Security Program (TSP)**

<http://www.fema.gov/government/grant/tsp/index.shtm>

The TSP provides funding for an anti-terrorism and security awareness program for highway professionals in support of the National Preparedness Guidelines. All applicants are accepted so long as they support all four funding priority areas: participant identification and recruitment; training; communications; and information analysis and distribution for an anti-terrorism and security awareness program.

**Urban Areas Security Initiative Nonprofit Security Grant Program (UASI-NSGP)**  
<http://www.fema.gov/government/grant/uasi/index.shtm>

The UASI-NSGP specifically targets major areas of concern, those being areas designated as having the highest level of terrorist threat or vulnerability, and aims to improve the protection and preparedness of potentially targeted organizations. Applicants only include non-profit organizations deemed as having a high risk to terrorism and who reside within the areas of concern.

**U.S. Fire Administration**

**Assistance to Firefighters Grant Program (AFGP)**

<http://www.firegrantsupport.com/afg/>  
<http://www.usfa.dhs.gov/fireservice/grants/>

The primary goal of the Assistance to Firefighters Grants (AFG) is to meet the firefighting and emergency response needs of fire departments and nonaffiliated emergency medical services organizations. Since 2001, AFG has helped firefighters and other first responders to obtain critically needed equipment, protective gear, emergency vehicles, training, and other resources needed to protect the public and emergency personnel from fire and related hazards. The Grant Programs Directorate of the Federal Emergency Management Agency administers the grants in cooperation with the U.S. Fire Administration.

**Fire Prevention & Safety Grants (FP&S)**

<http://www.firegrantsupport.com/fps/>

The Fire Prevention and Safety Grants (FP&S) are part of the Assistance to Firefighters Grants (AFG) and are under the purview of the Grant Programs Directorate in the Federal Emergency Management Agency. FP&S grants support projects that enhance the safety of the public and firefighters from fire and related hazards. The primary goal is to target high-risk populations and mitigate high incidences of death and injury. Examples of the types of projects supported by FP&S include fire prevention and public safety education campaigns, juvenile firesetter interventions, media campaigns, and arson prevention and awareness programs.

**Reimbursement for Firefighting on Federal Property**

<http://www.usfa.dhs.gov/fireservice/grants/rfff/>

Reimbursement may be made to fire departments for fighting fires on property owned by the federal government for firefighting costs over and above normal operating costs. Claims are submitted directed to the U.S. Fire Administration. For more information, please contact Tim Ganley at (301) 447-1358.

## **Staffing for Adequate Fire & Emergency Response (SAFER)**

<http://www.firegrantsupport.com/safer/>

The goal of SAFER is to enhance the local fire departments' abilities to comply with staffing, response and operational standards established by NFPA and OSHA (NFPA 1710 and/or NFPA 1720 and OSHA 1910.134 - see <http://www.nfpa.org/SAFERActGrant> for more details). Specifically, SAFER funds should assist local fire departments to increase their staffing and deployment capabilities in order to respond to emergencies whenever they may occur. As a result of the enhanced staffing, response times should be sufficiently reduced with an appropriate number of personnel assembled at the incident scene. Also, the enhanced staffing should provide that all front-line/first-due apparatus of SAFER grantees have a minimum of four trained personnel to meet the OSHA standards referenced above. Ultimately, a faster, safer and more efficient incident scene will be established and communities will have more adequate protection from fire and fire-related hazards.

## **Other Grant Programs**

### **Flood Mitigation**

- ❑ U.S. Army Corps of Engineers – *50/50 match funding for flood proofing and flood preparedness projects.*
- ❑ U.S. Department of Agriculture – *financial assistance to reduce flood damage in small watersheds and to improve water quality.*
- ❑ CT Department of Environmental Protection – *assistance to municipalities to solve flooding and dam repair problems through the Flood and Erosion Control Board Program.*

### **Hurricane Mitigation**

- ❑ FEMA State Hurricane Program - *financial and technical assistance to local governments to support mitigation of hurricanes and coastal storms.*
- ❑ FEMA Hurricane Program Property Protection – *grants to hurricane prone states to implement hurricane mitigation projects.*

### General Hazard Mitigation

- ❑ Americorps – *teams may be available to assist with landscaping projects such as surveying, tree planting, restoration, construction, and environmental education, and provide volunteers to help communities respond to natural hazard-related disasters.*

### Erosion Control and Wetland Protection

- ❑ U.S. Department of Agriculture – *technical assistance for erosion control.*
- ❑ CT Department of Environmental Protection – *assistance to municipalities to solve beach erosion problems through the Flood and Erosion Control Board Program.*
- ❑ North American Wetlands Conservation Act Grants Program – *funding for projects that support long term wetlands acquisition, restoration, and/or enhancement. Requires a 1-to-1 funds match.*



## **12.0 PLAN IMPLEMENTATION**

### **12.1 Implementation Strategy and Schedule**

The Council of Governments of the Central Naugatuck Valley is authorized to update this hazard mitigation plan as needed, coordinate its adoption with the Town of Southbury, and guide it through the FEMA approval process.

The individual recommendations of the hazard mitigation plan must be implemented by the municipal departments that oversee these activities. The Office of the First Selectman and the Department of Public Works in the Town of Southbury will primarily be responsible for developing and implementing selected projects, while some projects will be implemented by other departments. Appendix A incorporates an implementation strategy and schedule, detailing the responsible department and anticipated time frame for the specific recommendations listed throughout this document.

Upon adoption, the Plan will be made available to all Town departments and agencies as a planning tool to be used in conjunction with existing documents. It is expected that revisions to other Town plans and regulations, such as the Plan of Conservation and Development, department annual budgets, and the Zoning and Subdivision Regulations, will reference this plan and its updates. The Office of the First Selectman will be responsible for ensuring that the actions identified in this plan are incorporated into ongoing Town planning activities, and that the information and requirements of this plan are incorporated into existing planning documents within five years from the date of adoption or when other plans are updated, whichever is sooner.

The Office of the First Selectman will be responsible for assigning appropriate Town officials to update the Plan of Conservation and Development, Zoning Regulations, Subdivision Regulations, Wetlands Regulations, and Emergency Operations Plan to include the provisions in this plan. Should a general revision be too cumbersome or cost



prohibitive, simple addendums to these documents will be added that include the provisions of this plan. The Plan of Conservation and Development and the Emergency Operations Plan are the two documents most likely to benefit from the inclusion of the Plan in the Town's library of planning documents.

Finally, information and projects in this planning document will be included in the annual budget and capital improvement plans as part of implementing the projects recommended in this Plan. This will primarily include the annual budget and capital improvement projects lists maintained and updated by the Department of Public Works.

## ***12.2 Progress Monitoring and Public Participation***

The Office of the First Selectman will be the party responsible for monitoring the successful implementation of the Plan as part of his/her oversight of all municipal departments. Such monitoring may include periodic reports to the COGCNV regarding certain projects, meetings, site visits, and telephone calls as befits the project being implemented. The COGCNV will coordinate an annual discussion for review and evaluation of the plan. Participants in this review may include, but need not be limited to, representatives of the departments listed in Section 12.1.

Matters to be addressed during this discussion will include a review of the goals and objectives of the original plan, a review of hazards or disasters that occurred during the preceding period, a review of the mitigation activities that have been accomplished to date, a discussion of reasons that implementation may be behind schedule, and recommendations for new projects and revised activities. The annual discussion will be conducted in the late summer or autumn, at least three months before the annual application cycle for pre-disaster grants. This will enable a list of possible projects to be circulated for Town Departments to review, with sufficient time for developing an application.

Continued public involvement will be sought regarding the monitoring, evaluating, and updating of the Plan. Public input may be solicited through community meetings and input to web-based information gathering tools. Public comment on changes to the Plan may be sought through posting of public notices, and notifications posted to the website of the Council of Governments of the Central Naugatuck Valley, as well as of the Town of Southbury.

### ***12.3    Updating the Plan***

The Town of Southbury plans to formally update the plan at least once every five years. The COGCNV will remind the Town to formally update the plan within this timeframe. More frequent updates can be accomplished if a consensus to do so is reached by the Board of Selectmen of Southbury. The COGCNV will update the plan for the Town if the Town of Southbury submits a request to the COGCNV and secures funding to enable the COGCNV to do so.

To develop the plan update, a committee will be formed consisting of representatives of many of the same departments solicited for input to this plan. In addition, local business leaders, community and neighborhood group leaders, relevant private and non-profit interest groups, and the six neighboring municipalities will be solicited for representation, including the following:

- ❑ The Central Naugatuck Valley Emergency Planning Committee, managed by the COGCNV;
- ❑ Pomperaug Watershed Coalition;
- ❑ Key organizations from the list presented on Page 1-10;
- ❑ Town of Newtown Public Works Department and Planning Department;
- ❑ Town of Bridgewater Public Works Department and Planning Department;
- ❑ Town of Roxbury Public Works Department and Planning Department;
- ❑ Town of Woodbury Public Works Department and Planning Department;

- ❑ Town of Middlebury Public Works Department and Planning Department; and
- ❑ Town of Oxford Public Works Department and Planning Department.

Updates may include deleting recommendations as projects are completed, adding recommendations as new hazard impacts arise, or modifying hazard vulnerabilities as land use changes. In addition, the list of shelters and critical facilities should be updated as necessary, or at least every five years.

#### ***12.4 Technical and Financial Resources***

This Section is comprised of a list of resources to be considered for technical assistance and potentially financial assistance for completion of the actions outlined in this plan. This list is not all-inclusive and is intended to be updated as necessary.

##### ***Federal Resources***

##### **Federal Emergency Management Agency**

Region I  
99 High Street, 6<sup>th</sup> floor  
Boston, MA 02110  
(617) 956-7506  
<http://www.fema.gov/>

##### ***Mitigation Division***

The Mitigation Division is comprised of three branches that administer all of FEMA's hazard mitigation programs. The **Risk Analysis Branch** applies planning and engineering principles to identify hazards, assess vulnerabilities, and develop strategies to manage the risks associated with natural hazards. The **Risk Reduction Branch** promotes the use of land use controls and building practices to manage and assess risk in both the existing built developments and future development areas in both pre- and post-disaster environments. The **Risk Insurance Branch** mitigates flood losses by providing affordable flood insurance for property owners and by encouraging communities to adopt and enforce floodplain management regulations.

FEMA Programs administered by the Risk Analysis Branch include:

- ❑ *Flood Hazard Mapping Program*, which maintains and updates National Flood Insurance Program maps;
- ❑ *National Dam Safety Program*, which provides state assistance funds, research, and training in dam safety procedures;
- ❑ *National Hurricane Program*, which conducts and supports projects and activities that help protect communities from hurricane hazards; and
- ❑ *Mitigation Planning*, a process for states and communities to identify policies, activities, and tools that can reduce or eliminate long-term risk to life and property from a hazard event.

FEMA Programs administered by the Risk Reduction Branch include:

- ❑ *Hazard Mitigation Grant Program (HMGP)*, which provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration;
- ❑ *Flood Mitigation Assistance Program (FMA)*, which provides funds to assist states and communities to implement measures that reduce or eliminate long-term risk of flood damage to structures insurable under the National Flood Insurance Program;
- ❑ *Pre-Disaster Mitigation Grant Program (PDM)*, which provides program funds for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event;
- ❑ *Severe Repetitive Loss Program (SRL)*, which provides funding to reduce or eliminate the long-term risk of flood damage to "severe repetitive loss" structures insured under the National Flood Insurance Program;
- ❑ *Community Rating System (CRS)*, a voluntary incentive program under the National Flood Insurance Program that recognizes and encourages community floodplain management activities; and
- ❑ *National Earthquake Hazards Reduction Program (NEHRP)*, which in conjunction with state and regional organizations supports state and local programs designed to protect citizens from earthquake hazard.

The Risk Insurance Branch oversees the *National Flood Insurance Program (NFIP)*, which enables property owners in participating communities to purchase flood insurance. The NFIP assists communities in complying with the requirements of the program and publishes flood hazard maps and flood insurance studies to determine areas of risk.

FEMA also can provide information on past and current acquisition, relocation, and retrofitting programs, and has expertise in many natural and technological hazards. FEMA also provides funding for training state and local officials at Emergency Management Institute in Emmitsburg, Maryland.

The Mitigation Directorate also has in place several *Technical Assistance Contracts (TAC)* that support FEMA, States, territories, and local governments with activities to enhance the effectiveness of natural hazard reduction program efforts. The TACs support FEMA's responsibilities and legislative authorities for implementing the earthquake, hurricane, dam safety, and floodplain management programs. The range of technical assistance services provided through the TACs varies based on the needs of the eligible contract users and the natural hazard programs. Contracts and services include:

- ❑ *The Hazard Mitigation Technical Assistance Program (HMTAP) Contract*-supporting post-disaster program needs in cases of large, unusual, or complex projects; situations where resources are not available; or where outside technical assistance is determined to be needed. Services include environmental and biological assessments, benefit/cost analyses, historic preservation assessments, hazard identification, community planning, training, and more.
- ❑ *The Wind and Water Technical Assistance Contract (WAWTAC)*-supporting wind and flood hazards reduction program needs. Projects include recommending mitigation measures to reduce potential losses to post-FIRM structures, providing mitigation policy and practices expertise to States, incorporating mitigation into local hurricane program outreach materials, developing a Hurricane Mitigation and Recovery exercise, and assessing the hazard vulnerability of a hospital.
- ❑ *The National Earthquake Technical Assistance Contract (NETAC)* – supporting earthquake program needs. Projects include economic impact analyses of various earthquakes, vulnerability analyses of hospitals and schools, identification of and training on non-structural mitigation measures, and evaluating the performance of seismically rehabilitated structures, post-earthquake.

#### *Response & Recovery Division*

As part of the National Response Plan, this division provides information on dollar amounts of past disaster assistance including Public Assistance, Individual Assistance, and Temporary Housing, as well as information on retrofitting and acquisition/relocation initiatives. The Response & Recovery Division also provides mobile emergency response support to disaster areas, supports the National Disaster Medical System, and provides urban search and rescue teams for disaster victims in confined spaces.

The division also coordinates federal disaster assistance programs. The Public Assistance Grant Program (PA) that provides 75% grants for mitigation projects to protect eligible damaged public and private non-profit facilities from future damage. "Minimization" grants at 100% are available through the Individuals and Family Grant Program. The Hazard Mitigation Grant Program and the Fire Management Assistance Grant Program are also administered by this division.

**Computer Sciences Corporation**

New England Regional Insurance Manager  
Bureau and Statistical Office  
(781) 848-1908

Corporate Headquarters  
3170 Fairview Park Drive  
Falls Church, VA 22042  
(703) 876-1000  
<http://www.csc.com/>

A private company contracted by the Federal Insurance Administration as the National Flood Insurance Program Bureau and Statistical Agent, CSC provides information and assistance on flood insurance, including handling policy and claims questions, and providing workshops to leaders, insurance agents, and communities.

**Small Business Administration**

Region I  
10 Causeway Street, Suite 812  
Boston, MA 02222-1093  
(617) 565-8416  
<http://www.sba.gov/>

SBA has the authority to "declare" disaster areas following disasters that affect a significant number of homes and businesses, but that would not need additional assistance through FEMA. (SBA is triggered by a FEMA declaration, however.) SBA can provide additional low-interest funds (up to 20% above what an eligible applicant would "normally" qualify for) to install mitigation measures. They can also loan the cost of bringing a damaged property up to state or local code requirements. These loans can be used in combination with the new "mitigation insurance" under the NFIP, or in lieu of that coverage.

**Environmental Protection Agency**

Region I  
1 Congress Street, Suite 1100  
Boston, MA 02114-2023  
(888) 372-7341

Provides grants for restoration and repair, and educational activities, including:

- ❑ *Capitalization Grants for State Revolving Funds*: Low interest loans to governments to repair, replace, or relocate wastewater treatment plans damaged in floods. Does not apply to drinking water or other utilities.
- ❑ *Clean Water Act Section 319 Grants*: Cost-share grants to state agencies that can be used for funding watershed resource restoration activities, including wetlands and other aquatic habitat (riparian zones). Only those activities that control non-point pollution are eligible. Grants are administered through the CT DEP, Bureau of Water Management, Planning and Standards Division.

### **U.S. Department of Housing and Urban Development**

20 Church Street, 19<sup>th</sup> Floor  
Hartford, CT 06103-3220  
(860) 240-4800  
<http://www.hud.gov/>

The U.S. Department of Housing and Urban Development offers *Community Development Block Grants (CDBG)* to communities with populations greater than 50,000, who may contact HUD directly regarding CDGB. One program objective is to improve housing conditions for low and moderate income families. Projects can include acquiring flood prone homes or protecting them from flood damage. Funding is a 100% grant; can be used as a source of local matching funds for other funding programs, such as FEMA's "404" Hazard Mitigation Grant Program. Funds can also be applied toward "blighted" conditions, which is often the post-flood condition. A separate set of funds exists for conditions that create an "imminent threat." The funds have been used in the past to replace (and redesign) bridges where flood damage eliminates police and fire access to the other side of the waterway. Funds are also available for smaller municipalities through the State Administered CDBG program participated in by the State of Connecticut.

### **U.S. Army Corps of Engineers**

Institute for Water Resources  
7701 Telegraph Road  
Alexandria, VA 22315  
(703) 428-8015  
<http://www.iwr.usace.army.mil/>

The Corps provides 100% funding for floodplain management planning and technical assistance to states and local governments under the Floodplain Management Services Program (FPMS). Various flood protection measures such as beach re-nourishment, stream clearance and snagging projects, flood proofing, and flood preparedness are funded on a 50/50 matching basis by Section 22 planning Assistance to States



program. They are authorized to relocate homes out of the floodplain if it proves to be more cost effective than a structural flood control measure.

**U.S. Department of Commerce**

*National Weather Service*

Northeast River Forecast Center

445 Myles Standish Blvd.

Taunton, MA 02780

(508) 824-5116

<http://www.nws.noaa.gov/>

The National Weather Service prepares and issues flood, severe weather, and coastal storm warnings. Staff hydrologists can work with communities on flood warning issues and can give technical assistance in preparing flood warning plans.

**U.S. Department of the Interior**

*National Park Service*

Steve Golden, Program Leader

Rivers, Trails, & Conservation Assistance

15 State Street

Boston, MA 02109

(617) 223-5123

<http://www.nps.gov/rtca/>

The National Park Service provides technical assistance to community groups and local, state, and federal government agencies to conserve rivers, preserve open space, and develop trails and greenways, as well as identify non-structural options for floodplain development.

**U.S. Fish and Wildlife Service**

New England Field Office

70 Commercial Street, Suite 300

Concord, NH 03301-5087

(603) 223-2541

<http://www.fws.gov/>

The U.S. Fish and Wildlife Service provide technical and financial assistance to restore wetlands and riparian habitats through the North American Wetland Conservation Fund and Partners for Wildlife programs. It also administers the *North American Wetlands Conservation Act Grants Program*, which provides matching grants to organizations and individuals who have developed partnerships to carry out wetlands



projects in the United States, Canada, and Mexico. Funds are available for projects focusing on protecting, restoring, and/or enhancing critical habitat.

**U.S. Department of Agriculture**

*Natural Resources Conservation Service* (formerly SCS)

Connecticut Office

344 Merrow Road, Suite A

Tolland, CT 06084-3917

(860) 871-4011

The Natural Resources Conservation Service provides technical assistance to individual land owners, groups of landowners, communities, and soil and water conservation districts on land-use and conservation planning, resource development, stormwater management, flood prevention, erosion control and sediment reduction, detailed soil surveys, watershed/river basin planning and recreation, and fish and wildlife management. Financial assistance is available to reduce flood damage in small watersheds and to improve water quality. Financial assistance is available under the Emergency Watershed Protection Program; the Cooperative River Basin Program; and the Small Watershed Protection Program.

**Regional Resources**

**Northeast States Emergency Consortium**

1 West Water Street, Suite 205

Wakefield, MA 01880

(781) 224-9876

<http://www.serve.com/NESEC/>

The Northeast States Emergency Consortium (NESEC) develops, promotes, and coordinates "all-hazards" emergency management activities throughout the Northeast. NESEC works in partnership with public and private organizations to reduce losses of life and property. They provide support in areas including interstate coordination and public awareness and education, along with reinforcing interactions between all levels of government, academia, non-profit organizations, and the private sector.

## **State Resources**

### **Connecticut Department of Economic and Community Development**

505 Hudson Street  
Hartford, CT 06106-7106  
(860) 270-8000  
<http://www.ct.gov/ecd/>

The Connecticut Department of Economic and Community Development administers HUD's State CDBG Program, awarding smaller communities and rural areas grants for use in revitalizing neighborhoods, expanding affordable housing and economic opportunities, and improving community facilities and services.

### **Connecticut Department of Environmental Protection**

79 Elm Street  
Hartford, CT 06106-5127  
(860) 424-3000  
<http://www.dep.state.ct.us/>

The Connecticut DEP includes several divisions with various functions related to hazard mitigation:

*Bureau of Water Management, Inland Water Resources Division* - This division is generally responsible for flood hazard mitigation in Connecticut, including administration of the National Flood Insurance Program. Other programs within the division include:

- ❑ *National Flood Insurance Program State Coordinator*: Provides flood insurance and floodplain management technical assistance, floodplain management ordinance review, substantial damage/improvement requirements, community assistance visits, and other general flood hazard mitigation planning including the delineation of floodways.
- ❑ *State Hazard Mitigation Officer (shared role with the Department of Emergency Management and Homeland Security)*: Hazard mitigation planning and policy; oversight of administration of the Hazard Mitigation Grant Program, Flood Mitigation Assistance Program, and Pre-Disaster Mitigation Program. Has the responsibility of making certain that the Natural Hazard Mitigation Plan is updated every 3 years.
- ❑ *Flood Warning and Forecasting Service*: Prepares and issues flood, severe weather, and coastal storm warnings. Staff engineers and forecaster can work with communities on flood warning issues and can give technical assistance in

preparing flood warning plans. This service has helped the public respond much faster in flooding condition.

- ❑ *Flood & Erosion Control Board Program:* Provides assistance to municipalities to solve flooding, beach erosion and dam repair problems. Have the power to construct and repair flood and erosion management systems. Certain non-structural measures that mitigate flood damages are also eligible. Funding is provided to communities that apply for assistance through a Flood & Erosion Control Board on a non-competitive basis.
- ❑ *Stream Channel Encroachment Line Program:* Similar to the NFIP, this state regulatory program places restrictions on the development of floodplains along certain major rivers. This program draws in environmental concerns in addition to public safety issues when permitting projects.
- ❑ *Inland Wetlands and Watercourses Management Program:* Provides training, technical and planning assistance to local Inland Wetlands Commissions, reviews and approves municipal regulations for localities. Also controls flood management and natural disaster mitigations.
- ❑ *Dam Safety Program:* Charged with the responsibility for administration and enforcement of Connecticut's dam safety laws. Regulates the operation and maintenance of dams in the state. Permits the construction, repair or alteration of dams, dikes or similar structures and maintains a registration database of all known dams statewide. This program also operates a statewide inspection program.
- ❑ *Rivers Restoration Grant Program:* Administers funding and grants under the Clean Water Act involving river restoration, and reviews and provides assistance with such projects.

*Bureau of Water Management - Planning and Standards Division* - Administers the Clean Water Fund and many other programs directly and indirectly related to hazard mitigation including the Section 319 non-point source pollution reduction grants and municipal facilities program which deals with mitigating pollution from wastewater treatment plants.

*Office of Long Island Sound Programs (OLISP)* - Administers the Coastal Area Management Act (CAM) program and Long Island Sound License Plate Program.

**Connecticut Department of Emergency Management and Homeland Security**

25 Sigourney Street, 6<sup>th</sup> Floor

Hartford, CT 06106-5042

(860) 256-0800

<http://www.ct.gov/demhs/>

DEMHS is the lead agency responsible for emergency management. Specifically, responsibilities include emergency preparedness, response & recovery, mitigation, and an extensive training program. DEMHS is the state point of contact for most FEMA grant and assistance programs. DEMHS administers the Earthquake and Hurricane programs described above under the FEMA resource section. Additionally, DEMHS operates a mitigation program to coordinate mitigation throughout the state with other government agencies.

**Connecticut Department of Public Safety**

1111 Country Club Road

Middletown, CT 06457

(860) 685-8190

<http://www.ct.gov/dps/>

*Office of the State Building Inspector* - The Office of the State Building Inspector is responsible for administering and enforcing the Connecticut State Building Code, and is also responsible for the municipal Building Inspector Training Program.

**Connecticut Department of Transportation**

2800 Berlin Turnpike

Newington, CT 06131-7546

(860) 594-2000

<http://www.ct.gov/dot/>

The Department of Transportation administers the federal Intermodal Surface Transportation Efficiency Act (ISTEA) that includes grants for projects which promote alternative or improved methods of transportation. Funding through grants can often be used for projects with mitigation benefits such as preservation of open space in the form of bicycling and walking trails. CT DOT is also involved in traffic improvements and bridge repairs which could be mitigation related.

### **Private and Other Resources**

#### **The Association of State Floodplain Managers (ASFPM)**

2809 Fish Hatchery Road, Suite 204  
Madison, WI 53713  
(608) 274-0123  
<http://www.floods.org/>

ASFPM is a professional association of state employees that assist communities with the NFIP with a membership of over 1,000. ASFMP has developed a series of technical and topical research papers, and a series of Proceedings from their annual conferences. Many "mitigation success stories" have been documented through these resources, and provide a good starting point for planning.

#### **Institute for Business & Home Safety**

4775 East Fowler Avenue  
Tampa, FL 33617  
(813) 286-3400  
<http://www.ibhs.org/>

A non-profit organization put together by the insurance industry to research ways of reducing the social and economic impacts of natural hazards. The Institute advocates the development and implementation of building codes and standards nationwide and may be a good source of model code language.

#### **Multidisciplinary Center for Earthquake Engineering and Research (MCEER)**

University at Buffalo  
State University of New York  
Red Jacket Quadrangle  
Buffalo, New York 14261  
(716) 645-3391  
<http://mceer.buffalo.edu/>

A source for earthquake statistics, research, and for engineering and planning advice.

#### **The National Association of Flood & Stormwater Management Agencies (NAFSMA)**

1301 K Street, NW, Suite 800 East  
Washington, DC 20005  
(202) 218-4122  
<http://www.nafsma.org>

NAFSMA is an organization of public agencies who strive to protect lives, property, and economic activity from the adverse impacts of stormwater by advocating public policy, encouraging technology, and conducting educational programs. NAFSMA is a voice in national politics on water resources management issues concerning stormwater management, disaster assistance, flood insurance, and federal flood management policy.

**National Emergency Management Association (NEMA)**

P.O. Box 11910  
Lexington, KY 40578  
(859)-244-8000  
<http://www.nemaweb.org/>

A national association of state emergency management directors and other emergency management officials, the NEMA Mitigation Committee is a strong voice to FEMA in shaping all-hazard mitigation policy in the nation. NEMA is also an excellent source of technical assistance.

**Natural Hazards Center**

University of Colorado at Boulder  
482 UCB  
Boulder, CO 80309-0482  
(303) 492-6818  
<http://www.colorado.edu/hazards/>

The Natural Hazards Center includes the Floodplain Management Resource Center, a free library and referral service of the ASFPM for floodplain management publications. The Natural Hazards Center is located at the University of Colorado in Boulder. Staff can use keywords to identify useful publications from the more than 900 documents in the library.

**New England Flood and Stormwater Managers Association, Inc. (NEFSMA)**

c/o MA DEM  
100 Cambridge Street  
Boston, MA 02202

NEFSMA is a non-profit organization made up of state agency staff, local officials, private consultants and citizens from across New England. NEFSMA sponsors seminars and workshops and publishes the NEFSMA News three times per year to bring the latest flood and stormwater management information from around the region to its members.

***Volunteer Organizations*** - Volunteer organizations including the American Red Cross, the Salvation Army, Habitat for Humanity, and the Mennonite Disaster Service are often available to help after disasters. Service Organizations such as the Lions Club, Elks Club, and the Veterans of Foreign Wars are also available. Habitat for Humanity and the Mennonite Disaster Service provide skilled labor to help rebuild damaged buildings while incorporating mitigation or flood proofing concepts. The office of individual organizations can be contacted directly, or the FEMA Regional Office may be able to assist.

***Flood Relief Funds*** - After a disaster, local businesses, residents and out-of-town groups often donate money to local relief funds. They may be managed by the local government, one or more local churches, or an ad hoc committee. No government disaster declaration is needed. Local officials should recommend that the funds be held until an applicant exhausts all sources of public disaster assistance, allowing the funds to be used for mitigation and other projects than cannot be funded elsewhere.

***Americorps*** - Americorps is the recently installed National Community Service Organization. It is a network of local, state, and national service programs that connects volunteers with nonprofits, public agencies, and faith-based and community organizations to help meet our country's critical needs in education, public safety, health, and the environment. Through their service and the volunteers they mobilize, AmeriCorps members address critical needs in communities throughout America, including helping communities respond to disasters. Some states have trained Americorps members to help during flood-fight situations, such as by filling and placing sandbags.

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## APPENDED TABLES

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## Appended Table 1 Hazard Event Ranking

*Each hazard may have multiple effects; for example, a hurricane causes high winds and inland flooding. Some hazards may have similar effects; for example, hurricanes and earthquakes may cause dam failure.*

Natural Hazards	Location	Frequency of Occurrence	Magnitude / Severity	Rank
	1 = small 2 = medium 3 = large	0 = unlikely 1 = possible 2 = likely 3 = highly likely	1 = limited 2 = significant 3 = critical 4 = catastrophic	
Winter Storms	3	3	2	8
Hurricanes	3	1	3	7
Summer Storms and Tornadoes	2	3	2	7
Ice Jams	1	3	2	6
Earthquakes	3	1	2	6
Wildfires	1	2	1	4

### Location

1 = small	isolated to specific area during one event
2 = medium	multiple areas during one event
3 = large	significant portion of the town during one event

### Frequency of Occurrence

0 = unlikely	less than 1% probability in the next 100 years
1 = possible	between 1 and 10% probability in the next year; or at least one chance in next 100 years
2 = likely	between 10 and 100% probability in the next year; or at least one chance in next 10 years
3 = highly likely	near 100% probability in the next year

### Magnitude / Severity

1 = limited	injuries and/or illnesses are treatable with first aid; minor "quality of life" loss; shutdown of critical facilities and services for 24 hours or less; property severely damaged < 10%
2 = significant	injuries and / or illnesses do not result in permanent disability; shutdown of several critical facilities for more than one week; property severely damaged <25% and >10%
3 = critical	injuries and / or illnesses result in permanent disability; complete shutdown of critical facilities for at least two weeks; property severely damaged <50% and >25%
4 = catastrophic	multiple deaths; complete shutdown of facilities for 30 days or more; property severely damaged >50%

*Frequency of Occurrence, Magnitude / Severity, and Potential Damages based on historical data from NOAA National Climatic Data Center and Town records*

**Appended Table 2**  
**Hazard Effect Ranking**

*Some effects may have a common cause; for example, a hurricane causes high winds and inland flooding.  
Some effects may have similar causes; for example, hurricanes and nor'easters both cause heavy winds.*

<b>Natural Hazard Effects</b>	<b>Location</b>	<b>Frequency of Occurrence</b>	<b>Magnitude / Severity</b>	<b>Rank</b>
	1 = small 2 = medium 3 = large	0 = unlikely 1 = possible 2 = likely 3 = highly likely	1 = limited 2 = significant 3 = critical 4 = catastrophic	
Nor'Easter Winds	3	3	2	8
Snow	3	3	2	8
Blizzard	3	3	2	8
Hurricane Winds	3	1	3	7
Ice	3	2	2	7
Thunderstorm and Tornado Winds	2	2	2	6
Flooding from Dam Failure	1	1	4	6
Flooding from Ice Jams	1	3	2	6
Shaking	3	1	2	6
Lightning	1	3	1	5
Flooding from Poor Drainage	1	3	1	5
Inland Flooding	2	2	1	5
Falling Trees/Branches	1	3	1	5
Hail	1	2	1	4
Fire/Heat	1	2	1	4
Smoke	1	2	1	4

**Location**

1 = small	isolated to specific area during one event
2 = medium	multiple areas during one event
3 = large	significant portion of the town during one event

**Frequency of Occurrence**

0 = unlikely	less than 1% probability in the next 100 years
1 = possible	between 1 and 10% probability in the next year; or at least one chance in next 100 years
2 = likely	between 10 and 100% probability in the next year; or at least one chance in next 10 years
3 = highly likely	near 100% probability in the next year

**Magnitude / Severity**

1 = limited	injuries and/or illnesses are treatable with first aid; minor "quality of life" loss; shutdown of critical facilities and services for 24 hours or less; property severely damaged < 10%
2 = significant	injuries and / or illnesses do not result in permanent disability; shutdown of several critical facilities for more than one week; property severely damaged <25% and >10%
3 = critical	injuries and / or illnesses result in permanent disability; complete shutdown of critical facilities for at least two weeks; property severely damaged <50% and >25%
4 = catastrophic	multiple deaths; complete shutdown of facilities for 30 days or more; property severely damaged >50%

*Frequency of Occurrence, Magnitude / Severity, and Potential Damages based on historical data from NOAA National Climatic Data Center*

***Appended Table 3***  
***Development Permit Checklist for Hazard Mitigation***  
***and Effective Emergency Management***

	Southbury Code of Ordinance	Zoning Regulations	Subdivision Regulations	Aquifer Protection Area Regulations
<b>Flood Damage Prevention and Control Ordinance</b> This section of the Town code promotes the public health, safety and general welfare and minimizes public and private losses due to flood conditions by establishing standards and elevations for construction and renovations in flood hazard areas	6 <input type="checkbox"/>			
<b>Flood Plain District</b> This section defines the boundaries of the flood plain district and states that no building or structure within the boundaries of the district may be constructed, moved, or substantially improved without a Flood Hazard Area Permit obtained from the Building Official of the Town of Southbury in accordance with the Flood Damage Prevention and Control Ordinance listed above. This requirement has terms which the project must meet in order to be in compliance with the ordinance		5 <input type="checkbox"/>		
<b>Drainage</b> This section outlines the Town's provision to manage storm water, which includes the collection and disposal thereof in an attempt to: avoid storm water flow across sidewalks; protect water courses and wetlands from pollution, erosion and sedimentation; avoid an amount of discharge and time of concentration of flow beyond the capacity of downstream drainage channels; and avoid downstream flooding. This section also calls for the improvement of existing watercourses, channels, and additional drainage systems on lots or downstream of lots.		7.2.6 <input type="checkbox"/>		
<b>Drainage</b> This section outlines the design standards for stormwater and other non sanitary drainage facilities, including location, suitable receiving water bodies, design specifications for pipes, manholes, and culverts, and the use of underdrains.		7.2.6 <input type="checkbox"/>		



***Appended Table 3***  
***Development Permit Checklist for Hazard Mitigation***  
***and Effective Emergency Management***

	Southbury Code of Ordinance	Zoning Regulations	Subdivision Regulations	Aquifer Protection Area Regulations
<b>Wetlands and Watercourses</b> This section calls for site development plans to provide protection of all wetlands and watercourses, which includes floodplains in their natural state, unless prior modification approval has been given.		7.2.7 <input type="checkbox"/>		
<b>Soil Erosion and Sedimentation Control</b> This section calls for a provision be made for soil erosion and sediment control in accordance with the standards of the Town of Southbury Soil Erosion Sediment Control Ordinance.		7.2.16 <input type="checkbox"/>		
<b>Setbacks and Slopes</b> This section states that no earth removal or placement shall occur within 50 feet of an abutting property line without written approval from abutting property owner. However, this practice may occur at approximate grade and within 50 feet of an abutting street line. Finished slopes cannot exceed 25% grade or some lesser slope that is necessary to provide stability, safety, and the opportunity for future reuse and development		8.7.4 <input type="checkbox"/>		
<b>Natural Features</b> specifies that a subdivision should avoid filling or excavation or other encroachment upon wetlands, water courses, floodplains, and other land subject to potential flooding			4.8 <input type="checkbox"/>	
<b>Terrain</b> specifies that each lot shall be capable of accommodating [permitted buildings]...with driveway access, parking spaces and suitable sites for on-site sewage disposal and water supply, without disturbing wetlands and water courses.			4.9.1 <input type="checkbox"/>	

***Appended Table 3***  
***Development Permit Checklist for Hazard Mitigation***  
***and Effective Emergency Management***

	Southbury Code of Ordinance	Zoning Regulations	Subdivision Regulations	Aquifer Protection Area Regulations
<b>Special Flood Hazard Areas/Floodways</b> specifies that when a subdivision includes land in a Special Flood Hazard Area or floodway, the lots, streets, drainage and other improvements shall be reasonably safe from flood damage and shall capable of use without danger from flooding			4.2.3 <input type="checkbox"/>	
<b>APA - Southbury Training School</b> These regulations are a zoning overlay and control land use and development in the affected part of the town located within the APA. Therefore, the APA Regulations indirectly provide a level of protection against development of certain commercial and industrial properties in or near floodplains in this portion of Southbury				<input type="checkbox"/>
<b>APA - Heritage Village Water Company</b> These regulations are a zoning overlay and control land use and development in the affected part of the town located within the APA. Therefore, the APA Regulations indirectly provide a level of protection against development of certain commercial and industrial properties in or near floodplains in this portion of Southbury				<input type="checkbox"/>

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**APPENDIX A**  
**STAPLEE MATRIX**

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## Strategies Listed by Primary Report Section for Southbury

Strategies Listed by Primary Report Section for Southbury		Responsible Department <sup>1</sup>	Schedule	STAPLEE Criteria									
				Good = 3, Average =2, and Poor = 1									
				Socially acceptable?	Technically feasible?	Administratively workable?	Politically acceptable?	Can it be legally implemented?	Economically beneficial?	Environmentally beneficial?	STAPLEE Sum of Scores		
ALL HAZARDS		Dissemination of informational pamphlets regarding natural hazards to public locations	A. Ongoing B. 2009-2014 C. 2014-2019 D. 2019-2024	3	3	3	3	3	3	3	3	21	
		Continue implementation of CodeRED system		3	3	3	3	3	3	3	20		
		Continue to review and update Emergency Operations Plan.		3	3	3	3	3	3	3	21		
		INLAND FLOODING											
		Prevention		Streamline the permitting process to ensure maximum education of developer or applicant									
				Consider joining FEMA's Community Rating System	B	3	2	3	3	3	3	3	3
Continue to require Flood Hazard Area Permits for activities within SFHAs.	B			3	3	2	3	2	2	3	2	17	
Require new buildings constructed in flood prone areas to be protected to the highest recorded flood level regardless of SFHA	A			3	3	3	3	3	3	3	3	19	
Consider resurveying local flood prone areas and produce new local-level regulatory floodplain maps using more exacting study techniques.	B			2	2	2	2	3	2	3	2	16	
	B			2	3	2	2	2	2	2	2	15	
Property and Natural Resource Protection													
		Pursue the acquisition of additional municipal open space properties inside SFHAs and set those aside as greenways, parks, etc.											
		Selectively pursue conservation recommendations listed in the Plan of Conservation and Development and other studies and documents.	B,C,D	3	2	2	3	3	3	3	3	19	
		Continue to regulate development in protected and sensitive areas, including steep slopes, wetlands, and floodplains.	B,C,D	3	2	2	3	3	3	2	3	18	
		Subject to a favorable FEMA cost-benefit analysis, apply for a grant to acquire the property at 111 Flood Bridge Road.	A	2	3	3	3	2	3	2	3	18	
		Consider purchasing residences along Flood Bridge Road, River Hill Road, River Trail, Manor Drive, and Pomperaug Trail.	B	3	3	2	3	3	3	3	3	20	
		Work with homeowners on Flood Bridge Rd, River Hill Rd, River Tr, Manor Dr, Pomperaug Tr, and other areas to educate about floodproofing.	C	1	3	2	3	3	3	3	3	18	
			B,C	2	2	2	3	3	2	3	2	17	
Structural Projects													
		Increase the conveyance capacity of the culvert for Jeremy Brook under Hulls Hill Road at the intersection with Jeremy Swamp Road.	C	3	3	3	3	3	2	2		19	
		Upgrade the drainage systems along, and the cross culverts beneath River Rd to prevent flooding due to clogging of storm drains and the incapacity of culverts.	B	3	3	3	3	3	2	2		19	
		Install and repair storm drains and drainage systems on Lakeside Road and Lee Farm Road.	C	3	3	3	3	3	2	2		19	
		Increase in the elevation and replace the bridge over Transylvania Brook at Spruce Brook Road.	C	3	3	3	3	3	2	2		19	
		Work with CTDOT to elevate portions of Route 172 and replace the bridge over Pomperaug River to mitigate for flooding problems.	D	3	3	2	3	2	2	2		17	
ICE JAMS													
		Monitor the stretch of the Pomperaug River prone to ice jams. If conditions are imminent, evacuations or other preventive measures should be taken.	A										
		Consider purchasing residences along Manor Dr and Pomperaug Tr, and work with homeowners to educate them about the benefits of floodproofing.	C	1	3	2	3	3	3	3	3	18	
		Evaluate options for instream structural projects and commence a dialog with DEP and USACE about potential funding for such projects.	C	3	2	3	3	2	1	1	15		
WIND DAMAGE RELATED TO HURRICANES, SUMMER STORMS, AND WINTER STORMS													
		Increase tree limb maintenance & inspections, esp. along Route 172, Route 67 and other evacuation routes.	B	3	3	2	3	3	3	2	3	19	
		Increase inspections of trees on private property near power lines and Town right-of-ways.	B	1	3	2	2	1	3	2	3	14	
		Require that utilities be placed underground in new developments and pursue funding to place them underground in existing developed areas.	A,B	3	2	3	3	3	3	3	2	19	
		Review potential evacuation plans to ensure timely migration of people seeking shelter in all areas of Town.	B	3	3	3	3	3	3	3	2	20	
		Standardize a tree maintenance program for the Town.	B	3	3	3	3	3	3	3	2	20	
		Continue outreach regarding dangerous trees on private property.	B	3	3	3	3	3	3	3	2	20	
		Continue to require compliance with the amended Connecticut Building Code for wind speeds.	B	3	3	3	3	3	3	3	2	20	
		Provide for the Building Dept or the P&Z Commissions to make literature available during the permitting process regarding design standards.	Planning, Bldg.	A	3	3	3	3	3	3	3	2	20

## Strategies Listed by Primary Report Section for Southbury

Strategies Listed by Primary Report Section for Southbury	Responsible Department <sup>1</sup>	Schedule	STAPLEE Criteria						
			<i>Good = 3, Average =2, and Poor = 1</i>						
			Socially acceptable?	Technically feasible?	Administratively workable?	Can it be legally implemented?	Economically beneficial?	Environmentally beneficial?	
<b>WINTER STORMS</b>									
Post a list of sheltering facilities and plowing prioritization in the Town Hall and on the Town's website so residents can plan how to access critical facilities.	Public Works, Fire Planning	B	3	3	3	3	3	2	
Continue to encourage two modes of egress into every neighborhood by the creation of through streets.	A		2	3	3	2	3	2	
Provide educational materials to property owners regarding using shutters, storm windows, pipe insulators, and removing snow from flat roofs	Fire Dept.	B	3	3	3	3	3	2	
Provide educational materials with safety tips and reminders regarding cold weather	Fire Dept.	B	3	3	3	3	3	2	
<b>EARTHQUAKES</b>									
Consider preventing new residential development in areas prone to collapse.	Planning	B	2	2	3	3	3	3	
Continue regulating development on and near slopes, and consider setting a prohibition on development of slopes above a certain grade.	Planning	B	2	3	3	3	3	3	
Continue to require adherence to the state building codes.	Bldg.	A	3	3	3	3	3	2	
Ensure that municipal departments have adequate backup facilities in case earthquake damage occurs to municipal buildings.	Police & Fire Dept.	B	3	3	2	3	2	2	
<b>DAM FAILURE</b>									
Work with ACOE and DEP to stay up to date on the evolution of EOPs and Dam Failure Analyses for the significant and high hazard dams.	Public Works	B	3	3	2	3	2	3	
All Class B and C dams in Town should be regularly inspected by their respective owners, along with regular maintenance as required.	Public Works	B	3	3	1	3	1	3	
Initiate correspondence with the owners of the five listed Class B dams, including the DEP, with regard to maintenance.	Public Works	B	3	3	2	3	2	3	
Consider implementing occasional Town inspections of Class A, AA, and unranked dams.	Public Works	C	3	3	1	2	1	3	
Consider specifically including dam failure areas in the CodeRED emergency notification system.	Police & Fire Dept.	B	3	3	2	3	3	3	
With regard to Long Meadow Pond Dam, support the Town of Bethlehem's efforts to address repairs to Long Meadow Pond Dam.	Selectman's Office	B	3	3	2	3	3	3	
<b>WILDFIRES</b>									
Heritage Village Water Company should continue to extend the public water supply systems into areas that require water for fire protection.	Selectman's Office	B	3	3	3	3	1	2	
Heritage Village Water Company & Southbury Training School should continue to identify and upgrade portions of the systems that are substandard for fire-fighting	Selectman's Office	B	3	2	3	3	2	2	
Continue to require the installation of water tanks in any new developments within the Town.	Planning, Fire	A	3	2	3	3	3	3	
Continue to promote inter-municipal cooperation in firefighting efforts.	Fire Dept.	A	3	3	3	3	3	3	
Continue to support public outreach programs to increase awareness of forest fire danger and how to use common firefighting equipment.	Fire Dept.	A	3	3	3	3	3	3	
Continue reviewing subdivision applications to ensure neighborhoods and driveways are properly sized to allow access of emergency vehicles.	Planning, Fire	A	3	3	3	3	2	3	
Provide outreach programs on how to properly manage burning and campfires on private property.	Fire Dept.	B	3	3	3	3	3	3	
Distribute copies of booklets such as "Is Your Home Protected from Wildfire Disaster? - A Homeowner's Guide to Wildfire Retrofit."	Fire Dept.	B	3	3	3	3	3	3	
Patrol Town-owned open space and parks to prevent unauthorized campfires.	Fire Dept.	B	3	3	3	3	2	3	
Enforce regulations and permits for open burning.	Fire Dept.	B	3	3	3	3	3	3	
Continue to place utilities underground.	Planning	A	2	2	2	3	3	3	

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**APPENDIX B**  
**DOCUMENTATION OF PLAN DEVELOPMENT**

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***APPENDIX B***  
***PREFACE***

An extensive data collection, evaluation, and outreach program was undertaken to compile information about existing hazards and mitigation in the Town of Southbury, as well as to identify areas that should be prioritized for hazard mitigation. Documentation of this process is provided within the following sets of meeting minutes and field reports.

## ***Meeting Minutes***

### **NATURAL HAZARD PRE-DISASTER MITIGATION PLAN FOR SOUTHBURY Council of Governments Central Naugatuck Valley Initial Data Collection Meeting February 6, 2008**

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#### ***I. Welcome & Introductions***

The following individuals attended the data collection meeting:

- ☐ David Murphy, P.E., Milone & MacBroom, Inc. (MMI)
- ☐ Samuel Eisenbeiser, Fitzgerald & Halliday, Inc. (FHI)
- ☐ Shawn Goulet, Milone & MacBroom, Inc. (MMI)
- ☐ Virginia Mason, Council of Governments Central Naugatuck Valley (CGCNV)
- ☐ Mark A.R. Cooper, First Selectman
- ☐ Jennifer Naylor, First Selectman's Office
- ☐ George Slaiby, Southbury Police Department & Emergency Management
- ☐ Richard Lyle, Southbury Fire Department & LEPC
- ☐ DeLoris Curtis, Southbury Planning Department
- ☐ Tom Crowe, Southbury Department of Public Works

#### ***II. Description and Need for Hazard Mitigation Plans / Disaster Mitigation Act of 2000***

Virginia and David described the basis for the natural hazard planning process and possible outcomes. The list of recent FEMA grants was reviewed. First Selectman Cooper assigned Jennifer Naylor of the First Selectman's Office as the point of contact for the project.

#### ***III. Project Scope and Schedule***

The project scope was described, including project initiation and data collection, the vulnerability assessment, public meetings, development of recommendations, and the FEMA Review and Plan adoption. A 12-month schedule was presented. The public informational meeting was scheduled for the second Wednesday in March (March 12<sup>th</sup>) at 6:30 PM at the Fire House. Virginia mentioned that she will develop a press release for the meeting.

#### ***IV. Hazards to Address***

The Southbury plan will address flooding, ice jams, hurricanes and tropical storms, winter storms and nor'easters, summer storms and tornadoes, earthquakes, dam failure, and wildfires.



***V. Discussion of Hazard Mitigation Procedures in Effect & Problem Areas***

In general, the Town of Southbury has three unique situations that can potentially lead to difficult disaster response: (1) the presence of Heritage Village, with its 2,500 age-restricted units and access limitations; (2) the predominance of year-round homes in challenging riverside and hilly locations that were formerly summer cottages; and (3) the tendency for more recent developments to rely on dead-end streets.

With regard to number (1) above, Heritage Village has its own security but not its own police and rescue teams. It relies on the Town of Southbury for these services. The adjacent Traditions development of 150 units is similar but smaller, but a one way entrance/exit and an emergency access connection to Heritage Village.

With regard to number (2) above, many of the cottages date back to the 1930s when CL&P sold numerous cottage home lots for \$100 each. These cottage home lots were transformed into year-round dwellings mostly during the 1950s, 1960s and 1970s. These homes are now the largest problem in the Town in terms of overbank flooding and flooding caused by poor drainage.

A majority of the Town (those areas developed post-1980s) has utilities located underground. There is currently a Town ordinance that prohibits dwellings in floodplains. The year-round homes located on the cottage lots pre-date the floodplain prohibition.

***A. Emergency Response Capabilities & Evacuation Routes***

There was discussion that the town is interested and will be meeting to discuss the CodeRED Emergency Notification System for emergency notifications very soon. No local evacuation plan exists. Evacuation routes are determined on a case-case basis. Both George and Richard mentioned that there is a constant need to evacuate residents along Pomperaug Trail and Flood Bridge Road. Prior to a flood, both the Town Police and the Town Fire Departments warn the residents of the danger. Both departments monitor the watercourses' levels. The Fire House and the Senior Center (located centrally within the Town) are the two shelters.

Newer subdivisions can only have 20 or fewer lots on a dead end. A recent subdivision project was denied because of steep slopes. The road widths associated with new subdivisions is required to be 26 feet. However, some subdivisions with less than 20 lots allow 22' road widths. There is a substantial amount of one-way entrance/exit roadways in the Town. The importance of connectivity needs to be addressed in the project. There was mention that age-restricted housing is no longer allowed in Southbury.

*B. Noted Flooding and/or Drainage Problem Areas*

**Flooding**

The following major flooding locations will be of highest priority during this project:

- ❑ The homes located along Manor Road and Pomperaug Trail are often inundated during sustained precipitation events. In addition, Pomperaug Trail and Manor Road are under constant threat of flooding associated with ice jams. Additionally, these roads have dead ends and thus have only one entrance/exit.
- ❑ Homes located on and just off Flood Bridge Road experience flooding during sustained storm events. Nearby, houses along the private dirt road at the junction of River Hill Road & Branch Road are located within the flood zone and under constant threat of flooding from the Pomperaug River.

The following locations are also noteworthy and will be explored throughout the project:

- ❑ Route 172 at the Ray Lewis House ("Hay Fever Farm") becomes inundated during large scale rainfall events.
- ❑ Spruce Brook at Route 172 experiences mainly road flooding. However, there have been reports of residential damage. The road would benefit from replacement of the bridge over the Transylvania Brook in this location.
- ❑ At the Hulls Hill Road/Jeremy Swamp Road intersection, which is at a low elevation, road closures can result from flooding. This area is connected with the Jeremy Brook watercourse.
- ❑ Recent problems on Lakeside Road associated with drainage have been caused by stormwater clogging the culvert. Most recently, the storms of early February caused minor damage to a home after a culvert became clogged. Lee Farm Drive has similar problems.
- ❑ Community House Road near Bullet Hill Brook has history of road flooding during heavy rain storms
- ❑ At the Route 172 Bridge over the Pomperaug River south of Middle Road, nuisance flooding is a common occurrence.

- ❑ From South Farm Road to South Flat Road, whenever flooding is expected, the road is shut-down and the traffic is re-routed. This is a common occurrence during the rainy season of the spring.
- ❑ Berkshire Road is a dead end and, because of its close orientation with the Pomperaug River, is noted as high priority to include it in connectivity with other roadways. This is important for emergency vehicles and options for transit if evacuation is needed.
- ❑ Private roads and trails (including Hillside Road, Heritage Village and Berkshire Estates) are too narrow for emergency vehicular transit. They present the possibility of access problems during emergencies in the area.
- ❑ Flag Swamp Road is a dirt road that connects Southbury to Roxbury and is a dead end. This road is orientated along the watercourse associated with Flag Swamp.
- ❑ Piers Corner Lake Road also has one in/out route and is located in close proximity to the lake, therefore is under threat of flooding.
- ❑ Little Fox Road is a one way in/out road that can be affected by flooding associated with an unnamed watercourse.

#### **Potential Problems Associated with River Road**

- ❑ Prior to the construction of I-84, River Road was an important arterial road. The River Road bridge (circa 1962(?)) over the Pomperaug River is often used as a backup to I-84 when traffic occurs on the highway, but is currently rated as being “poor” to “very poor”. The bridge crosses the Pomperaug River just before its confluence with the Housatonic River. This bridge is owned by the Town. Approximately \$500,000 is needed for this bridge replacement project. It is likely that this will be mentioned in the hazard mitigation plan, in case PDM funding could be applied someday.
- ❑ Following the northern side of the Housatonic River, sections of the road are closed at times throughout the course of the year. The town pays for the costs associated with repairs. Another section is subsiding/developing a sinkhole and this section is important access for the satellite company that supports federal defense, ViaSat/Comsat. There is also a dam located in close proximity to the property. Although only five or six homes use this section of River Road, ViaSat/Comsat is a facility with national importance.
- ❑ To the northwest of the River Road No. 2 bridge, the road is washing away due to rainfall and changes in sediment size. Following River Road further to the west, between South Flat Hill Road and Stillson Road, flooding occurs on a normal basis.

- ❑ Flooding from debris in the culvert takes place to the west of the River Road bridge. Also, just to the north of the River Road bridge (along the Pomperaug River) there are ice jams that take place, causing flooding along Pomperaug Road and Manor Road.

These different locations along River Road will be given high priority to projects associated with road flooding and infrastructure throughout the project. The importance of River Road to residents of the Town, and of those traveling along I-84 is extremely significant.

### **Erosion/Slide Hazards**

- ❑ Lower Fish Rock Road is a dead end street along the Housatonic. A residence at the end of the street is in danger of sliding into the river due to the disturbing of the ground at this location.
- ❑ A riverbank stabilization application for the Pomperaug River is pending for funding.

### **Wildfires**

- ❑ Wildfires will be discussed, but are not priority in Southbury because much of the possible land to be subject to wildfires is mostly state-owned.
- ❑ The Town typically requires that developments outside of the HVWC's existing service area need water tanks for fire protection. All new development projects are required to include water tanks in the projects, while some older neighborhoods have tanks, some do not. The Town does not use fire ponds or dry hydrants.

### **Land Acquisition for Open Space**

- ❑ Acquisitions are constantly removing developable land. The process has been aggressive and a goal of 20% open space in the Town has been set to reach by 2012. The goals of the acquisition and transformation are connecting other open space properties, connecting wildlife, and eliminating possible developments in close association with floodplains. Southbury Land Trust is very involved in the process and, to a smaller extent, the National Audubon Society.

### **Critical Facilities and Communities**

- ❑ Heritage Village includes 2,500 condominium units with a population of 4,000. The development has its own security, but does not have a police force.

- ❑ Traditions includes 150 units and has a one way entrance/exit with an emergency access via Heritage Village.
- ❑ The Southbury Training School is a large Connecticut DMR facility. This facility serves the entire state of Connecticut.
- ❑ East Hill Woods and Pomperaug Woods are both life care centers.
- ❑ Assisted living communities include Kensington Green and Greys Meadows.
- ❑ The private Sewage Treatment Plant near the golf course is located in the flood plain of the Pomperaug River.
- ❑ The Heritage Valley Water Company wellfield is located within 100 year flood plain. It was mentioned that the wells had experienced contamination a few years ago. Has the DPH required elevation of the wellheads above the flood plain?

#### ***VI. Acquisitions***

- ❑ *Comprehensive Plan of Development.* Southbury Planning Commission, 2004.
- ❑ *Inland Wetlands and Watercourses Regulations.* Southbury Inland Wetlands and Watercourses Commission, May 2005.
- ❑ *Subdivisions Regulations.* Southbury Planning Department, January 1, 2007.
- ❑ *Zoning Regulations.* Southbury Zoning Commission, 2007.

COGCNV field notes

Field inspection on February 13, 2008.

Notes typed February 15, 2008.

Shawn Goulet

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Connecticut experienced a period of heavy rains on frozen ground on February 13, 2008. Precipitation measured 1.35 inches over approximately 9 hours in nearby Litchfield and 1.62 inches in Waterbury. On February 13, 2008 David Murphy and Shawn Goulet highlighted high priority areas of potential flooding mentioned during the initial data collection meeting in the Town of Southbury. Additionally, areas of potential flooding were outlined in the Town of Middlebury. These sites were visited on February 13, 2008 and problematic areas were photographed. These problematic areas primarily included areas of potential poor drainage due to the snow cover. The sequence of photography is listed below:

Photographs:

1. Nuisance flooding along River Rd.
2. Nuisance flooding along River Rd.
3. The Town of Southbury alleviating nuisance flooding along River Road
4. The Town of Southbury alleviating nuisance flooding along River Road
5. A front yard along Pomperaug Trail is flooded
6. The end of Pomperaug Trail is flooded
7. Another front yard along Pomperaug Trail is flooded
8. River Road Bridge over the Pomperaug River
9. The view looking upstream of the Pomperaug River from Manor Road
10. The view looking west and upgradient along Jeremy Swamp Road
11. Nuisance flooding along Jeremy Swamp Road
12. Jeremy Brook bends after the culvert crossing beneath Hulls Hill Road
13. View looking south of Jeremy Brook culvert crossing outlet along Hulls hill Road
14. View of Jeremy Brook near the culvert crossing
15. Water from Jeremy Brook begins to spill onto Hulls Hill Road
16. An undersized culvert appears stressed due to the substantial precipitation
17. Water associated with Jeremy Brook before entering the culvert crossing
- 18.
- 19.
- 20.

These notes follow the sequence of photography above.

- a) River Road (west of Glen Rd.), Southbury – Looking north along River Road, water from an unnamed stream builds (Photo #1). The cause of the nuisance flooding looks to be a failing culvert due to its overcapacity or damming.



*1. Nuisance flooding along River Road*

- b) River Road (west of Glen Road), Southbury – This is the same location as Photo #1. The Town of Southbury has to alleviate the culvert during large-scale rain events along this portion of River Rd. in Photo #3.



*3. The Town of Southbury alleviating nuisance flooding along River Road*

- c) Pomperaug Trail, Southbury – The front yards of different homes along Pomperaug Trail were flooded like the representative home in Photo #3. The backyards of these homes border the Pomperaug River.





*5. A front yard along Pomperaug Trail is flooded*

- d) River Road Bridge (over the Pomperaug River), Southbury – The River Road Bridge over the Pomperaug River becomes instrumental to vehicular transportation when traffic on I-84 becomes problematic or the highway is shut-down. The bridge is currently rated as being in “poor” to “very poor” condition and is owned by the Town. Photo #4 shows the view of the bridge from Berkshire Road.



*8. River Road Bridge over the Pomperaug River*



- e) Manor Road, Southbury – Photo #5 is the view looking upstream the Pomperaug River from Manor Road. Homes, Manor Road, and Pomperaug Trail are often inundated during sustained precipitation events. Ice jams at this location often bring about flooding events.



*9. The view looking upstream of the Pomperaug River from Manor Road*

- f) Jeremy Swamp Road, Southbury – Traveling east along Jeremy Swamp Road, water was found to be moving rapidly downgradient towards Jeremy Brook (Photo #6) prior to the Jeremy Swamp Road/Hulls Hill Road intersection. Potential for storm drain failure along this road can lead towards substantial nuisance flooding (Photo #7).



*10. The view looking west and upgradient along Jeremy Swamp Road*



*11. Nuisance flooding along Jeremy Swamp Road*

- g) Hulls Hill Road/Jeremy Swamp Road, Southbury – Jeremy Brook flows rapidly to the east of the Hulls Hill Road/Jeremy Swamp Road intersection (Photo #8).



*13. View looking south of Jeremy Brook culver crossing outlet along Hulls hill Road*

The intersection often becomes inundated during heavy precipitation events and is subsequently closed by the Town. The intersection was approaching inundation at the time of data collection (Photo #9).



*15. Water from Jeremy Brook begins to spill onto Hulls Hill Road*

The lone culvert crossing at the location appears to be insufficient for a storm of this scale (Photo #10).



*16. An undersized culvert appears stressed due to the substantial precipitation*

- h) Regan Road, Middlebury – Regan Road, which follows part of Hop Brook through Middlebury was determined to be a possible source of road and property/house inundation. Photos 18-20 show Hop Brook at an elevated stage level during the rain event alongside the road and near homes in this section of the Town.





*18. The downstream view of Hop Brook along Regan Road*



*19. The upstream view of Hop Brook along Regan Road*



*20. The view of Hop Brook from Regan Road*



February 28, 2008

John Turk  
Economic Development Commission  
260 Horse Fence Hill Road  
Southbury, CT 06488

**Re: Pre-Disaster Natural Hazard Mitigation Planning  
Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston**

Dear Mr. Turk,

The Council of Governments Central Naugatuck Valley (COGCNV) is coordinating the development of pre-disaster natural hazard mitigation plans for Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston. Plan development and adoption is required in order to be eligible for certain pre-disaster mitigation funds from FEMA, as well as a greater portion of post-disaster funding.


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Correspondence will be mailed within the next two weeks with a date, time, and location for the meeting in Bethlehem. Please contact the COGCNV at 203-757-0535 or [vmason@cogcnv.org](mailto:vmason@cogcnv.org) if you have any questions about the planning process or the meetings.

We hope that you will assist in this very important project, and we look forward to seeing you soon.

Sincerely,

  
Virginia Mason

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February 28, 2008

Lake Zoar Authority  
185 Lakemere Drive  
Southbury, CT 06488

**Re: Pre-Disaster Natural Hazard Mitigation Planning  
Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston**

Dear Director,

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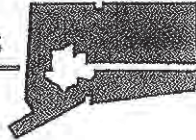
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Sincerely,

  
Virginia Mason

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February 28, 2008

Rob Webb  
Southbury Business Association  
PO Box 222  
Southbury, CT 06488

**Re: Pre-Disaster Natural Hazard Mitigation Planning  
Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston**

Dear Mr. Webb,

The Council of Governments Central Naugatuck Valley (COGCV) is coordinating the development of pre-disaster natural hazard mitigation plans for Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston. Plan development and adoption is required in order to be eligible for certain pre-disaster mitigation funds from FEMA, as well as a greater portion of post-disaster funding.


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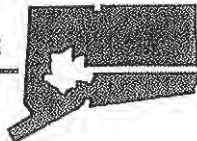
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Sincerely,

  
Virginia Mason

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February 28, 2008

Mark Massoud  
 Land Use Inspector/ZEO  
 501 Main Street South  
 Southbury, CT 06488

**Re: Pre-Disaster Natural Hazard Mitigation Planning  
 Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston**

Dear Mr. Massoud,

The Council of Governments Central Naugatuck Valley (COGCNV) is coordinating the development of pre-disaster natural hazard mitigation plans for Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston. Plan development and adoption is required in order to be eligible for certain pre-disaster mitigation funds from FEMA, as well as a greater portion of post-disaster funding.


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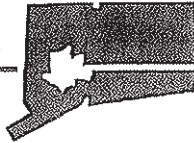
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Sincerely,

  
 Virginia Mason

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February 28, 2008

Neal Lustig  
 Director of Health  
 Pomperaug Health District  
 800 Main Street South  
 Southbury, CT 06488

**Re: Pre-Disaster Natural Hazard Mitigation Planning  
 Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston**

Dear Mr. Lustig, *Neal*

The Council of Governments Central Naugatuck Valley (COGCV) is coordinating the development of pre-disaster natural hazard mitigation plans for Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston. Plan development and adoption is required in order to be eligible for certain pre-disaster mitigation funds from FEMA, as well as a greater portion of post-disaster funding.

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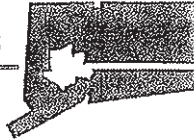
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Sincerely,

*Virginia Mason*  
 Virginia Mason

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February 28, 2008

Peter Grimm  
Tribury Chamber of Commerce  
PO Box 807  
Southbury, CT 06488

**Re: Pre-Disaster Natural Hazard Mitigation Planning  
Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston**

Dear Mr. Grimm,

The Council of Governments Central Naugatuck Valley (COGCNV) is coordinating the development of pre-disaster natural hazard mitigation plans for Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston. Plan development and adoption is required in order to be eligible for certain pre-disaster mitigation funds from FEMA, as well as a greater portion of post-disaster funding.


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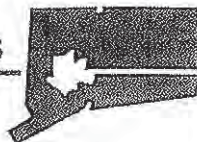
Sincerely,



Virginia Mason

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February 26, 2008

Kristen Bulkovitch  
 President  
 United Way of Greater Waterbury  
 P.O. Box 2688  
 Waterbury, CT 06723-2688

**Re: Pre-Disaster Natural Hazard Mitigation Planning  
 Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston**

Dear Ms. Bulkovitch,

The Council of Governments Central Naugatuck Valley (COGCNV) is coordinating the development of pre-disaster natural hazard mitigation plans for Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston. Plan development and adoption is required in order to be eligible for certain pre-disaster mitigation funds from FEMA, as well as a greater portion of post-disaster funding.

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Sincerely,

*Virginia Mason*  
 Virginia Mason

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February 28, 2008

Richard Stubbs  
 American Red Cross Waterbury Area  
 64 Holmes Avenue  
 Waterbury, CT 06710

Re: Pre-Disaster Natural Hazard Mitigation Planning  
 Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston

Dear Mr. <sup>Rich</sup>Stubbs,

The Council of Governments Central Naugatuck Valley (COGCNV) is coordinating the development of pre-disaster natural hazard mitigation plans for Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston. Plan development and adoption is required in order to be eligible for certain pre-disaster mitigation funds from FEMA, as well as a greater portion of post-disaster funding.

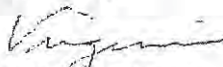
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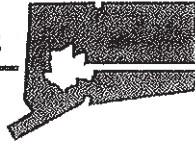
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February 28, 2008

Lake Lillinonah Authority  
 11 Coe Road  
 Brookfield, CT 06804

**Re: Pre-Disaster Natural Hazard Mitigation Planning  
 Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston**

Dear Director,

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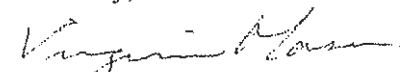
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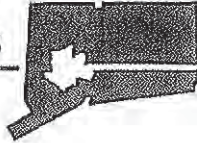
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February 28, 2008

H. William Davis  
Planning Commission  
501 Main Street South  
Southbury, CT 06488

**Re: Pre-Disaster Natural Hazard Mitigation Planning  
Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston**

Dear Mr. Davis,

The Council of Governments Central Naugatuck Valley (COGCNV) is coordinating the development of pre-disaster natural hazard mitigation plans for Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston. Plan development and adoption is required in order to be eligible for certain pre-disaster mitigation funds from FEMA, as well as a greater portion of post-disaster funding.

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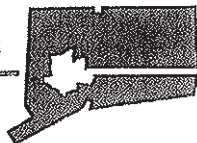
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Virginia Mason

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February 28, 2008

Tom Crider  
Southbury Land Trust  
PO Box 600  
Southbury, CT 06488

**Re: Pre-Disaster Natural Hazard Mitigation Planning  
Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston**

Dear Mr. Crider,

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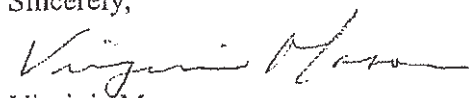
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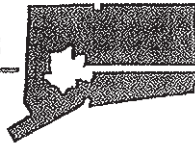
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February 28, 2008

Ed Edelson  
Executive Director  
Pomperaug River Watershed Coalition  
PO Box 141  
Southbury, CT 06488

**Re: Pre-Disaster Natural Hazard Mitigation Planning  
Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston**

Dear Mr. Edelson,

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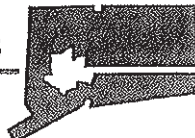
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Sincerely,

  
Virginia Mason

T:\Projects\Emergency Planning\Pre-Disaster Mitigation\Predisaster FY 06\Letter to Stakeholders.doc



February 28, 2008

Gary Giroux  
Zoning Commission  
501 Main Street South  
Southbury, CT 06488

**Re: Pre-Disaster Natural Hazard Mitigation Planning  
Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston**

Dear Mr. Giroux,

The Council of Governments Central Naugatuck Valley (COGCV) is coordinating the development of pre-disaster natural hazard mitigation plans for Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston. Plan development and adoption is required in order to be eligible for certain pre-disaster mitigation funds from FEMA, as well as a greater portion of post-disaster funding.

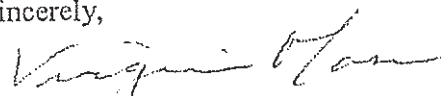
In order to successfully develop the local mitigation plans, a significant public outreach effort is required by FEMA. In addition, FEMA requests that stakeholders such as land trusts, neighborhood groups, chambers of commerce, health districts, watershed associations, and educational institutions be invited to provide input. Therefore, COGCV invites your participation at one or more of the public informational meetings listed below:

<i>Meeting</i>	<i>Date</i>	<i>Time</i>	<i>Location</i>
Naugatuck	March 3, 2008	6:00 PM	Town Hall
Southbury	March 19, 2008	6:30 PM	Town Hall
Thomaston	March 24, 2008	7:00 PM	Town Hall
Beacon Falls	April 3, 2008	7:00 PM	Town Hall
Middlebury	April 7, 2008	6:30 PM	Town Hall
Bethlehem	<i>To Be Determined</i>		

Correspondence will be mailed within the next two weeks with a date, time, and location for the meeting in Bethlehem. Please contact the COGCV at 203-757-0535 or [vmason@cogcnv.org](mailto:vmason@cogcnv.org) if you have any questions about the planning process or the meetings.

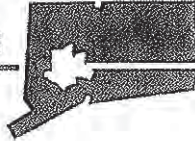
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Sincerely,

  
Virginia Mason

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February 28, 2008

Karen Huber  
 Southbury Land Trust  
 PO Box 600  
 Southbury, CT 06488

**Re: Pre-Disaster Natural Hazard Mitigation Planning  
 Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston**

Dear Ms. Huber,

The Council of Governments Central Naugatuck Valley (COGCNV) is coordinating the development of pre-disaster natural hazard mitigation plans for Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston. Plan development and adoption is required in order to be eligible for certain pre-disaster mitigation funds from FEMA, as well as a greater portion of post-disaster funding.

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Sincerely,

  
 Virginia Mason

T:\Projects\Emergency Planning\Pre-Disaster Mitigation\Predisaster FY 06\Letter to Stakeholders.doc

## **NEWS RELEASE**

To: Mauve Slavin  
Voices

Contact: Virginia Mason  
Assistant Director

For Release: Immediately

203-757-0535

Ice jams in the winter? Flooding problems along the Pomperaug? What other types of natural emergencies can Southbury plan for? A meeting will be held on Wednesday, March 19, 2008 at 6:30 P. M. at the Fire House to discuss the importance of planning to minimize the effects of natural disasters in the community. Southbury is one of six municipalities which successfully applied through the Council of Governments of the Central Naugatuck Valley (COGCNV) for a planning grant to identify natural hazards and ways the town can reduce their impacts. The consultants, Milone and MacBroom, Inc., will be seeking input from the public about possible local natural hazards such as hurricanes, nor'easters, floods, severe thunderstorms, wildfires, and earthquakes. The town invites the public to attend this informational meeting and participate in this process.

In coming months, the consultants will develop a plan identifying actions that can be undertaken prior to a disaster to reduce the loss of life and property damages associated with the event. The plan will be submitted to FEMA in accordance with the Disaster Mitigation Act of 2000. The Act requires communities to have approved mitigation plans in order to be eligible to receive Pre-Disaster Mitigation Program project grants.

The Council of Governments of the Central Naugatuck Valley consists of thirteen municipalities in the greater Waterbury area: Beacon Falls, Bethlehem, Cheshire, Middlebury, Naugatuck, Oxford, Prospect, Southbury, Thomaston, Waterbury, Watertown, Wolcott, and Woodbury. For further information, contact Virginia Mason or Selma Alves at COGCNV by phone at 203-757-0535 or email at [vmason@cnvgcnv.org](mailto:vmason@cnvgcnv.org).



## Southbury Hosts Meeting to Plan for Natural Disasters

**SOUTHBURY** — A meeting will take place at 6:30 p.m. Wednesday, March 19, at the Southbury Firehouse to discuss the importance of planning to minimize the effects of natural disasters in the community.

Southbury is one of six municipalities which successfully applied through the Council of Governments of the Central Naugatuck Valley for a planning grant to identify natural hazards and ways the town can reduce their impacts.

The consultants, Milone and MacBroom, Inc., will be seeking input from the public about pos-

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Those seeking additional information may call Virginia Mason or Selma Alves at COGCNV at 203-757-0535 or e-mail [vmaison@cnvgcnv.org](mailto:vmaison@cnvgcnv.org).

## State Offers Help to F&S Oil Customers

**HARTFORD** — The state Department of Consumer Protection is increasing telephone lines and staff availability for former F & S Oil Company customers.

An e-mail address and information form for customers is also available.

Those wishing to e-mail questions or concerns may e-mail [foodstandards@ct.gov](mailto:foodstandards@ct.gov).

A complaint form has been posted on the agency's website at [www.ct.gov/dcp](http://www.ct.gov/dcp).

"Many persons are calling us to provide their information in order to start a claim against F & S or one of its subsidiaries — Village Oil, Bosse Graziano Oil

Company, Carlson Fuel of Meriden, Inc., and U.S. Fuels — and using e-mail will definitely save them time," said Consumer Protection Commissioner Jerry Farrell, Jr.

"E-mailing us the necessary information is the most efficient and effective way to communicate with us at the moment."

The complaint form on the department's website asks for the following information: name, full address, age, day-time phone number, name of the company, type of contract, service, prepaid, or discount, how the contract (cash or credit card) was purchased and the date the con-



Star Buck

The Star Buck for the last week was a stone wall and pillar with lamp on Strathmore Road in Middlebury. There was one caller with the correct location: Elaine Jacovich of Middlebury. This week's challenge is above. If you think you know

## Egg Hunt Set

**OXFORD** — The Park and Recreation Department will have its annual Easter Egg Hunt at 1 p.m. Saturday, March 15, at the soccer field at Great Oak Middle School.

The hunt is for toddlers to grade 2.



## ***Meeting Minutes***

### **NATURAL HAZARD PRE-DISASTER MITIGATION PLAN FOR SOUTHBURY Council of Governments Central Naugatuck Valley Public Information Meeting March 19, 2008**

---

#### ***I. Welcome & Introductions***

Numerous individuals attended the public meeting:

- ☐ David Murphy, P.E., Milone & MacBroom, Inc. (MMI)
- ☐ Samuel Eisenbeiser, Fitzgerald & Halliday, Inc. (FHI)
- ☐ Virginia Mason, Council of Governments Central Naugatuck Valley (CGCNV)
- ☐ DeLoris Curtis, Southbury Planning Department
- ☐ Rick Lyle, Assistant Fire Chief & LEPC
- ☐ Tom Crowe, Southbury Department of Public Works
- ☐ George Slaiby, Southbury Police Department & Emergency Management
- ☐ Jennifer Naylor, First Selectman's Office
- ☐ John Turk, Board of Selectmen
- ☐ Oscar Fuller, Region 5 Amateur Radio Emergency Service (ARES)
- ☐ Harlan Ford, Region 5 ARES
- ☐ Maeve Slavin, Voices Newspaper
- ☐ Chris Gardner, Waterbury Republican-American
- ☐ Rachel Pederson, resident of River Trail
- ☐ Joann Murphy, resident of River Trail
- ☐ John Fleming, resident of River Trail
- ☐ Joann Hart, resident, 129 River Trail
- ☐ John Koolis, resident, 111 Floodbridge Road
- ☐ Leovigilda Villadowd, resident, 155 Grasslands Road
- ☐ Laarni Ring, resident, 155 Grasslands Road

Ms. Mason introduced the project team and the project, explaining the COG's role in the project, the goals of the Disaster Mitigation Act, and the relationship to the FEMA pre-disaster and post-disaster funding processes.

#### ***II. Power Point: "Natural Hazard Pre-Disaster Mitigation Plan, Southbury, Connecticut"***

Mr. Murphy and Mr. Eisenbeiser presented the power point slideshow.

#### ***III. Questions, Comments, and Discussion***

The majority of the discussion focused on flooding of the Floodbridge Road and River Trail neighborhoods along the Pomperaug River:



- ❑ Several residents from River Trail provided narratives of flooding incidents and evacuations that occurred as the road was flooding. John Fleming on River Trail is not interested in being bought out, and neither are his neighbors. Mr. Fleming's basement floods and is vented (wet floodproofing). However, his foundation has been damaged. The first floor is believed to be six inches above flood levels.
- ❑ Joann Murphy spent \$14,000 to repair flood damages last year. Flood levels in her house have reached a depth of three feet on the first floor. Pictures are available.
- ❑ The owner of 111 Floodbridge Road would like to be bought out by the Town and it was explained that PDM funds can sometimes be used for this purpose.
- ❑ All the residents living along the Pomperaug River that were in attendance are concerned with the Long Meadow Pond dam in Bethlehem. If the dam fails, they would all suffer damages. They were notified in February 2007 when sandbagging was taking place at the dam, and were displeased that a formal notification and process for evacuation were not available at that time. They recommend that the notification process be improved.
- ❑ A resident at 155 Grasslands Road is experiencing "flooding" from an adjacent subdivision. Her driveway and garage floor are reportedly cracking from this water.
- ❑ Cedar Land Park experiences flooding and has been evacuated by boat.
- ❑ Oscar Fuller of the Region 5 Amateur Radio Emergency Service (ARES) offered the services of his organization (for a fee) to integrate amateur radio into the Town's emergency communications as a backup to the primary communications system. He has worked with other towns and the Danbury Hospital.

# Natural Hazard Pre-Disaster Mitigation Plan Southbury, Connecticut



**Presented by:**

**David Murphy, P.E. – Associate  
Milone & MacBroom, Inc.**



**Sam Eisenbeiser, AICP  
Fitzgerald & Halliday, Inc.**



# March 19, 2008

# History of Hazard Mitigation Plans



- **Authority**
  - Disaster Mitigation Act of 2000 (amendments to Stafford Act of 1988)
- **Goal of Disaster Mitigation Act**
  - Encourage disaster preparedness
  - Encourage hazard mitigation measures to reduce losses of life and property



# Municipalities Currently Involved in the Regional Mitigation Planning Process

- Beacon Falls
- Bethlehem
- Middlebury
- Naugatuck
- Southbury
- Thomaston



**Local municipalities must have a FEMA approved Hazard Mitigation Plan in place to receive federal grant funds for hazard mitigation projects**



## Selection of FEMA Pre-Disaster Mitigation Grants: 2003-2006

*List does not include seismic, wind retrofit, home acquisition, and planning projects*

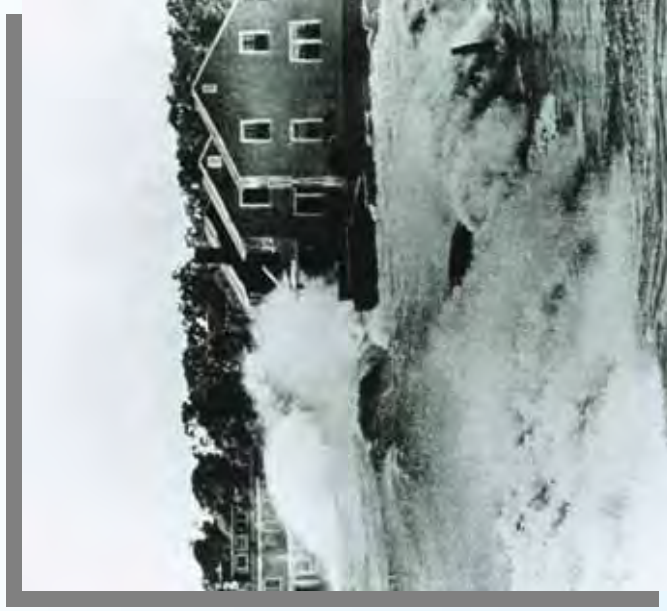
<i>State</i>	<i>Description</i>	<i>Grant</i>
Colorado	Detention pond	\$3,000,000
Oregon	Water conduit replacement	\$3,000,000
Washington	Road elevation	\$3,000,000
Oregon	Floodplain restoration	\$2,984,236
Colorado	Watershed mitigation	\$2,497,216
Georgia	Drainage improvements	\$1,764,356
Massachusetts	Pond flood hazard project	\$1,745,700
Oregon	Ice storm retrofit	\$1,570,836
North Dakota	Power transmission replacement	\$1,511,250
Texas	Home elevations	\$1,507,005
Florida	Storm sewer pump station	\$1,500,000
Massachusetts	Flood hazard mitigation project	\$1,079,925
Kansas	Effluent pump station	\$765,000
South Dakota	Flood channel restoration	\$580,657
Massachusetts	Culvert project	\$525,000
Texas	Storm shelter	\$475,712
Massachusetts	Housing elevation and retrofit	\$473,640
Utah	Fire station retrofit	\$374,254
Washington	Downtown flood prevention project	\$255,000
New York	WWTP Floodwall construction	\$223,200
Massachusetts	Road mitigation project	\$186,348
Massachusetts	Flood mitigation project	\$145,503
Vermont	Road mitigation project	\$140,441
New Hampshire	Water planning for firefighting	\$134,810
Oregon	Bridge scour relocation project	\$116,709
New Hampshire	Box culvert project	\$102,000
Missouri	Bank stabilization	\$48,750
Tennessee	Utility protection	\$40,564
Wisconsin	Waterway stabilization	\$12,909





# What is a Natural Hazard ?

- An extreme natural event that poses a risk to people, infrastructure, and resources



# What is Hazard Mitigation?

- ***Pre-disaster*** actions that reduce or eliminate long-term risk to people, property, and resources from natural hazards and their effects



A Road Closure During / After a Large Scale  
Rainfall Event is a Type of Hazard Mitigation





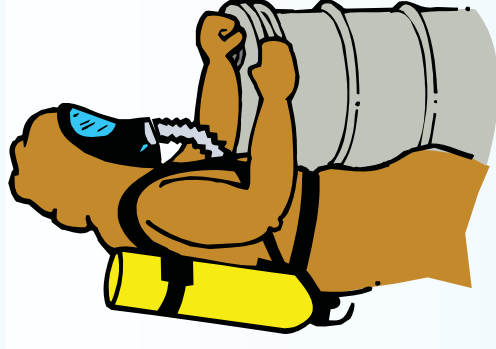
# Long-Term Goals of Hazard Mitigation

- Reduce loss / damage to life, property, and infrastructure
- Reduce the cost to residents and businesses
- Educate residents and policy-makers about natural hazard risk and vulnerability
- Connect hazard mitigation planning to other community planning efforts
- Enhance and preserve natural resource systems in the community



# What a Hazard Mitigation Plan Does Not Address

- Terrorism and Sabotage
- Disaster Response and Recovery
- Human Induced Emergencies (some fires, hazardous spills and contamination, disease, etc.)



# Components of Hazard Mitigation Planning Process

- Identify natural hazards that could occur in Southbury
- Evaluate the vulnerability of structures and populations and identify critical facilities and areas of concern
- Assess adequacy of mitigation measures currently in place
- Evaluate potential mitigation measures that could be undertaken to reduce the risk and vulnerability
- Develop recommendations for future mitigation actions



# Southbury's Critical Facilities

- Emergency Services – Police, Fire, Ambulance
- Municipal Facilities – Town Hall
- The Fire House & Senior Center



Southbury Town Hall



MILONE & MACBROOM



Old Poverty Road House Fire (June 2007)



Fitzgerald & Halliday, Inc.

# Southbury's Critical Facilities

- Life / Health Care and Assisted Living
- Water Utilities – Tanks, Pumping Stations
- Wastewater Utilities – Pumping Stations and Treatment Plants
- The Southbury Training School
- ViaSat / ComSat



Satellite facility



Southbury Training School

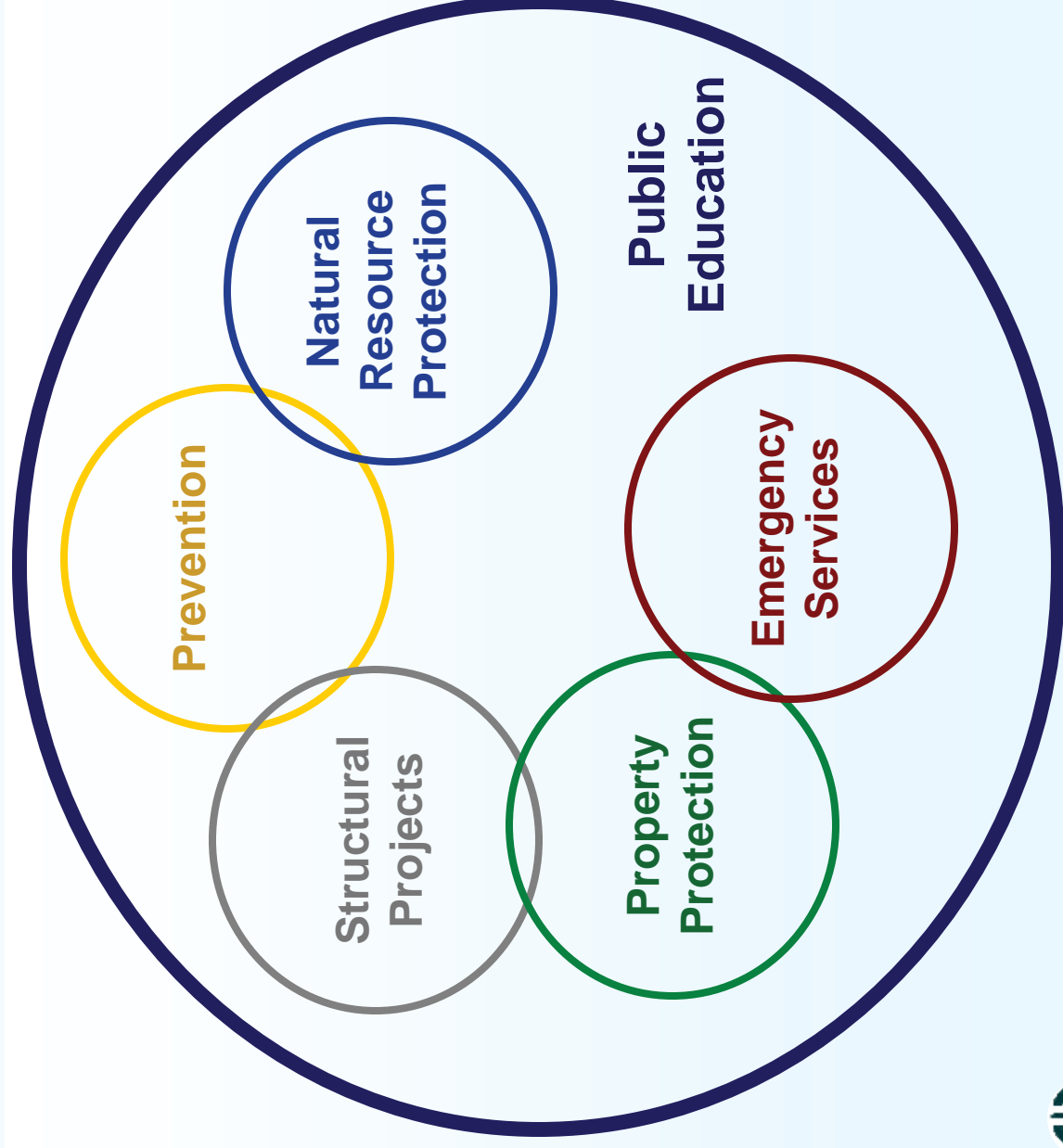


MILONE & MACBROOM



Fitzgerald & Halliday, Inc.

# Potential Mitigation Categories



MILONE & MACBROOM



Fitzgerald & Halliday, Inc.



# Potential Mitigation Measures

- Utilization of CodeRED Emergency Notification System
- Adopt local legislation that limits or regulates development in vulnerable areas
- Public education programs – dissemination of public safety information
- Construction of structural measures
- Allocate technical and financial resources for mitigation programs
- Preserve critical land areas and natural systems



# Primary Natural Hazards Facing Southbury

- Inland flooding
- Winter storms, nor'easters, heavy snow, blizzards, ice storms
- Ice Jams
- Hurricanes
- Summer storms, tornadoes, thunderstorms, lightning, hail
- Dam failure
- Wildfires
- Earthquakes



River Road – West of Flooding  
of Unnamed Tributary



Undersized Culvert @ Hulls Hill Road /  
Jeremy Swamp Road Intersection



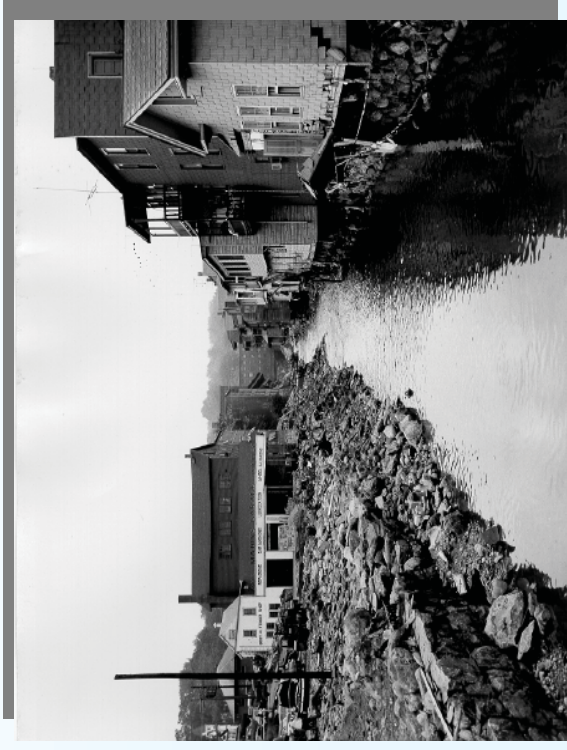
MILONE & MACBROOM



Fitzgerald & Halliday, Inc.

# Hurricanes

- Winds
- Heavy rain / flooding



# Summer Storms and Tornadoes

- Heavy wind / tornadoes / downbursts
- Lightning
- Heavy rain
- Hail



Lightning over Boston



Tornado in KS



Flooding in MN



MILONE & MACBROOM



Fitzgerald & Halliday, Inc.



# Winter Storms

- Blizzards and nor'easters
- Heavy snow and drifts
- Freezing rain / ice



CT River - April 2007



MILONE & MACBROOM



Connecticut



Southbury - April 2007



Fitzgerald & Halliday, Inc.

# Ice Jams

- Occur on rivers partially or totally frozen
- Ice floes pile on channel obstructions
- Backwater upstream can rapidly rise and overflow channel banks
- When the jam is released, flooding migrates downstream
- Very dangerous / serious threat



Area of common ice jams on Pomeraug River





# Dam Failure

- Severe rains or earthquakes can cause failure
- Possibility of loss of life and millions of dollars in property damage



Shepaug Dam



MILONE & MACBROOM



Fitzgerald & Halliday, Inc.

# Wildfires

- Southbury has low to moderate risk of wildfires
- Land subject to wildfires is mostly state-owned
- Fire
- Heat
- Smoke



Photo courtesy of FEMA



# Earthquakes

- Southbury is in an area of minor seismic activity
- Chester, CT experienced a small, 2.0 magnitude earthquake on March 11, 2008
- Can cause dam failure
  - ◆ Shaking
  - ◆ Liquefaction
  - ◆ Secondary (Slides/Slumps)



Photos courtesy of FEMA



# Area-Specific Problems

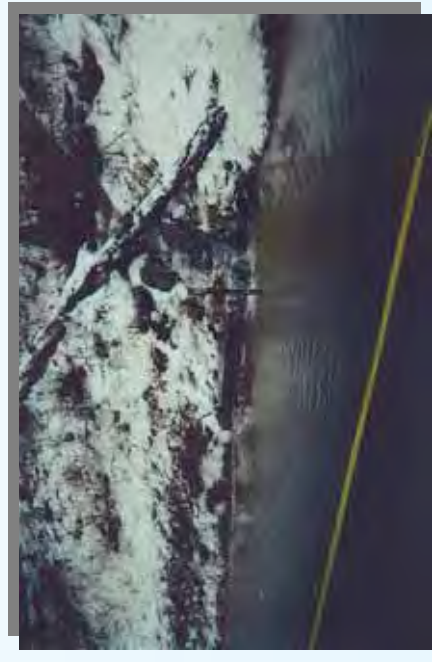
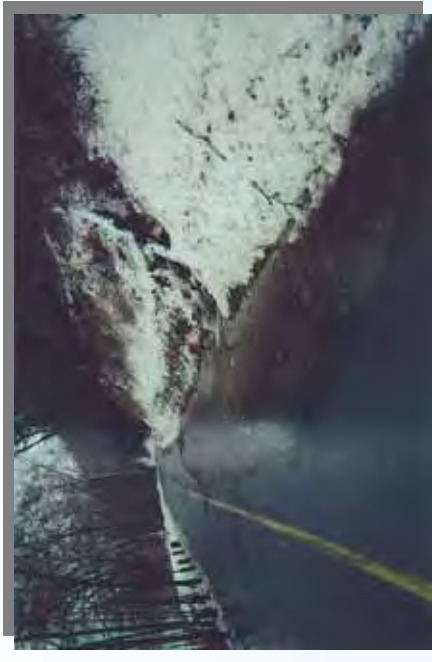
- Roadway and property flooding at rivers and streams
  - ◆ River Road – from small streams
  - ◆ Manor Road & Pomperaug Trail along the Pomperaug River
  - ◆ Flood Bridge Road
  - ◆ Hulls Hill Road / Jeremy Swamp Road Intersection
  - ◆ Other streams and localized problems
- Flooding caused by poor drainage
- Potential bridge maintenance / replacement
- Erosion and scour caused by high flows





# Flooding at Rivers and Streams

- Along River Road – from small streams



# Flooding at Rivers and Streams

- Manor Road & Pomperaug Trail along the Pomperaug River



Pomperaug Trail



Manor Road



MILONE & MACBROOM



Fitzgerald & Halliday, Inc.



# Flooding at Rivers and Streams

- Flood Bridge Road –Pomeraug River



April 2007 Nor'easter



MILONE & MACBROOM



Fitzgerald & Halliday, Inc.

# Flooding at Rivers and Streams

- Hulls Hill Road / Jeremy Swamp Road Intersection  
Jeremy Brook



MILONE & MACBROOM



Fitzgerald & Halliday, Inc.

# Flooding at Rivers and Streams

- Route 172 – “Hay Fever Farm”
- Community House Road at Bullet Hill brook
- River Hill Road & Branch Road at Pomeraug River
- South Flat Hill Road at Little Pootatuck Brook
- Flagg Swamp Road at Flagg Swamp





# Flooding Caused by Poor Drainage

- Lee Farm Drive
- Lakeside Road

Lee Farm Drive and Lakeside Road



# Potential Bridge Maintenance / Replacement

- River Road Bridge over Pomperaug River - Town-owned bridge in need of maintenance
- Spruce Brook Bridge at Route 172 – in need of replacement over Transylvania Brook



# Erosion & Scour Caused by High Flows

- Locations along the Pomperaug River in Southbury



MILONE & MACBROOM



Fitzgerald & Halliday, Inc.



## Next Steps

- Incorporate input from residents
- Rank hazard vulnerability
- Develop a response strategy
- Prepare the draft plan with recommendations for review by the Town and the public
- Adopt and implement the plan



## A photograph showing a white car partially submerged in floodwater. A person is standing next to the car, and the water is murky and reflects the surrounding trees.

[illegible]





JOSALEE THRIFT REPUBLICAN-AMERICAN

David Murphy, right, of consulting firm Milone & MacBroom, speaks to Laarni Ring and her mother Linda Villadolid, who lives on Grasslands Road in Southbury and whose property is flooded with water runoff from a nearby subdivision, during a meeting Wednesday at the Southbury Firehouse to discuss planning for natural disasters in the area.

# Southbury plan could help flooded residents

## Noting storm hazards can lead to federal aid

BY CHRIS GARDNER  
REPUBLICAN-AMERICAN

**SOUTHBURY** — When the heavens open, and the Pomperaug River begins to swell, John Fleming and Joann Murphy head for higher ground.

The two River Trail homeowners said their homes routinely flood during heavy rainstorms. Twice since February Fleming has had three feet of water in his basement, while Murphy's basement from floor to ceiling and some of the first floor washed out during heavy rains last April 16.

"We get hit one of the hardest in Southbury," said Fleming, who attended a meeting Wednesday at the firehouse to discuss areas in town prone to impact from natural disasters like heavy rain, wind and ice

jams. "The road's usually covered with water, and then they come to evacuate."

Southbury is one of six towns in the Central Naugatuck Valley region — Beacon Falls, Bethlehem, Middlebury, Naugatuck and Thomaston are the others — developing a plan to identify possible storm hazards, and how to mitigate them. Only after a plan is created can the town apply for relief from the Federal Emergency Management Agency.

FEMA has helped hundreds of cities and towns across the country defend against storms. The agency has built detention ponds, replaced water conduits, elevated roads and houses, moved power lines and stabilized riverbanks, said David Murphy, a consultant working with the town and Council of

Governments of the Central Naugatuck Valley to develop Southbury's plan.

In the cases of Fleming and Joann Murphy, David Murphy said FEMA might pay to elevate the houses or even buy them out.

He said there are several other areas in Southbury prone to flooding, including River Road, where small streams rush down a steep bank on one side of the road and wash out the pavement. Homes on Manor Road, Pomperaug Trail and Flood Bridge Road have been damaged by high water and ice jams from the Pomperaug River, and there is an undersized culvert at Hulls Hill and Jeremy Swamp roads that causes water to rush over the pavement.

David Murphy hopes to have the plan completed by fall, in

time for the town to apply for federal money during the next funding cycle in December.

"When FEMA is making decisions about what to fund, they're going to say, 'How much is it costing residents?'" he said. "You need to keep your records so they know how much it's going to cost."

---

**APPENDIX C**  
**RECORD OF MUNICIPAL ADOPTION**

---



RECEIVED  
MAR 13 2009

MILONE AND MACBROOM

S. Bighinatti  
U.S. Department of Homeland Security  
Region I  
99 High St. 6th Floor  
Boston, MA 02110-2320



**FEMA**

March 10, 2009

COPY FOR YOUR  
INFORMATION

H. William Davis, First Selectman  
Town of Southbury  
501 Main Street South  
Southbury, CT 06488

Dear Mr. Davis:

Thank you for the opportunity to review the Town of Southbury Natural Hazard Pre-Disaster Mitigation Plan. The Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA) Region I has evaluated the plan for compliance with the Interim Final Rule published in the Federal Register on February 26, 2002 (44 CFR Parts 201 and 206). The plan satisfactorily meets all of the mandatory requirements of the regulations except §201.6(c)(5), adoption by the local governing body.

Federal regulations require that a plan must include documentation of its formal adoption by the local governing body (e.g., Board of Selectmen). Accordingly, this letter reflects a conditional approval of the plan until we receive a copy of its signed and stamped adoption resolution. Once this adoption resolution has been received and accepted, FEMA Region I will send a formal letter of approval to you confirming the Town of Southbury's eligibility to apply for Mitigation Grants administered by FEMA. If the plan is not adopted within one calendar year of FEMA's conditional approval, the jurisdiction must update the entire plan and resubmit it for FEMA review.

Along with a copy of the plan's adoption resolution, please also be sure to submit an electronic version of the plan. FEMA must upload complete, electronic versions of all approved plans into the National Emergency Management Information System (NEMIS) database. Acceptable electronic formats include a .doc or .pdf file and may be submitted to us on a CD.

Thank you for your continued dedication to public service demonstrated by preparing and adopting a strategy for reducing future disaster losses. Congratulations once again for achieving this milestone and ensuring a safer future for the residents of the Town of Southbury. Should you have any questions, please do not hesitate to contact Marilyn Hilliard at (617) 956-7536.

Sincerely,

  
Kevin M. Merli, Director  
Mitigation Division

Enclosure

Cc: Art Christian, CT State Hazard Mitigation Officer  
Scott Bighinatti, Environmental Scientist, Milone & MacBroom  
Virginia Mason, Assistant Director, COGCNV

## Southbury, CT LOCAL MITIGATION PLAN REVIEW CROSSWALK

### INSTRUCTIONS FOR USING THE PLAN REVIEW CROSSWALK FOR REVIEW OF LOCAL MITIGATION PLANS

Attached is a Plan Review Crosswalk based on the *Local Multi-Hazard Mitigation Planning Guidance*, published by FEMA in July, 2008. This Plan Review Crosswalk is consistent with the *Robert T. Stafford Disaster Relief and Emergency Assistance Act* (Stafford Act), as amended by Section 322 of the *Disaster Mitigation Act of 2000* (P.L. 106-390), the *National Flood Insurance Act of 1968*, as amended by the *National Flood Insurance Reform Act of 2004* (P.L. 108-264) and *44 Code of Federal Regulations (CFR) Part 201 – Mitigation Planning*, inclusive of all amendments through October 31, 2007.

#### SCORING SYSTEM

**N – Needs Improvement:** The plan does not meet the minimum for the requirement. Reviewer's comments must be provided.

**S – Satisfactory:** The plan meets the minimum for the requirement. Reviewer's comments are encouraged, but not required.

Each requirement includes separate elements. All elements of a requirement must be rated "Satisfactory" in order for the requirement to be fulfilled and receive a summary score of "Satisfactory." A "Needs Improvement" score on elements shaded in gray (recommended but not required) will not preclude the plan from passing.

When reviewing single jurisdiction plans, reviewers may want to put an N/A in the boxes for multi-jurisdictional plan requirements. When reviewing multi-jurisdictional plans, however, all elements apply. States that have additional requirements can add them in the appropriate sections of the *Local Multi-Hazard Mitigation Planning Guidance* or create a new section and modify this Plan Review Crosswalk to record the score for those requirements. Optional matrices for assisting in the review of sections on profiling hazards, assessing vulnerability, and identifying and analyzing mitigation actions are found at the end of the Plan Review Crosswalk.

#### The example below illustrates how to fill in the Plan Review Crosswalk:

Assessing Vulnerability: Overview				
Requirement §201.6(c)(2)(iii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.				
Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan include an overall summary description of the jurisdiction's vulnerability to each hazard?	Section II, pp. 4-10	The plan describes the types of assets that are located within geographically defined hazard areas as well as those that would be affected by winter storms.		
B. Does the new or updated plan address the impact of each hazard on the jurisdiction?	Section II, pp. 10-20	The plan does not address the impact of two of the five hazards addressed in the plan.  Required Revisions: <ul style="list-style-type: none"><li>• Include a description of the impact of floods and earthquakes on the assets.</li></ul> Recommended Revisions: This information can be presented in terms of dollar value or percentages of damage.		
SUMMARY SCORE				



# LOCAL MITIGATION PLAN REVIEW SUMMARY

The plan cannot be approved if the plan has not been formally adopted. Each requirement includes separate elements. All elements of the requirement must be rated "Satisfactory" in order for the requirement to be fulfilled and receive a score of "Satisfactory." Elements of each requirement are listed on the following pages of the Plan Review Crosswalk. A "Needs Improvement" score on elements shaded in gray (recommended but not required) will not preclude the plan from passing. Reviewer's comments must be provided for requirements receiving a "Needs Improvement" score.

Prerequisite(s) (Check Applicable Box)	NOT MET	MET
1. Adoption by the Local Governing Body: §201.6(c)(5) OR	X	
2. Multi-Jurisdictional Plan Adoption: §201.6(c)(5) AND		N/A
3. Multi-Jurisdictional Planning Participation: §201.6(a)(3)		N/A
<b>Planning Process</b>	N	S
4. Documentation of the Planning Process: §201.6(b) and §201.6(c)(1)		X
<b>Risk Assessment</b>	N	S
5. Identifying Hazards: §201.6(c)(2)(i)		X
6. Profiling Hazards: §201.6(c)(2)(i)		X
7. Assessing Vulnerability: Overview: §201.6(c)(2)(ii)		X
8. Assessing Vulnerability: Addressing Repetitive Loss Properties: §201.6(c)(2)(ii)		X
9. Assessing Vulnerability: Identifying Structures, Infrastructure, and Critical Facilities: §201.6(c)(2)(ii)(B)	X	
10. Assessing Vulnerability: Estimating Potential Losses: §201.6(c)(2)(i)(B)	X	
11. Assessing Vulnerability: Analyzing Development Trends: §201.6(c)(2)(i)(C)		X
12. Multi-Jurisdictional Risk Assessment: §201.6(c)(2)(iii)		N/A

\*States that have additional requirements can add them in the appropriate sections of the Local Multi-Hazard Mitigation Planning Guidance or create a new section and modify this Plan Review Crosswalk to record the score for those requirements.

\*\*Plan conditionally approved pending receipt of adoption documentation

## SCORING SYSTEM

Please check one of the following for each requirement.

**N – Needs Improvement:** The plan does not meet the minimum for the requirement. Reviewer's comments must be provided.

**S – Satisfactory:** The plan meets the minimum for the requirement. Reviewer's comments are encouraged, but not required.

Mitigation Strategy	N	S
13. Local Hazard Mitigation Goals: §201.6(c)(3)(i)		X
14. Identification and Analysis of Mitigation Actions: §201.6(c)(3)(ii)		X
15. Identification and Analysis of Mitigation Actions: NFIP Compliance, §201.6(c)(3)(ii)		X
16. Implementation of Mitigation Actions: §201.6(c)(3)(iii)		X
17. Multi-Jurisdictional Mitigation Actions: §201.6(c)(3)(iv)		N/A

Plan Maintenance Process	N	S
18. Monitoring, Evaluating, and Updating the Plan: §201.6(c)(4)(ii)		X
19. Incorporation into Existing Planning Mechanisms: §201.6(c)(4)(ii)		X
20. Continued Public Involvement: §201.6(c)(4)(iii)		X

Additional State Requirements*	N	S
Insert State Requirement		
Insert State Requirement		
Insert State Requirement		

## LOCAL MITIGATION PLAN APPROVAL STATUS

PLAN NOT APPROVED

See Reviewer's Comments

PLAN APPROVED

X\*\*

# Southbury, CT LOCAL MITIGATION PLAN REVIEW CROSSWALK

## Local Mitigation Plan Review and Approval Status

<b>Jurisdiction:</b> Southbury, CT	<b>Title of Plan:</b> Town of Southbury, CT Natural Hazard Pre-Disaster Mitigation Plan	<b>Date of Plan:</b> November 2008
<b>Local Point of Contact:</b> Scott Bighinatti	<b>Address:</b> 99 Realty Drive Cheshire, Connecticut 06702	
<b>Title:</b> Environmental Scientist		
<b>Agency:</b> Milone & MacBroom		
<b>Phone Number:</b> (203) 271-1773	<b>E-Mail:</b> scottb@miloneandmacbroom.com	

<b>State Reviewer:</b>	<b>Title:</b>	<b>Date:</b>
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<b>FEMA Reviewer:</b> Reid Dominie	<b>Title:</b> Hazard Mitigation Specialist	<b>Date:</b> February 2009
<b>Date Received in FEMA Region [Insert #]</b>		
Plan Not Approved		
Plan Conditionally Approved	3.10.09	
Date Approved		

<b>Jurisdiction:</b> Southbury, CT	<b>NFIP Status*</b>			
	<b>Y</b>	<b>N</b>	<b>N/A</b>	<b>CRS Class</b>
	X			

\* Notes: Y = Participating      N = Not Participating      N/A = Not Mapped



# Southbury, CT LOCAL MITIGATION PLAN REVIEW CROSSWALK

## PREREQUISITE(S)

### 1. Adoption by the Local Governing Body

**Requirement §201.6(c)(5):** [The local hazard mitigation plan **shall** include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council).

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			NOT MET	MET
A. Has the local governing body adopted new or updated plan?			X	
B. Is supporting documentation, such as a resolution, included?			X	
SUMMARY SCORE			X	

### 2. Multi-Jurisdictional Plan Adoption

**Requirement §201.6(c)(5):** For multi-jurisdictional plans, each jurisdiction requesting approval of the plan **must** document that it has been formally adopted.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			NOT MET	MET
A. Does the new or updated plan indicate the specific jurisdictions represented in the plan?				
B. For each jurisdiction, has the local governing body adopted the new or updated plan?				
C. Is supporting documentation, such as a resolution, included for each participating jurisdiction?				
SUMMARY SCORE				N/A

### 3. Multi-Jurisdictional Planning Participation

**Requirement §201.6(a)(3):** Multi-jurisdictional plans (e.g., watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process ... Statewide plans will not be accepted as multi-jurisdictional plans.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			NOT MET	MET
A. Does the new or updated plan describe how each jurisdiction participated in the plan's development?				
B. Does the updated plan identify all participating jurisdictions, including new, continuing, and the jurisdictions that no longer participate in the plan?				
SUMMARY SCORE				N/A

## Southbury, CT LOCAL MITIGATION PLAN REVIEW CROSSWALK

**PLANNING PROCESS: §201.6(b):** *An open public involvement process is essential to the development of an effective plan.*

### 4. Documentation of the Planning Process

**Requirement §201.6(b):** *In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process **shall** include:*

- (1) *An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;*
- (2) *An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and*
- (3) *Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.*

**Requirement §201.6(c)(1):** *[The plan **shall** document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the plan provide a narrative description of the process followed to prepare the <b>new or updated</b> plan?	Pg 1-8 to 1-11	The Plan provides a detailed description of the planning process.		X
B. Does the <b>new or updated</b> plan indicate who was involved in the <b>current</b> planning process? (For example, who led the development at the staff level and were there any external contributors such as contractors? Who participated on the plan committee, provided information, reviewed drafts, etc.?)	Pg 1-8 to 1-11	Ms. Virginia Mason of COGCNV spearheaded the development of Southbury's Plan. The Town personnel involved in the planning process are listed on page 1-9.		X
C. Does the <b>new or updated</b> plan indicate how the public was involved? (Was the public provided an opportunity to comment on the plan during the drafting stage and prior to the plan approval?)	Pg 1-8 to 1-11	The Public was invited to participate in the planning process via newspaper, "Residents were invited to attend the public meeting via newspaper announcements. There were approximately eight residents of the Town that attended the meeting, providing valuable comments with regard to flooding in the Town" (1-9). Additional public comments will be heard at the tentatively scheduled Plan adoption meeting in March 2009.		X
D. Does the <b>new or updated</b> plan discuss the opportunity for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?	Pg 1-8 to 1-11	"A total of 14 municipal agencies and civic organizations were invited via a mailed copy of the press release that announced the public information meeting" (1-9 to 10-10). These entities are listed on page 1-10 and included neighboring communities.		X
E. Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?	Pg 1-8 to 1-11	The Plan cites the CT State Hazard Mitigation Plan. Plans and Studies are referenced throughout the Plan and cited in Section 12.0. Under each hazard section, a subsection analyzes existing programs, policies and mitigation measures.		X
F. Does the plan include a description of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved?		This is a new Plan.		N/A



## Southbury, CT LOCAL MITIGATION PLAN REVIEW CROSSWALK

### 4. Documentation of the Planning Process

**Requirement §201.6(b):** In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process **shall** include:

- (1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
- (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and
- (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

**Requirement §201.6(c)(1):** [The plan **shall** document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

SUMMARY SCORE	
SCORE	
	X

**RISK ASSESSMENT:** §201.6(c)(2): The plan shall include a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.

### 5. Identifying Hazards

**Requirement §201.6(c)(2)(i):** [The risk assessment **shall** include a] description of the type ... of all natural hazards that can affect the jurisdiction.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan include a description of the types of all natural hazards that affect the jurisdiction?	Pg 1-5	The Plan lists the identified hazards on page 1-5, "based on a review of the Connecticut Natural Hazard Mitigation Plan and correspondence with local officials."		X
SUMMARY SCORE				X

### 6. Profiling Hazards

**Requirement §201.6(c)(2)(i):** [The risk assessment **shall** include a] description of the ... location and extent of all natural hazards that can affect the jurisdiction. The plan **shall** include information on previous occurrences of hazard events and on the probability of future hazard events.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the risk assessment identify the location (i.e., geographic area affected) of each natural hazard addressed in the new or updated plan?	Sections 3-10	Each hazard is granted its own section, under which fall the following subsections: setting; hazard assessment; historic record; existing programs, policies and mitigation measures; vulnerabilities and risk assessment; and potential mitigation measures, strategies and alternatives.		X
B. Does the risk assessment identify the extent (i.e.,	Sections 3-10	See above		X

# Southbury, CT LOCAL MITIGATION PLAN REVIEW CROSSWALK

magnitude or severity) of each hazard addressed in the new or updated plan?				
C. Does the plan provide information on previous occurrences of each hazard addressed in the new or updated plan?	Sections 3-10	See Above		X
D. Does the plan include the probability of future events (i.e., chance of occurrence) for each hazard addressed in the new or updated plan?	Sections 3-10	See Above		X
SUMMARY SCORE				X



## Southbury, CT LOCAL MITIGATION PLAN REVIEW CROSSWALK

### 7. Assessing Vulnerability: Overview

**Requirement §201.6(c)(2)(ii):** [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan include an overall summary description of the jurisdiction's vulnerability to each hazard?	Sections 3-10	Each hazard is granted its own section, under which fall the following subsections: setting; hazard assessment; historic record; existing programs, policies and mitigation measures; vulnerabilities and risk assessment; and potential mitigation measures, strategies and alternatives.		X
B. Does the new or updated plan address the impact of each hazard on the jurisdiction?	Sections 3-10	See above		X
SUMMARY SCORE				X

### 8. Assessing Vulnerability: Addressing Repetitive Loss Properties

**Requirement §201.6(c)(2)(ii):** [The risk assessment] must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged floods.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan describe vulnerability in terms of the types and numbers of repetitive loss properties located in the identified hazard areas?	Pg 3-13 to 3-19	Note: This requirement becomes effective for all local plans approved after October 1, 2008. "Based on correspondence with the State of Connecticut NFIP Coordinator, ten repetitive loss properties are listed in the Town of Southbury. Two are no longer considered by FEMA to be repetitive loss properties and one is a duplicate listing, such that seven are considered active repetitive loss properties. One of the seven properties is also classified as a Severe Repetitive Loss Property" (3-13).		X
SUMMARY SCORE				X

### 9. Assessing Vulnerability: Identifying Structures

**Requirement §201.6(c)(2)(ii)(A):** The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area ....

Location in the	SCORE
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# Southbury, CT LOCAL MITIGATION PLAN REVIEW CROSSWALK

Element	Plan (section or annex and page #)	Reviewer's Comments	N	S
A. Does the <b>new or updated</b> plan describe vulnerability in terms of the <b>types and numbers</b> of <b>existing</b> buildings, infrastructure, and critical facilities located in the identified hazard areas?	Pg 2-24 to 2-29	<i>Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.</i> Critical Facilities in Southbury are listed and mapped.		X
B. Does the <b>new or updated</b> plan describe vulnerability in terms of the <b>types and numbers</b> of <b>future</b> buildings, infrastructure, and critical facilities located in the identified hazard areas?		<i>Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.</i>	X	
SUMMARY SCORE			X	



## Southbury, CT LOCAL MITIGATION PLAN REVIEW CROSSWALK

### 10. Assessing Vulnerability: Estimating Potential Losses

**Requirement §201.6(c)(2)(ii)(B):** [The plan **should** describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate ...

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan estimate potential dollar losses to vulnerable structures?	Not Found	Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.	X	
B. Does the new or updated plan describe the methodology used to prepare the estimate?	Not Found	Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.	X	
SUMMARY SCORE			X	

### 11. Assessing Vulnerability: Analyzing Development Trends

**Requirement §201.6(c)(2)(ii)(C):** [The plan **should** describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan describe land uses and development trends?	Pg 2-1 to 2-6 and 2-22 to 2-29	Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.		X
SUMMARY SCORE				X

### 12. Multi-Jurisdictional Risk Assessment

**Requirement §201.6(c)(2)(iii):** For multi-jurisdictional plans, the risk assessment **must** assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan include a risk assessment for each participating jurisdiction as needed to reflect unique or varied risks?				
SUMMARY SCORE				N/A



## Southbury, CT LOCAL MITIGATION PLAN REVIEW CROSSWALK

**MITIGATION STRATEGY:** §201.6(c)(3): *The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.*

### 13. Local Hazard Mitigation Goals

**Requirement §201.6(c)(3)(i):** *[The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards?	Pg 1-3 to 1-4	Hazard Mitigation Goals are listed. In future updates of the Plan, we recommend that a description of the process used to develop these goals be provided.		X
<b>SUMMARY SCORE</b>				X

### 14. Identification and Analysis of Mitigation Actions

**Requirement §201.6(c)(3)(ii):** *[The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan identify and analyze a <b>comprehensive range</b> of specific mitigation actions and projects for each hazard?	Sections 3-10 and Specifically Section 11	A summary of proposed mitigation actions can be found on pages 11-2 to 11-7		X
B. Do the identified actions and projects address reducing the effects of hazards on <b>new</b> buildings and infrastructure?	Sections 3-10 and Specifically Section 11			X
C. Do the identified actions and projects address reducing the effects of hazards on <b>existing</b> buildings and infrastructure?	Sections 3-10 and Specifically Section 11			X
<b>SUMMARY SCORE</b>				X



## Southbury, CT LOCAL MITIGATION PLAN REVIEW CROSSWALK

### 15. Identification and Analysis of Mitigation Actions: National Flood Insurance Program (NFIP) Compliance

**Requirement: §201.6(c)(3)(ii):** [The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan describe the jurisdiction (s) participation in the NFIP?	Pg 3-8 & 3-10	<b>Note: This requirement becomes effective for all local mitigation plans approved after October 1, 2008.</b> "SFHAs in Southbury are delineated on Flood Insurance Rate Maps and Flood Insurance Studies. An initial Flood Hazard Boundary Map was identified on February 8, 1974. The FIRM delineates areas within Southbury that are vulnerable to flooding and was originally published on March 28, 1980. The FIS was originally published on March 28, 1980 and has not been updated. The Town's FIRM was last updated on December 11, 1981" (3-3).		X
B. Does the mitigation strategy identify, analyze and prioritize actions related to continued compliance with the NFIP?	Pg 11-2 to 11-7	<b>Note: This requirement becomes effective for all local mitigation plans approved after October 1, 2008.</b> The Plan proposes such actions as "Consider joining FEMA's Community Rating System" and considering a restudy of local flood prone areas and "produce new local level regulatory maps... (11-2 to 11-3)"		X
<b>SUMMARY SCORE</b>				X

### 16. Implementation of Mitigation Actions

**Requirement: §201.6(c)(3)(iii):** [The mitigation strategy section shall include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated mitigation strategy include how the actions are prioritized? (For example, is there a discussion of the process and criteria used?)	Pg 1-7 to 1-8	The Plan provides a discussion of STAPLEE ranking method used to prioritize the Town's mitigation actions.		X
B. Does the new or updated mitigation strategy address how the actions will be implemented and administered, including the responsible department, existing and potential resources and the timeframe to complete each action?	Pg 12-1 and Appendix A			X
C. Does the new or updated prioritization process include	Pg 1-8	STAPLEE		X

# Southbury, CT LOCAL MITIGATION PLAN REVIEW CROSSWALK

an emphasis on the use of a cost-benefit review to maximize benefits?				
D.			This is a new Plan.	
				N/A
			SUMMARY SCORE	X



## Southbury, CT LOCAL MITIGATION PLAN REVIEW CROSSWALK

### 17. Multi-Jurisdictional Mitigation Actions

**Requirement §201.6(c)(3)(iv):** For multi-jurisdictional plans, there **must** be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan include identifiable <b>action</b> items for each jurisdiction requesting FEMA approval of the plan?				
B. Does the <b>updated</b> plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred?				
<b>SUMMARY SCORE</b>				N/A

### PLAN MAINTENANCE PROCESS

#### 18. Monitoring, Evaluating, and Updating the Plan

**Requirement §201.6(c)(4)(i):** [The plan maintenance process **shall** include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan describe the method and schedule for <b>monitoring</b> the plan, including the responsible department?	Pg 12-2	"The Office of the First Selectman will be the party responsible for monitoring the successful implementation of the Plan as part of his/her oversight of all municipal departments" (11-2). The method and schedule for monitoring the Plan is discussed.		X
B. Does the <b>new or updated</b> plan describe the method and schedule for <b>evaluating</b> the plan, including how, when and by whom (i.e. the responsible department)?	Pg 12-2 to 12-3			X
C. Does the <b>new or updated</b> plan describe the method and schedule for <b>updating</b> the plan within the five-year cycle?	Pg 12-3	"The Town of Southbury plans to formally update the plan at least once every five years. The COGCNV will remind the Town to formally update the plan within this timeframe" (12-3).		X
<b>SUMMARY SCORE</b>				X



## Southbury, CT LOCAL MITIGATION PLAN REVIEW CROSSWALK

### 19. Incorporation into Existing Planning Mechanisms

**Requirement §201.6(c)(4)(ii):** [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan identify other local planning mechanisms available for incorporating the mitigation requirements of the mitigation plan?	Pg 12-1 to 12-2	"It is expected that revisions of other Town plans and regulations, such as the Plan of Conservation and Development, department annual budgets, and the Zoning and Subdivision Regulations, will reference this plan and its updates" (12-1).		X
B. Does the <b>new or updated</b> plan include a process by which the local government will incorporate the mitigation strategy and other information contained in the plan (e.g., risk assessment) into other planning mechanisms, when appropriate?	Pg 12-1 to 12-2	"The Office of the First Selectmen will be responsible for ensuring that the actions identified in this plan are incorporated into ongoing Town planning activities..." (12-1).		X
C.		This is a new Plan.		N/A
<b>SUMMARY SCORE</b>				X

### Continued Public Involvement

**Requirement §201.6(c)(4)(iii):** [The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan explain how <b>continued public participation</b> will be obtained? (For example, will there be public notices, an on-going mitigation plan committee, or annual review meetings with stakeholders?)	Pg 12-3	"Continued public involvement will be sought regarding the monitoring, evaluating, and updating of the Plan. Public input may be solicited through community meetings and input to web-based information gathering tools. Public comment on changes to the Plan may be sought through posting of public notices, and notifications posted to the website of the Council of Governments of the Central Naugatuck Valley, as well as the website of the Town of Southbury" (12-3).		X
<b>SUMMARY SCORE</b>				X

**ERRATA TO BE PRESENTED MARCH 19, 2009**  
***Natural Hazard Pre-Disaster Mitigation Plan***  
***Town of Southbury, Connecticut***

**Table of Contents:**

Page iv      Updated title of Table 9-1.

**Section 1**

Page 1-9:    Added current First Selectman, H William Davis, Jr., to list of individuals involved with the Plan. Clarification of titles for two other individuals (former First Selectman and Assistant).

**Section 2**

Page 2-5:    Added source for Table 2-1.

Page 2-5:    Vizada Americas currently owns the formerly Telenor Satellite Communications facility.

Page 2-24:   Updated Table 2-5 for Vizada Americas facility.

Page 2-26:   Updated second paragraph to discuss the potential use of the Walzer Family Jewish Community Campus facility as an additional shelter under dire circumstances.

**Section 3**

Page 3-7:    Added October 2005 storms and damages in discussion of historic record.

**Section 9**

Page 9-2:    Included Long Meadow Pond Dam in Bethlehem in the discussion of dams whose failures could affect Southbury, and added that dam to Table 9-1.



03/25/2009

## Selectmen Hear Presentation on Pre-Disaster Planning

By: Tammy McVey-Camilleri

SOUTHBURY - A public hearing on the Natural Hazard Pre-Disaster Mitigation Plan preceded the Thursday, March 19, Board of Selectmen meeting.

David Murphy of Milone and MacBroom narrated a PowerPoint presentation highlighting a plan every town in the country needs to have in place in order to access certain Federal Emergency Management Agency funds to pay for pre-disaster mitigation.

After board approval, Southbury can apply each fall and have access to lists of projects that are eligible for funds from FEMA.

The Natural Hazard Pre-Disaster Mitigation Plan is full of recommendations that allow towns to apply for different mitigation projects.

"Example of this include storm water plans, elevating homes, buying open space, anything that helps mitigate for disasters," explained Mr. Murphy.

Mr. Murphy encouraged residents to view the website at [www.cogenv.org](http://www.cogenv.org). Copies of the plan are available in the first selectman's office at Town Hall.

Recommendations in the Natural Hazard Pre-Disaster Mitigation Plan include: Consider including dam failure inundation areas in the CodeRed base, continue implementation of CodeRed, acquire properties in flood plains and convert to open space use, evaluate structural projects for reducing ice jams, focus tree limb inspection maintenance along evacuation routes and annual exercises with public works and the police.

Selectman Carol Hubert, sitting in the chair for First Selectman Bill Davis, thanked Mr. Murphy and Officer George Slaiby, Southbury's Emergency Services Director for the presentation.

Selectman Hubert chaired the selectmen's meeting in absence of Mr. Davis who was attending the Connecticut Federation of Planning and Zoning Commissions Awards, where six Southbury commission members were recognized with 12-year service achievement awards.

Southbury's award recipients are: Lemuel Johnson, Jr., ZBA chairman; J. Peirce Behrendt, vice chair ZBA; Peter Peterson, ZBA secretary; Paul Sullivan, ZBA; Gary Giroux, Zoning Commission chair; and Todd White, Zoning member.

Selectmen, after discussing the Natural Hazard Pre-Disaster Mitigation Plan, postponed a vote until the board's April 2 meeting to give everyone time to review the detailed packaged material.

"Clearly, this is telling us to be proactive," Mrs. Hubert noted.

Selectmen also heard a presentation on the FEMA-based Pet Sheltering Annex-Emergency Operations Plan.

"This was based on experiences from Hurricane Katrina," Emergency Services Director Slaiby explained. "Residents wouldn't evacuate because they didn't want to leave their pets behind and a plan was not in place.

"If we had a disaster, we could open up one of the bays in the town garage for our pets. Residents will have to bring a three-day supply of food.

"Everything is education and having residents have the information of a plan in place. FEMA does not step in for 72 hours."

Selectmen adopted the Pet Sheltering Annex-Emergency Operations Plan.

Todd Thompson has proposed a Model Air Multi Use Park on seven acres in the Purchase Brook area.

Advertisement



The board has received a 67-signature petition against the proposal and 12 letters supporting the project.

Selectman Ken Kerin, noting he saw both sides of the proposal, had some concern with the "multi-use" wording.

"I'm concerned about legal issues and yet, I can also see a need for our citizens' recreational needs," Mr. Kerin said. "We need the expertise of our Planning Commission and Park and Recreation on this."

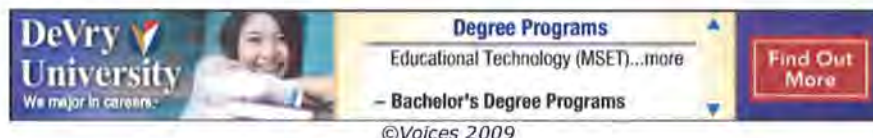
Selectmen agreed to refer the proposal to the Planning Commission and the Park and Recreation Commission.

Town Treasurer William Sarosky told selectmen the town has not yet received a \$142,538.36 rebate from the telecommunication tax liability revenue check.

The state Office of Policy and Management has informed the town it should see the check by April 1.

The Board of Selectmen were to hold a special meeting at 8:30 a.m. Monday, March 23, at Town Hall to investigate the town's options in pursuing its own independent police force.

The next Board of Selectmen meeting at 7:30 p.m. Thursday, April 2, at Town Hall.

A banner advertisement for DeVry University. On the left, the DeVry University logo is displayed with the tagline "We major in careers." and a photo of a smiling woman. To the right, a yellow box contains the text "Degree Programs" followed by "Educational Technology (MSET)...more" and "– Bachelor's Degree Programs". A red button on the far right says "Find Out More". Below the banner, the text "©Voices 2009" is visible.

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**TOWN OF SOUTHBURY**  
**OFFICE OF THE FIRST SELECTMAN**

501 Main Street South  
Southbury, Connecticut 06488  
(203) 262-0647  
Fax: (203) 264-9762



April 3, 2009

Virginia Mason  
Council of Governments  
60 North Main Street  
Waterbury, CT 06702-1403

Dear Ms. Mason:

The Southbury Board of Selectmen at a regular meeting held on April 2, 2009 approved the Town of Southbury Natural Hazard Pre-Disaster Mitigation Plan, as presented at a Public Hearing held on March 19, 2009.

Very truly yours,

H. William Davis, Jr.  
First Selectman

SOUTHBURY BOARD OF SELECTMEN  
April 2, 2009

RESOLVED, that the Southbury Board of Selectmen hereby approves the Town of Southbury Natural Hazard Pre-Disaster Mitigation Plan as presented on March 19, 2009.

Approved unanimously by the Board of Selectmen on April 2, 2009.