TOWN OF THOMASTON
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 the Connecticut Department of Environmental Protection (DEP)

Council of Governments of the Central Naugatuck Valley
60 North Main Street, 3rd Floor
Waterbury, Connecticut 06702-1403

Prepared By:

MILONE & MACBROOM, INC.
99 Realty Drive
Cheshire, Connecticut 06410
(203) 271-1773
www.miloneandmacbroom.com

In Association With:

Fitzgerald & Halliday
72 Cedar Street
Hartford, Connecticut 06106
(860) 446-2102
www.fhiplan.com

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EXECUTIVE SUMMARY

Town of Thomaston Natural Hazard Pre-Disaster Mitigation Plan

1. The primary purpose of a Natural Hazard Pre-Disaster Mitigation Plan 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 identified hazards. Once a community has a FEMA-approved hazard mitigation plan, the community is then eligible to apply for Pre-Disaster Mitigation project funds and certain other funds for mitigation activities.

2. The hilly, elevated terrain of Thomaston makes it vulnerable to an array of natural hazards. The terrain inhibits the creation of through streets, limiting emergency response times and increasing the vulnerability for access cut off.

3. Thomaston is drained by four watersheds corresponding to the Naugatuck River (55% of town's land area), Branch Brook (25%), Northfield Brook (18%), and Leadmine Brook (2%). Thomaston also has significant open space (23%).

4. The Highway Department is the principal municipal department that responds to problems caused by natural hazards.

5. Critical facilities include police, fire, governmental, educational, and major transportation facilities as these are needed to ensure that emergencies are addressed while day to day operation of Thomaston continues. In addition, Town personnel consider public and private water, sewer, electric, and communications utilities to be critical facilities. Nearly all these facilities could be impacted by a dam failure. The Communications Building on Chapel Street is located in a wildfire risk area.

6. The Fire Department has an emergency generator and is the primary shelter, but has limited overnight space. The High School is the secondary shelter and can hold more evacuees overnight but does not have a generator. The Highway Department can serve as an emergency supply distribution center. These facilities should be listed on the Town website.

7. The Police Chief is the primary day-to-day emergency manager in Thomaston. A local evacuation plan exists to ensure timely migration of people seeking shelter should be developed. The Town uses the regional evacuation plan developed by the COGCNV.

8. Extensive flood control modifications have been made since 1955 including the construction by the Army Corps of Engineers of the Thomaston Dam, Northfield Dam and Black Rock Dam. Indirect flooding that occurs in the floodplains adjacent to the rivers and localized nuisance flooding along tributaries is a more common problem as overflow of the river systems are generally limited to river corridors and floodplains. The Town has already a number of measures in place to prevent flood damage including regulations, codes, and ordinance preventing encroachment and development near floodways which are carried out by the Planning and Zoning and the Inland Wetlands Commissions. Most flooding that occurs is due to undersized road culverts. Problem areas include: Bayberry Drive, Carter Road, and Hickory Hill Road, High Street Extension, Hillside Avenue and Gilbert Street, Watertown Road, and Reynolds Bridge Road. These may require repair or replacement of culverts, the installation of drainage systems, or riprap installations.

9. The Town has a current Stormwater Management Plan (2006) an annual street sweeping program, and cleans it catch basins at least biannually.

10. The Town should consider joining FEMA's Community Rating System to reduce the cost of flood insurance to residents.

11. Planning and Zoning should consider requiring developers to build detention and retention facilities where appropriate so the post-development stormwater does not leave a site at a rate higher than under pre-development conditions. The use of Geographic Information System (GIS) technology can aid in the identification of problem areas. A checklist should be developed to cross-reference the bylaws, regulations, and codes related to flood damage prevention for distribution to applicants. The Town may also wish to pursue additional open space acquisitions.

12. A moderate Category 2 hurricane (winds 96-110 mph) is expected to strike Connecticut once every ten years. The town is vulnerable to hurricane damage from wind and flooding and from any tornadoes accompanying a storm.

13. Thomaston has adopted the Connecticut Building Code as its building code. Effective December 31, 2005, the design wind speed for Thomaston is 95 mph. Wind is a potential issue for the 20-30 unit mobile home part off Waterbury Road.

14. The Town requires all utilities in new subdivisions to be underground whenever possible and performs annual tree maintenance near roadways and for property owners who request it.

15. While tornadoes are uncommon, Litchfield County and Hartford County are the areas at the highest risk for tornadoes in Connecticut.

16. Thomaston uses a new notification system, Code RED, as its emergency notification service. Efforts should be made by the town to list as many telecommunication devices to this system as possible.

17. In the winter, icing causes difficult driving conditions throughout the hillier sections of Thomaston, including Blakeman Road and the condominium access road at 143 Pine Hill Road.

18. Dam failure can affect a large area of Thomaston (or downstream of the Town-owned dam in Litchfield). There are four dams in Town with significant or high failure potential. The three with the highest potential (Class C) are all owned and maintained by the United States Army Corps of Engineers. The Class B dam is owned by the City of Waterbury. All of these dams are believed to be in good to excellent condition. Several critical facilities are located within the dam failure inundation areas of the Class C dams. Another Class C dam with potential issues for Thomaston is the Plymouth Reservoir dam in Plymouth whose outflow has caused damage to the bridge on Altair Avenue that is currently being repaired.

19. There are smaller dams in Town such as the Leigh Avenue Dam and Southerly Pond Dam that do not have hazard classifications with the Connecticut Department of Environmental Protection.

20. Wildfires are considered a likely event in Thomaston each year, but they are generally contained to a small range with limited damage to non-forested areas. Homeowner education is an effective prevention method. The construction of dry hydrants throughout Town would provide additional supplies of firefighting water in areas without public water supply.

21. There are many technical and financial resources available through such agencies as FEMA, the United States Army Corps of Engineers, the United States Fire Administration, and the Connecticut Department of Environmental Protection to assist Thomaston in performing mitigation activities.

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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 pre-disaster hazard 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 Thomaston, Connecticut ("Thomaston" or "Town"). The HMP is relevant not only in emergency management situations, but also should be used within the Town of Thomaston'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 pre-disaster hazard 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 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.

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/

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 Thomaston'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 efforts.*** Implementation of certain mitigation measures may increase a community's rating, and thus the benefits that it derives from FEMA. The Town of Thomaston has never participated in the Community Rating System.

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 can potentially affect the Town of Thomaston:

- Inland Flooding
- Hurricanes and Tropical Storms
- Summer Storms (including lightning, hail, and heavy winds) and Tornadoes
- Winter Storms
- 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, or a winter storm. Thus, Appended Tables 1 and 2 provide summaries of the hazard events and hazard effects that impact the Town of Thomaston, 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 Thomaston'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*; *Potential Mitigation Measures, Strategies, and Alternatives,* and for chapters with several recommendations, *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 of Thomaston 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 Thomaston.

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

This document concludes with a strategy for implementation of the Hazard Mitigation 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 Thomaston? Is there any equity issues involved that would mean that one segment of Thomaston could be treated unfairly?
- **Technical**: Will the proposed strategy work? Will it create more problems than it will solve?
- **Administrative**: Can Thomaston 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 Thomaston 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 scoring is 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

The Town of Thomaston is a member of the Council of Governments of the Central Naugatuck Valley (COGCNV), the regional planning body responsible for Thomaston and twelve other member municipalities: Beacon Falls, Bethlehem, Cheshire, Middlebury, Naugatuck, Oxford, Prospect, Southbury, Waterbury, Watertown, Wolcott, and Woodbury. The municipalities of Cheshire, Prospect, Oxford, Waterbury, Watertown, Wolcott, and Woodbury have existing mitigation plans, and hazard mitigation plans are being concurrently developed for 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 Thomaston will also be coordinated by the COGCNV. In addition, the COGCNV provided Geographic Information System (GIS) base mapping and created the figures presented in this document.

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

- Ms. Maura Martin, First Selectwoman
- Mr. Paul Pronovost, Highway Superintendent, Thomaston Highway Department
- Mr. Eugene Torrence, Jr., Chief of Police
- Mr. Rich Tingle, Superintendent, Thomaston Water Pollution Control Authority
- Ms. Mary Barton, Land Use Officer
- Mr. Ken Koval, Fire Department
- Mr. Marc Beneditto, Fire 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:

- ***Field inspections were performed on February 13, 2008.*** Observations were made of flooding and problem areas within the Town after a period of heavy rain falling on frozen ground.

- ***A project meeting with Town officials was held February 14, 2008.*** Necessary documentation was collected, and problem areas within the Town were discussed.

- ***Field inspections were performed on March 5, 2008.*** Observations were made of flooding and problem areas within the Town.

- ***A public information meeting was held March 24, 2008 at 7:00 P.M.*** Preliminary findings were presented and public comments solicited.

- ***Additional field inspections were performed on August 1, 2008.*** Observations were made of problem areas within the Town.

While residents were invited to the public information meeting via newspaper, only one resident attended that was not Town personnel. Similarly, eight municipal agencies and civic organizations were invited via a mailed copy of the press release that announced the public information meeting. These included the following:

- Naugatuck River Watershed Association;
- Torrington Area Health District;
- United Way of Greater Waterbury;
- American Red Cross – Waterbury Area;
- Thomaston Inland Wetlands Commission;
- Thomaston Planning & Zoning Commission;
- Thomaston Conservation Commission; and
- Thomaston Economic Development Commission;

Of these organizations, the American Red Cross was represented at the meeting. Residents were also encouraged to contact the COG with comments via newspaper articles. As another direct gauge of public interest, a review of Public Works Department complaint files was undertaken to document problems of public concern.

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 January 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.thomastonct.org) 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 where 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 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

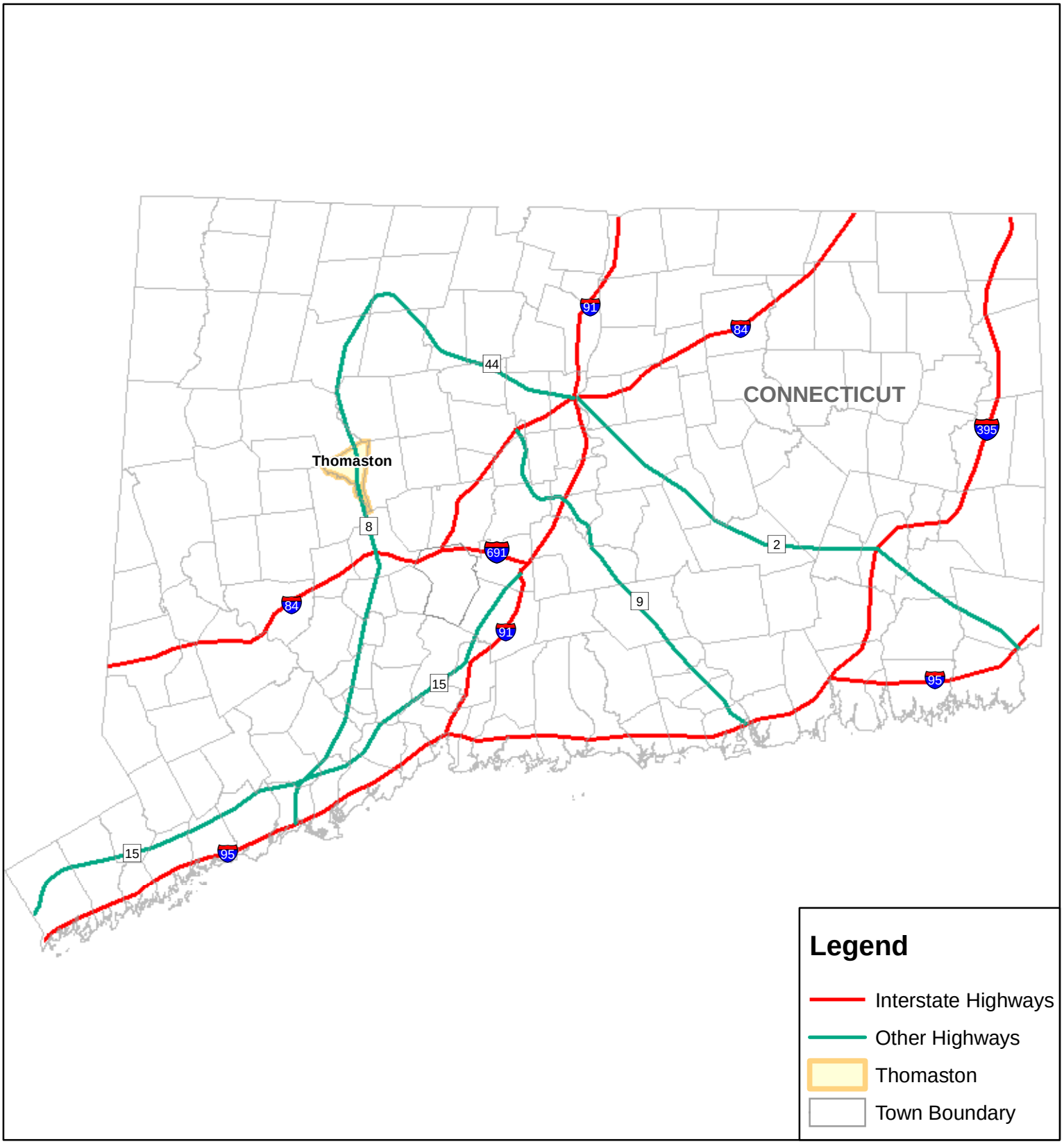
The Town of Thomaston is located in Litchfield County. It is bordered by Waterbury to the south, Watertown to the south and southwest, Morris to the west, Litchfield to the northwest, Harwinton to the North, and Plymouth to the east. Refer to Figure 2-1 for a location schematic and Figure 2-2 for a location map.

Thomaston is located within the western part of the crystalline uplands, or Western Highlands, of western Connecticut. This geologic feature consists of three belts of metamorphic rocks bounded to the west by the sediments and metamorphic rocks of the Hudson River valley and on the east by the Triassic sediments of the Connecticut River valley. The topography of the Town ranges from gently rolling terrain in the river valleys to steep hilly terrain throughout most of the upland areas. Elevations range from 290 feet above sea level along the Naugatuck River in the southeastern part of Town to over 1,010 feet above sea level near Lattin Hill in the northern part of Town, based on the National Geodetic Vertical Datum of 1929. The hilly, elevated terrain of Thomaston makes it particularly vulnerable to an array of natural hazards.

2.2 Existing Land Use

Thomaston's hills and steep slopes limit development in much of the Town. A compact commercial district is located in the center of the town at the intersection of East Main Street and Main Street alongside the Naugatuck River. The commercial center is surrounded by medium density residential areas. Industrial sites are dispersed alongside the Naugatuck River. Additional commercial sites are located in the southwest part of Thomaston near Route 6 and Route 109. Low density residential areas are located in the northwestern areas of Thomaston, interspersed with agricultural and recreational areas.

Figure 2-1: Thomaston 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

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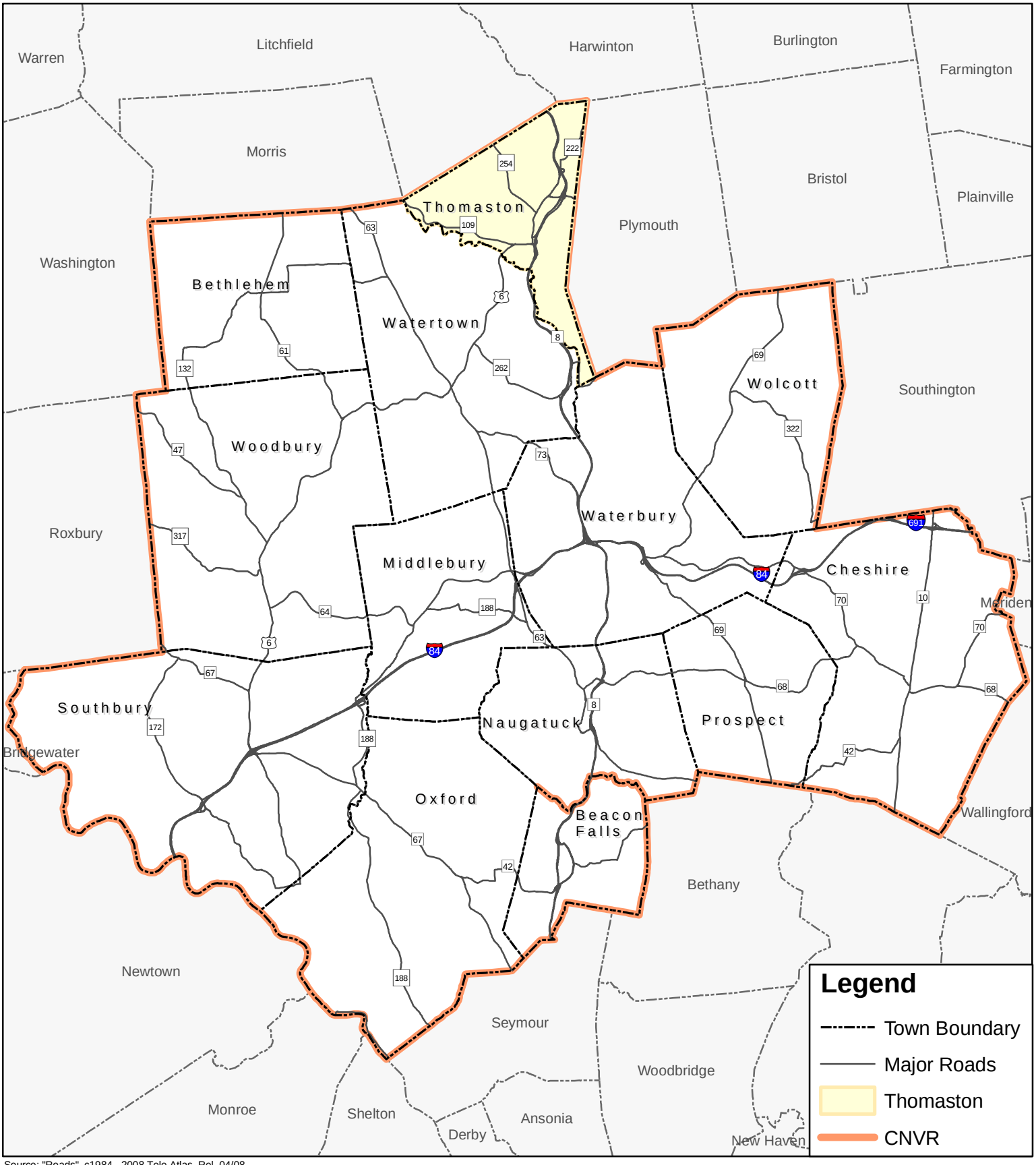
Figure 2-2: Thomaston in the CNVR



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

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The Town of Thomaston encompasses 12.1 square miles. Table 2-1 provides a summary of land use in Thomaston by area. In addition, refer to Figure 2-3 for a map of generalized land use provided by the COGCNV.

Table 2-1
Land Use by Area

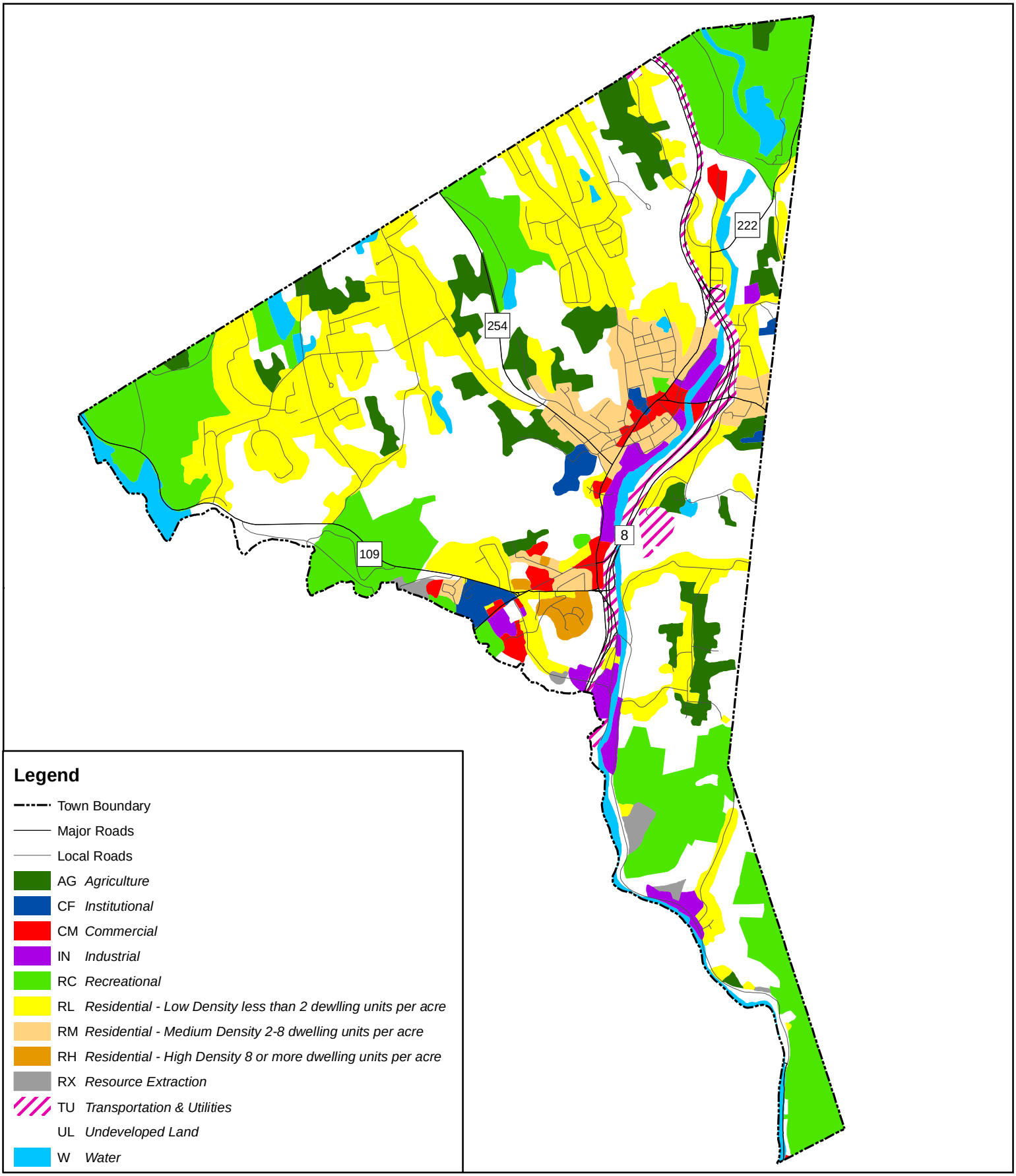
Land Use	Area (acres)	Pct.
Vacant	2,602	33%
Residential - Low Density	1,769	23%
Recreational	1,509	19%
Agricultural	538	7%
Residential - Medium Density	348	4%
Water	325	4%
Utilities/Transportation	222	3%
Industrial	167	2%
Commercial	120	2%
Institutional	79	1%
Residential - High Density	51	1%
Mining	42	1%

Source: Council of Governments Central Naugatuck Valley, 2000

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 Thomaston. The following discussion highlights Thomaston's geology at several regional scales. Geologic information discussed in the following section was acquired in GIS from the Connecticut DEP.

Figure 2-3: Thomaston Generalized Land Use



Source: "Roads", c1984 - 2008 Tele Atlas, Rel. 04/08.
"Town Boundary", DEP
"Land Use", COGCNV 2000
For general planning purposes only. Delineations may not be exact.
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In terms of North American bedrock geology, the Town of Thomaston 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 Thomaston lies within the Eugeosyncline Sequence. Bedrock belonging to the Eugeosyncline Sequence are typically deformed, metamorphosed, and intruded by small to large igneous plutons.

The Town of Thomaston's bedrock consists primarily of metasedimentary and metaigneous schists and secondarily of metamorphic granofels. The bedrock alignment trends generally southwest to northeast through the Town. Refer to Figure 2-4 for a depiction of the bedrock geology in the Town of Thomaston.

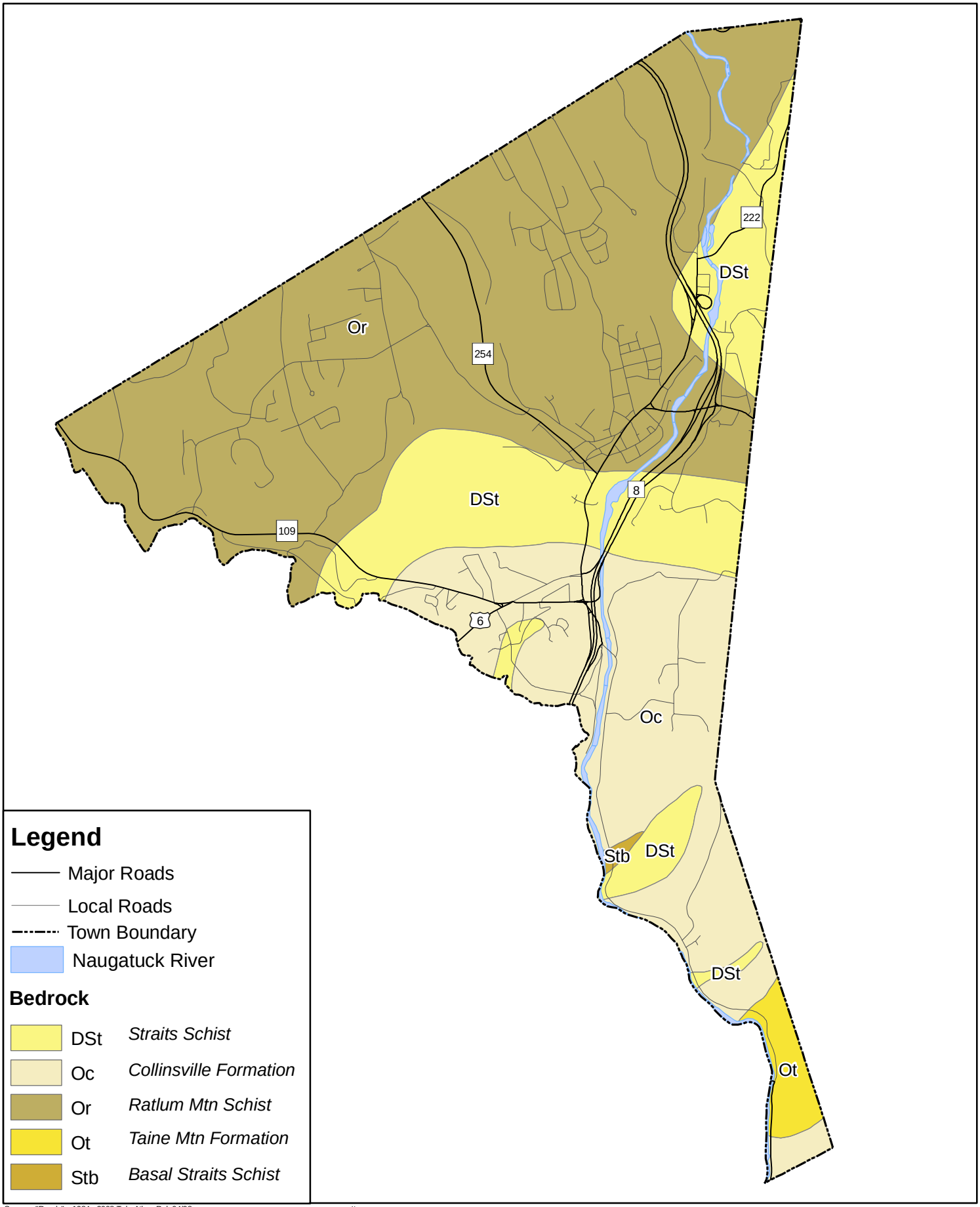
Bedrock Geology

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

The bedrock beneath the Town of Thomaston is part of 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 five primary bedrock formations in the Town (from north to south) are Ratlum Mountain Schist, The Straits Schist, Collinsville Formation, Basal Member of the Straits Schist, and the Taine Mountain Formation:

Figure 2-4: Thomaston Bedrock Geology



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

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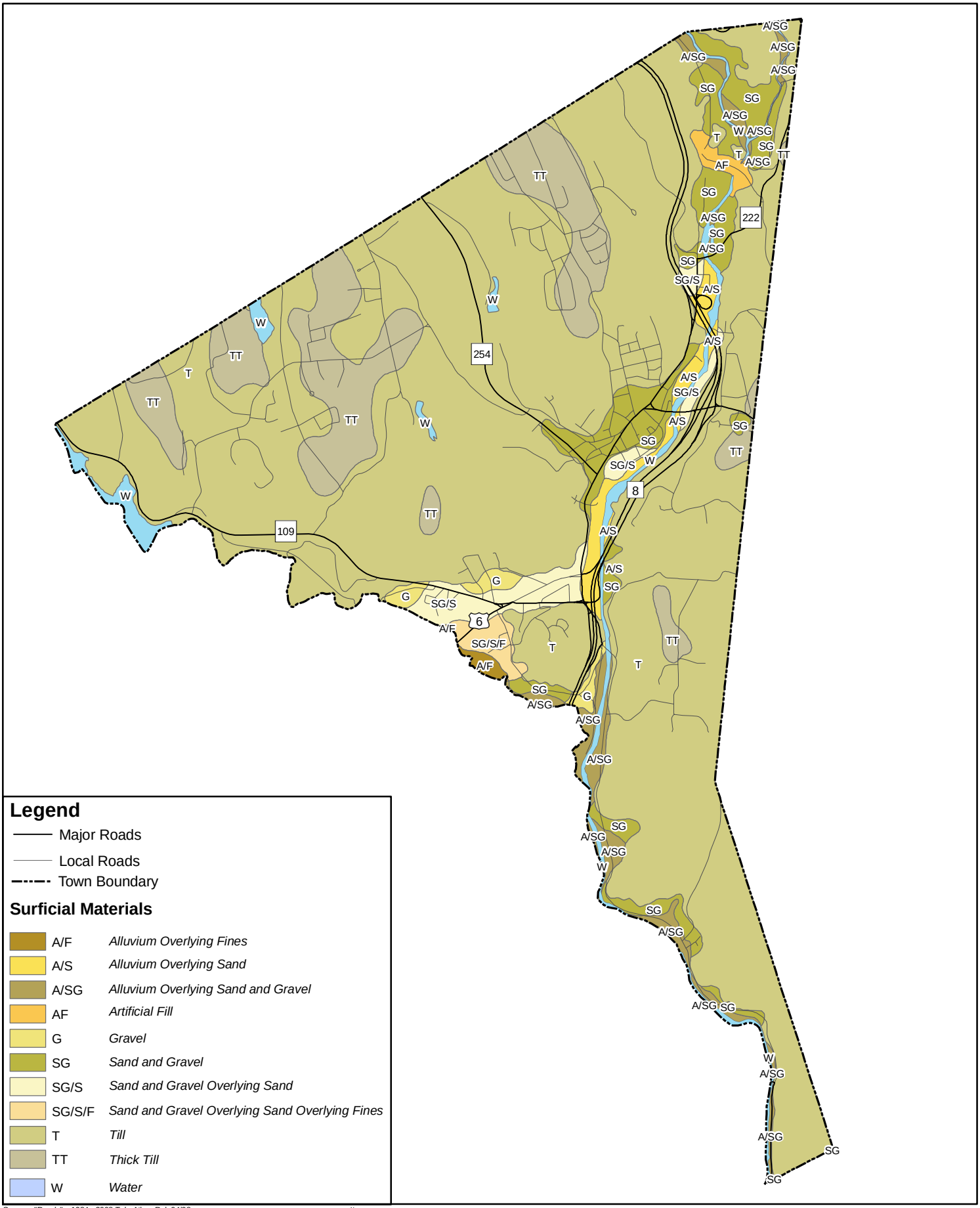
- The Ratlum Mountain Schist consists of gray, medium-grained schist and granofels.
- The Straits Schist is a silvery to gray, coarse-grained schist.
- The Collinsville Formation is a gray and silvery, medium- to coarse-grained schist and dark, fine- to medium-grained amphibolite and hornblende gneiss.
- The Basal Member of The Straits Schist is a gray schist with amphibolite, marble, and quartzite.
- The Taine Mountain Formation consists of gray, medium-grained, well-laminated granofels.

No known faults are mapped in the Town of Thomaston. Bedrock outcrops can be difficult to find in Thomaston due to the forested nature of the Town, although outcrops can be found at higher elevations and on hilltops.

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.

A vast area of the Town is covered by glacial till. Tills contain an unsorted mixture of clay, silt, sand, gravel, and boulders deposited by glaciers as a ground moraine. This area includes nearly all of Thomaston with the exception of the river valleys associated with the Naugatuck River and its tributary streams. Stratified sand and gravel ("stratified drift") areas are associated with the Naugatuck River and the lower parts of Branch Brook and Northfield Brook. These deposits accumulated by glacial meltwater streams during the outwash period following the latest glacial recession.

Figure 2-5: Thomaston Surficial Geology



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

June 2008

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The amount of stratified drift present in the Town is important for several reasons. First, the stratified drift is currently used by the Connecticut Water Company to provide drinking water via pumping wells. Secondly, in regard to inland flooding, areas of stratified materials are generally coincident with inland 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. However, smaller glacial till watercourses can also cause flooding, such as those in northern, western, and southern Thomaston. The amount of stratified drift also has bearing on the relative intensity of earthquakes and the likelihood of soil subsidence in areas of fill. These topics will be discussed in later sections.

In terms of soil types, approximately 75% of the Town falls within the Hollis-Chatfield-Rock outcrop complex, Canton and Charlton soils, Charlton-Chatfield complex, Paxton and Montauk fine sandy loam, and Udorthents (Table 2-2). The remainder of the Town has soil types of consisting primarily of various fine to gravelly sandy loams, wetland soils, and urban land. The following soil descriptions are taken in part from the official series descriptions from the United States Department of Agriculture (USDA) website.

Table 2-2
Soils by Taxonomic Class

Soil Type	Area (acres)	Pct.
Hollis-Chatfield-Rock outcrop complex	1468	18.9%
Canton and Charlton Soils	1392	17.9%
Charlton-Chatfield complex	1192	15.3%
Paxton and Montauk fine sandy loam	958	12.3%
Udorthents	832	10.7%
Rock outcrop-Hollis complex	326	4.2%
Woodbridge fine sandy loam	306	3.9%
Merrimac sandy loam	223	2.9%
Ridgebury, Leicester, and Whitman soils	217	2.8%
Water	186	2.4%
Other (20 types)	675	8.7%
Total	**7775**	**100.0%**

Source: 2005 Soil Survey Geographic (SSURGO) database for the State of Connecticut

- The Hollis-Chatfield rock outcrop complex consists of shallow, well-drained and somewhat excessively drained soils formed in a thin mantle of till derived mainly from gneiss, schist, and granite. They are nearly level to very steep upland soils on bedrock-controlled hills and ridges. Slope ranges from three to forty-five percent. Depth to bedrock ranges from ten to 40 inches with outcrops present.

- The Canton and Charlton soils consist of very deep, well- drained soils formed in a loamy mantle underlain by sandy till with stones and boulders often present. The soils are found on nearly level to steep glaciated plains, hills, and ridges. Slope ranges from zero to thirty-five percent. Saturated hydraulic conductivity is high in the solum and high or very high in the substratum.

- The Charlton-Chatfield series consists of moderately deep to deep, well-drained, and somewhat excessively drained soils formed in glacial till. They are very nearly level to very steep soils on glaciated plains, hills, and ridges. The soil is often stony or very stony. Slope ranges from three to forty-five percent. Crystalline bedrock is at depths of 20 to 40 inches. Saturated hydraulic conductivity is moderately high to high in the mineral soil.

- The Paxton and Montauk series consists of very deep, well-drained loamy soils formed in lodgment till derived primarily from granitic materials. The soils are very deep to bedrock and moderately deep to a densic contact. They are nearly level to steep soils on upland till plains, hills, moraines, and drumlins. Slope ranges from 0 to forty-five percent. Saturated hydraulic conductivity is moderately high or high in the solum and low to moderately high in the substratum.

- Udorthents are disturbed soils underlying urban and built up lands where the original soil type is no longer easily identified. Such soils have been excavated or filled at least two feet.

2.4 Climate

Thomaston has an agreeable climate, characterized by moderate but distinct seasons. The average mean temperature is approximately 48 degrees, with summer temperatures in the mid-80s and winter temperatures in the upper 20's to mid-30s, Fahrenheit. Extreme conditions raise summer temperatures to near 100 degrees and winter temperatures to below zero. Median snowfall is just less than 46 inches per year as measured at Wigwam Reservoir weather station in Thomaston (NCDC, 2007). Median annual precipitation is 44 inches, spread evenly over the course of a year.

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 19th century (Miller et. al., 2002; 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 Thomaston is drained by four watersheds corresponding with the Naugatuck River, Branch Brook, Northfield Brook, and Leadmine Brook. These subregional drainage basins are all part of the regional Naugatuck River basin that ultimately discharges into the Housatonic River. The drainage basins are described below, and summarized in Table 2-3.

Table 2-3
Drainage Basins

Drainage Basin	Area (sq. mi)	Percent of Town
Naugatuck River	6.61	54.5%
Branch Brook	3.08	25.3%
Northfield Brook	2.24	18.5%
Leadmine Brook	0.21	1.7%
Total	**12.14**	**100.0%**

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

Naugatuck River

The Naugatuck River originates near the City of Torrington, CT, and winds south almost 40 miles to meet the Housatonic River in the City of Derby, giving it a total basin area of 311.16 square miles. It is the only major river in Connecticut whose headwaters are within the boundaries of the state. The Naugatuck River is well-known for its many defunct dams associated with its industrial history.

The Naugatuck River basin is by far the largest watershed in Thomaston, covering 54.5% of the Town's land area. It enters Thomaston in the Town's northeastern corner, flowing southward within the eastern border before serving as the Town's southwestern border in the Frost Bridge section of Town. The River is impounded once within Thomaston by a United States Army Corps of Engineers (ACOE) flood control dam known as Thomaston Dam.

The Naugatuck River is joined by a number of tributaries as it flows through Town. Leadmine Brook enters the river in the northeast end of Town upstream of the Thomaston Dam. An unnamed tributary that enters the Naugatuck River near Railroad Street drains from Plymouth Reservoir, an impoundment of about 40 acres. The Naugatuck River receives flow from several additional unnamed tributaries and from Northfield Brook near the center of Town. The river also has several tributaries in the south end of Town

near the Mattatuck State Forest, the largest of these being Branch Brook. Further south, Nibbling Brook converges with the Naugatuck River before it enters Waterbury.

Branch Brook

The Branch Brook watershed is the second largest in Thomaston, covering 25.3% of the Town's total land area. The upper reaches of this drainage basin are located in northeastern Morris and Litchfield, where Pitch Brook, Wigwam Brook, and their tributaries flow southward into Pitch Reservoir. In addition to the abovementioned tributaries, the Pitch Reservoir also receives water from a seven mile long aqueduct built in the 1920s from the Shepaug Reservoir on the border between the Towns of Litchfield and Warren. In total, the Branch Brook watershed drains 22.65 square miles of land in Thomaston, Watertown, Bethlehem, Morris, and Litchfield.

The Branch Brook drainage basin is heavily utilized for water supply. Pitch Reservoir is the first of three major impoundments in the watershed. Downstream are the Morris Reservoir on the Morris-Litchfield boundary and the Wigwam Reservoir on the Watertown-Thomaston boundary. All of these reservoirs as well as the aqueduct were constructed by the City of Waterbury in the first half of the twentieth century for water supply purposes.

Morris Brook and Moosehorn Brook from the north and Fen Brook from the south all feed Wigwam Reservoir. Branch Brook begins as the outlet stream from Wigwam Reservoir and creates the boundary between Watertown and Thomaston as it flows east into the Naugatuck River. Several unnamed tributaries flow south from Thomaston into Branch Brook along its reach. The brook is also impounded by the Black Rock Dam, an ACOE dam, in Black Rock State Park.

Northfield Brook

The Northfield Brook basin covers 18.5% of the Town. The drainage basin has its uppermost reaches in Litchfield in a small pond near Richards Road Extension. The outflow from this pond is Humaston Brook, which drains southward to Northfield Pond. The outlet stream from Northfield Pond is Northfield Brook. Just downstream of Northfield Pond, the brook converges with Turner Brook before entering Thomaston.

Once inside Thomaston, Northfield Brook is impounded in Northfield Brook Lake, an ACOE flood control impoundment. After leaving the impoundment, Northfield Brook flows to the southeast and enters into the Naugatuck River near the junction of Northfield Road and South Main Street in Thomaston. In all, the Northfield Brook basin drains 6.62 square miles of land in Thomaston and Litchfield.

Leadmine Brook

The Leadmine Brook drainage basin is by far the smallest in Thomaston, covering 0.21 square miles or 1.75% of the Town's total land area. This area is located in the northeastern corner of Thomaston, where Leadmine Brook enters Thomaston from Harwinton and flows into the Naugatuck River behind the Thomaston Dam. This short stretch of river receives three unnamed tributaries flowing westward from Plymouth and Harwinton.

Leadmine Brook's East Branch has its headwaters in New Hartford and its West Branch has its headwaters in Torrington. These two branches flow southward and converge in Harwinton, where Leadmine Brook is formed. As it flows to the south, Leadmine Brook is joined by several tributaries, including Caitlin Brook, which drains the 40 acre Harwinton Lake, Rock Brook, and Kelly Pond Brook. In total, the Leadmine Brook drainage basin covers 16.11 square miles across Thomaston, Harwinton, Torrington, Plymouth and New Hartford.

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. Thomaston has a population density of 659 individuals per square mile. By comparison, Waterbury has the highest population density in the region with 3,757 individuals per square mile; and Bethlehem has the lowest population density in the region with 185 individuals per square mile (Table 2-4).

Table 2-4
Population Density by Municipality, Region and State, 2005

Municipality	Total Population	Land Area (square miles)	Population Density
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	4844.80	722

Source: United States Census Bureau, 2005 Population Estimates

Thomaston is 133rd out of 169 municipalities in Connecticut in terms of population, with an estimated population of 7,916 in 2006. The town is the 67th most densely populated municipality in the state. The population of Thomaston increased by 7% between 1960 and 1970, while growth dropped to 1% from 1970-80 and rose again to 11% from 1980-90. 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 Thomaston in 2006 was $219,500, which is lower than the statewide median sales price of $275,000.

Thomaston has populations of people who are elderly, linguistically isolated, and/or disabled. These are depicted by the seven census blocks in Thomaston 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. These will be addressed as needed in subsequent sections.

2.7 Governmental Structure

The Town of Thomaston 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 and Zoning Commission, the Zoning Board of Appeals, the Fire Department, the Police Department, the Conservation Commission, the Fire Commission, the Inlands Wetlands and Watercourse Commission, the Building Inspector and the Public Works and Highway Department.

Figure 2-6: Thomaston Elderly Population

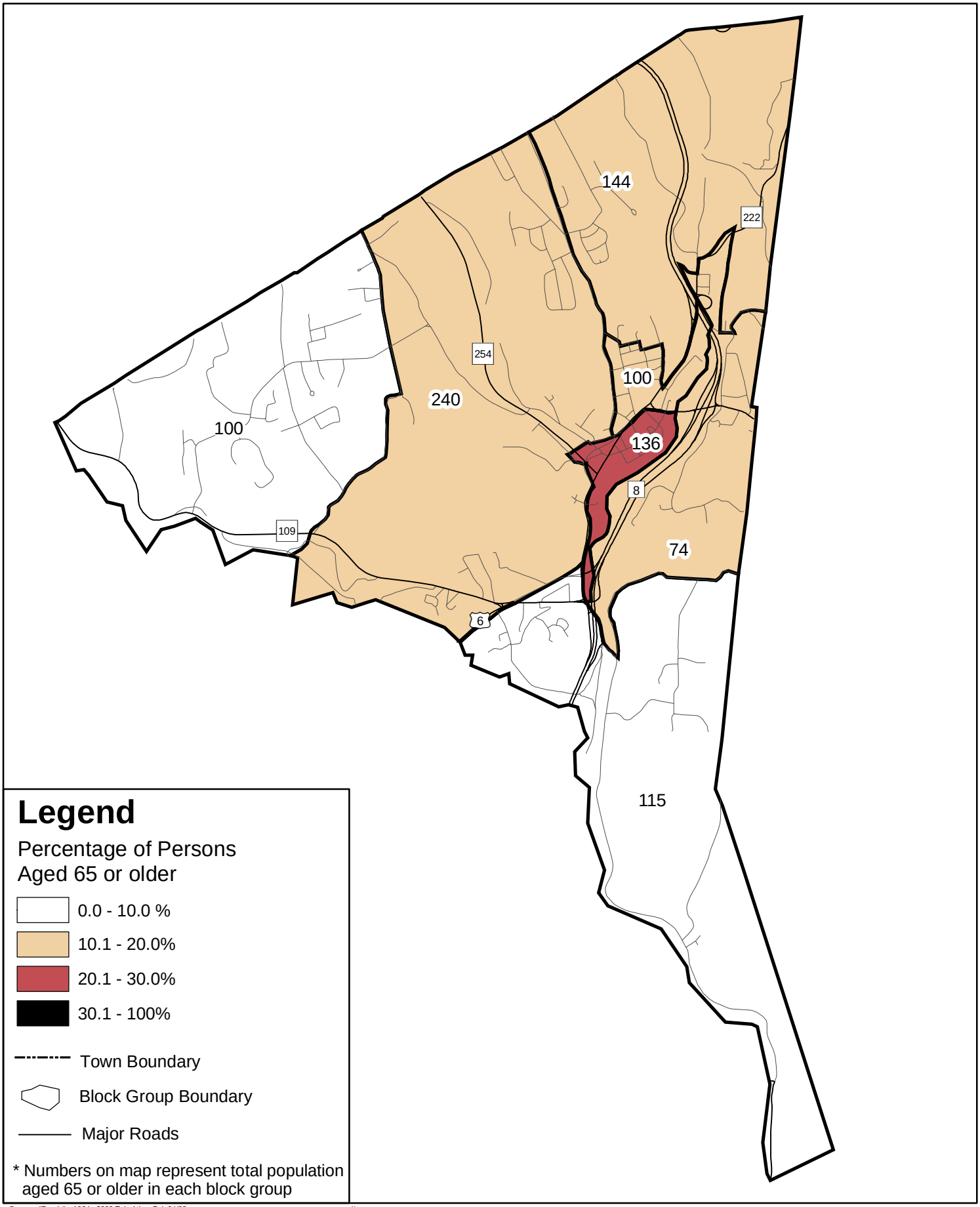
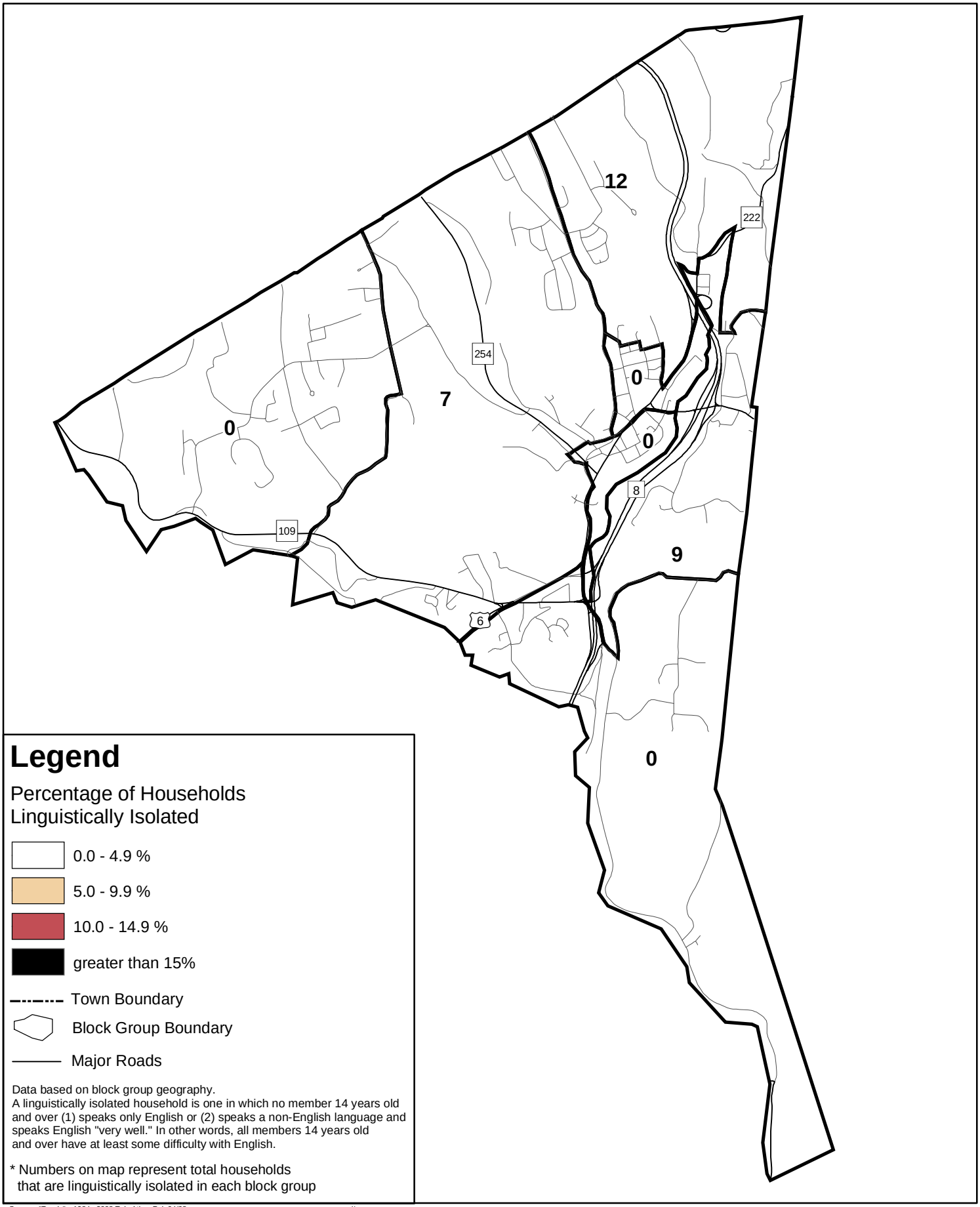


Figure 2-7: Thomaston Linguistically Isolated Households



Source: "Roads", c1984 - 2008 Tele Atlas, Rel. 04/08.
"Town Boundary", DEP
"Linguistically Isolated", "Block Groups", 2000 Census
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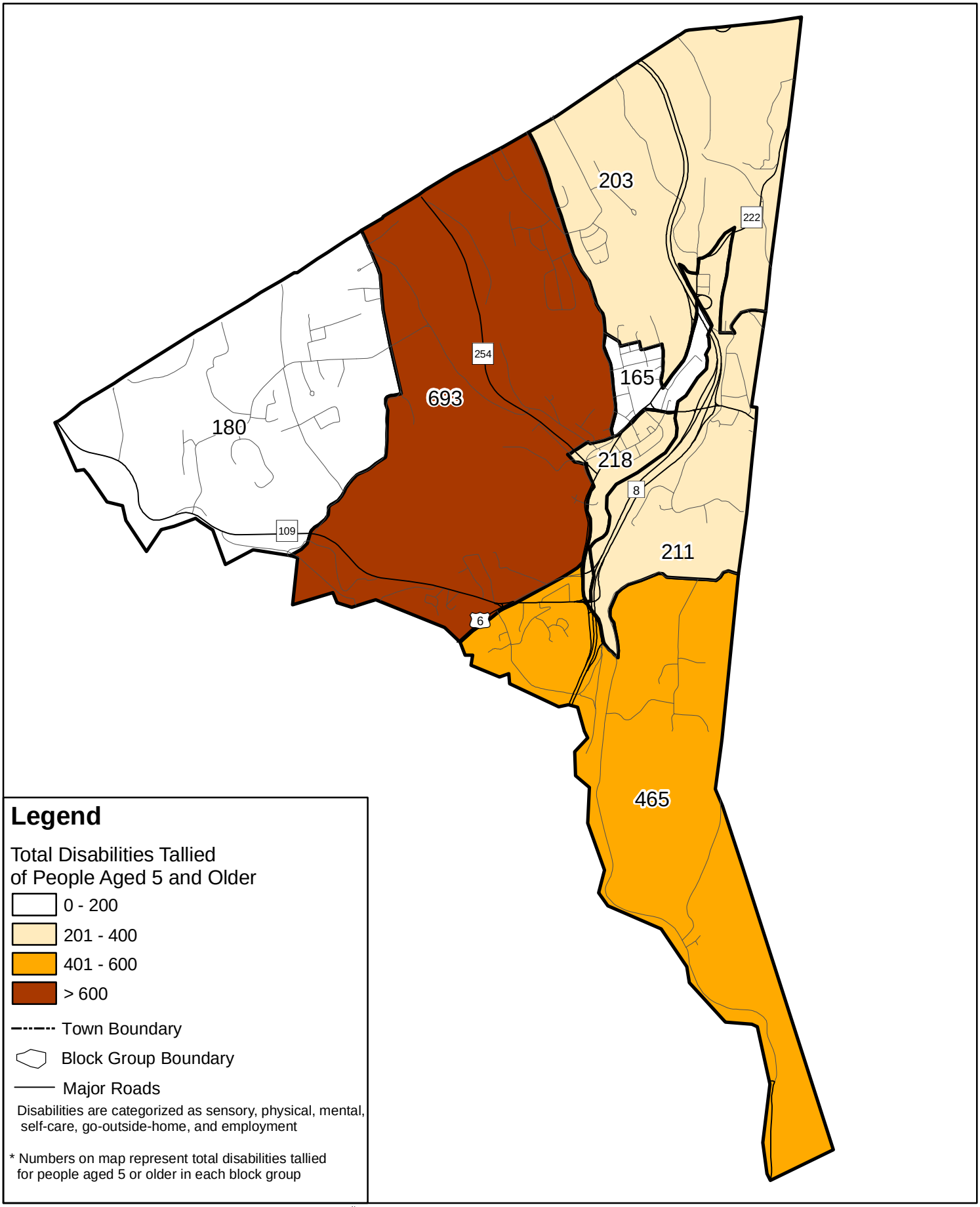
Figure 2-8: Thomaston Disabilities Map



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

2.8 Development Trends

Thomaston was first settled in the early 1700's and was originally part of the parish of Northbury in Mattatuck along with the adjacent Town of Plymouth. Thomaston became its own incorporated municipality in 1875. Thomaston, originally known as Plymouth Hollow, is named for Seth Thomas who began manufacturing clocks there in the early 1800's. The waterpower provided by the Naugatuck River played an important role in the development of the clock industry. In addition, Seth Thomas was instrumental in the routing of the rail line through Plymouth Hollow, creating an important connection with the brass industry in Waterbury.

Manufacturing continued into to the 1900's with the Seth Thomas Clock Company merging under the name General Time Instruments Corporation in 1930. However, the firm's success waned through the middle of the 20th century and in 1979 the General Time Instruments Corporation was bought and the company headquarters were moved out of Thomaston.

Residential Development

Residential development has slowed in recent years as the available land is characterized by steep topography. Cul-de-sacs in new developments are discouraged and connectivity of roads is encouraged; however, Thomaston is very hilly which sometimes limits the creation of through streets. Cul-de-sacs are limited to roads of 1,000 feet or less in total length. Subdivisions featuring cul-de-sacs offer a single access point for emergency

services, potentially lengthening emergency response times and rendering those residential areas vulnerable if access is cut off by flooding or downed tree limbs.

The minimum road width in new developments is 24 feet. Utilities are located underground in new developments whenever not inhibited by shallow depth to bedrock. Hydrants, underground tanks, and fire ponds are recommended for new developments but these are not required by any municipal regulations.

Recent development trends reflect a demand for age-restricted housing. There are two "Active Adult" 55-and-over developments planned for the Town. One is for 38 units off Humiston Circle, and the other is for 47 units off Strawberry Park. An elderly living facility consisting of rental homes is located on Reynolds Bridge Road, and two elderly rental facilities (Green Manor and Grove Manor) are located near the Town Center.

Commercial and Industrial Development and Open Space

An approval exists for a 12-lot Industrial Park off Reynolds Bridge Road. It has yet to be built, and the developer is applying for an extension of the approval. Certain business buildings in Town have redevelopment contracts. One of these buildings is located on Watertown Road across from the end of the Exit 38 ramp from Route 8 southbound. Also, a major Brownfield site is likely to be redeveloped someday, but no plans for this site are currently in development. This property is north of Route 6 at Route 8 (near Exit 39).

Thomaston has 23% protected open space, primarily due to the three ACOE dams in Town and the Wigwam reservoir lands owned by the City of Waterbury. Plans for the Naugatuck River Greenway are currently before the Planning and Zoning Commission to establish a multi-use trail along the Naugatuck River. Town personnel note that the general consensus in Town is that there is an abundance of open space and therefore developments should be allowed.

2.9 Critical Facilities and Sheltering Capacity

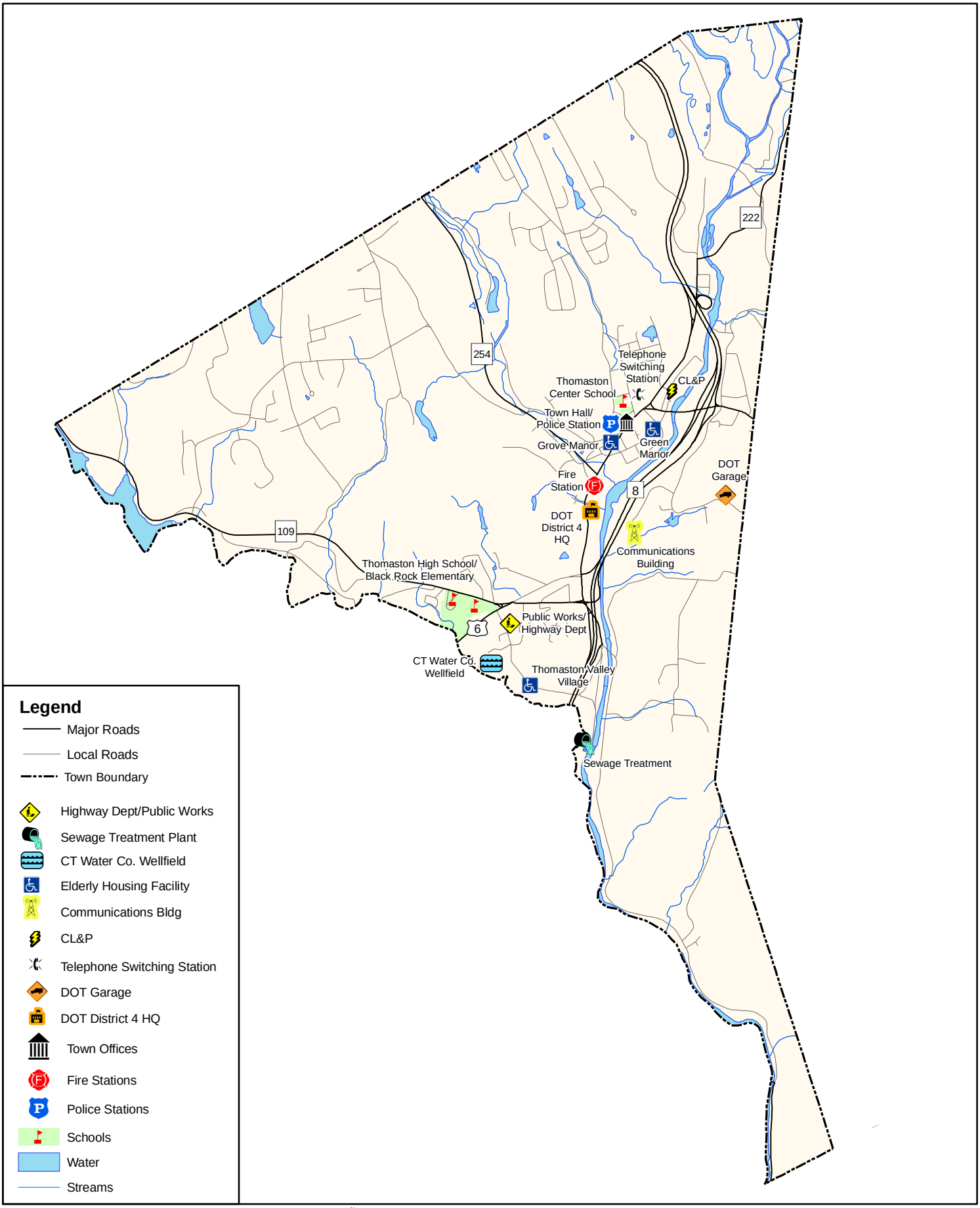
The Town considers its police, fire, governmental, and major transportation facilities to be its most important critical facilities, for these are needed to ensure that emergencies are addressed while day-to-day management of Thomaston continues. Elderly housing facilities are included with critical facilities, as these house populations of individuals that would require special assistance during an emergency. Educational institutions are included in critical facilities as well, as these can be used as shelters. In addition, Town personnel consider public and private water, sewer, electric, and communication utilities to be critical facilities.

A map of critical facilities is shown in Figure 2-9, and the associated list of critical facilities is provided in Table 2-5. Shelters, transportation, communications, and utilities are described in more detail below, along with a summary of the potential for these facilities to be impacted by natural hazards.

Shelters

Emergency shelters are considered to be an important subset of critical facilities, as they are needed in most emergency situations. The Town of Thomaston has designated two emergency shelters, and additional facilities can be used if necessary. The Fire Department is currently the primary shelter, but historically has only been used when power outages have occurred. The Fire Department has an auxiliary generator and can house 50 people temporarily, but has limited bed space for overnight evacuees. Thomaston High School is currently a secondary shelter, but will become a primary shelter once funding is secured for a generator. Both shelters are located on main roadways. The Police and Fire Departments staff the shelters.

Figure 2-9: Thomaston Critical Facilities



Source: "Roads", c1984 - 2008 Tele Atlas, Rel. 04/08.
"Town Boundary", DEP
"Facilities", Thomaston
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N W E S

0 0.5 1 Miles

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Table 2-5
Critical Facilities in Thomaston

Type	Name	Address	Located in Floodplain?
Elderly Rental Units	Thomaston Valley Village	200 Reynolds Bridge Rd	No
Elderly Rental Units	Green Manor	63 Green Manor	No
Elderly Rental Units	Grove Manor	11 Grove Street	No
Town Hall	Thomaston Municipal Building	158 Main St	No
Police Station	Thomaston Police Department	158 Main St	No
Fire Department	Thomaston Fire Department	245 South Main Street	No
Ambulance	Thomaston Ambulance	237 South Main Street	No
Public Works	Thomaston Highway Dept.	32 Reynolds Bridge Rd	No
Utility - Sewer	Sewage Treatment Plant	Old Waterbury Road	500-year
Utility - Water	Connecticut Water Company	Maple Avenue	500-year
Utility – Telephone	Telephone Switching Station	High Street	No
Utility – Electric	Connecticut Light & Power	Electric Avenue	No
School	Center School	1 Thomas Avenue	No
School	Thomaston High School	185 Branch Rd (Rt. 109)	No
School	Black Rock Elementary	57 Branch Rd (Rt. 109)	No
Communications	Communications Building	Chapel Street	No
State	DOT District 4 Headquarters	South Main Street	No
State	DOT Garage	Prospect Street	No

Source: Council of Governments Central Naugatuck Valley; Town of Thomaston

These buildings have been designated as public shelter facilities by meeting specific American Red Cross guidelines. Amenities and operating costs of the designated shelters including expenses for food, cooking equipment, emergency power services, bedding, etc., are the responsibilities of the community and generally are not paid for by the American Red Cross.

The Town's other school buildings - Center School and Black Rock Elementary School - are not considered as shelters, but could be converted to additional shelter space in case of an emergency. Other municipal buildings, such as the Highway Department garage, are not considered to be shelters but can serve as important emergency supply distribution centers.

In case of a 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 such facilities on a temporary basis for providing shelter until hazards such as hurricanes diminish. 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 Thomaston does not have any hospitals or medical centers. Instead, residents use the nearby facilities in Torrington, Bristol, or Waterbury. As a means of accessing these facilities, Thomaston has convenient access on Route 6 through Plymouth to Bristol or along Route 8 into Waterbury and Torrington that function as major transportation arteries.

Evacuation routes are regionally defined by the Regional Evacuation Plan. No local evacuation plan exists. Route 8, which runs north-south through the eastern part of Thomaston, provides access to Torrington to the north and Waterbury towards the south. Route 6 runs from Watertown to the southwest of Thomaston through the Reynolds Bridge area and then east into Plymouth and Bristol. The center of Town is also the spur for three other routes out of the area: Route 222 runs generally north-northeast into Harwinton; Route 254 runs northwest into Litchfield; and Route 109 runs west into Morris. Although there are no interstate highways within the town, I-84 can be accessed to the south of Thomaston, via Route 8.

Communications

The Police Chief is the primary day-to-day emergency manager in Thomaston. For long-term planning, the Town has a Local Emergency Preparedness Commissioner who forms temporary committees when the Town needs to accomplish a specific task related to emergency planning.

The Town has enhanced 9-1-1 for emergency notification and response. The Town uses the phone lines to enhance their radio communications. If phone service is cut off, Town personnel rely on low-band radios and the cellular tower in Town. The Town is looking to upgrade all emergency personnel to high-band radios, and an upgrade to the Town's radio and communication facility on Chapel Street, including a generator, is in the long-term plan. The Town has also recently contracted with Emergency Communications Network, Inc. to provide "CodeRED" high-speed telephone emergency notification services. The CodeRED system is capable of telephoning warnings into areas likely to be impacted by a disaster or into the entire Town at a rate of 60,000 calls per minute.

It is important to note that effective January 1, 2008, the Town of Thomaston is now in the southeast portion of Region 5 of the Connecticut Emergency Medical Service regions. The Town dispatch center has a high band radio compatible with Region 5, which contains most of the COGCNV municipalities.

Utilities

Water service is a critical component of hazard mitigation, especially in regards to fighting wildfires. It is also necessary for everyday residential, commercial, and industrial use. The Connecticut Water Company provides potable and fire fighting water to the majority of the center of Town and the Reynolds Bridge area. The Fire Department uses alternative water supplies to fight fires in the less developed areas of Thomaston. This is discussed further in Section 9.0.

Sewer service is an often overlooked critical facility. The Town Sewage Treatment Plant is located at the south end of Old Waterbury Road and serves most of the developed area of Thomaston. According to Town personnel, the plant is operating at near capacity and will likely be at capacity when the proposed developments are built in a few years.

Other utilities important to the Town include the electric and telephone lines in Town. These lines have substations on Electric Avenue and High Street, respectively. Electricity is important for both day-to-day living and emergency usage, and the telephone is used to complement emergency communications in Town. Thus, these two substations are included in the list of critical facilities.

Potential Impacts from Natural Hazards

Most critical facilities are not impacted by flooding in the Town of Thomaston. The electric substation on Electric Avenue and the Sewage Treatment Plant on Old Waterbury Road are both located in the mapped 100-year floodplain, but neither has any regular issues with flooding. Route 6 (Watertown Road), a major northeast-southwest thoroughfare has occasional flooding issues north of Route 109. Such flooding could potentially slow emergency response times due to detours around this area.

No critical facilities are susceptible to wind, summer storms, winter storms, or earthquakes more than the rest of the Town. However, nearly all of the critical facilities in Town could be impacted by dam failure, and the Communications Building on Chapel Street is located in a wildfire risk area. The following sections will discuss each natural hazard in detail and include a description of populations at risk.

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.

In general, inland flooding affects a small area of Thomaston with moderate to frequent regularity. The Naugatuck River drains the entire Town, and the Naugatuck River, Northfield Brook, and Branch Brook all have flood control dams maintained by the ACOE. Thus, the areas impacted by overflow of river systems are generally limited to river corridors and floodplains.

Indirect flooding that occurs in the floodplains adjacent to the rivers and localized nuisance flooding along tributaries is a more common problem in the Town. This type of flooding occurs particularly along roadways as a result of inadequate drainage and other factors. The frequency of flooding in Thomaston is considered highly likely for any given year, but flooding damage only has a limited effect (refer to Appended Table 2).

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, and winter storms. Flooding can also occur as a result of dam failure, which is discussed in Section 8.0, 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, deteriorate municipal drainage systems, and divert municipal staff and resources.

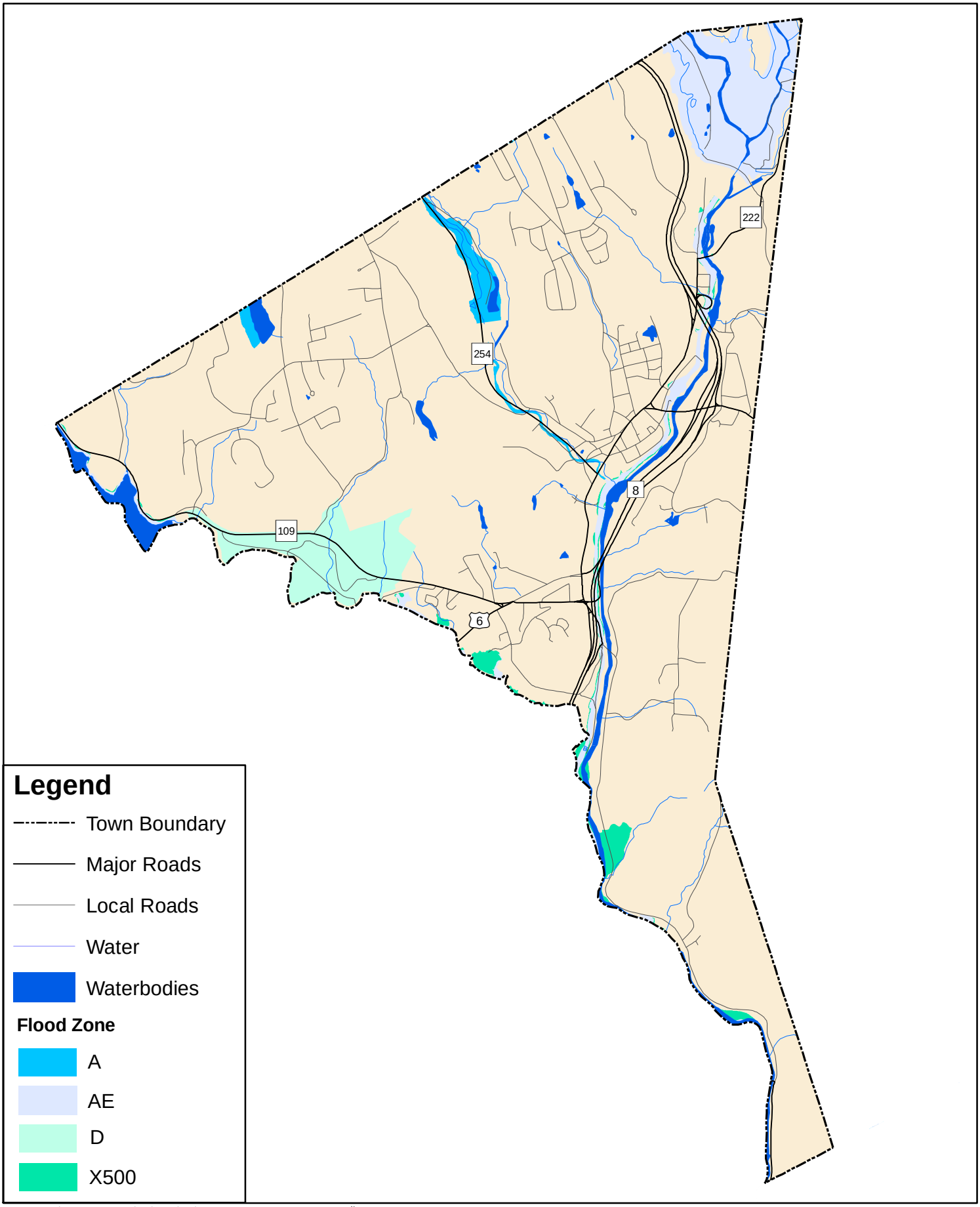
Furthermore, damp conditions trigger the growth of mold and mildew in flooded buildings, contributing to allergies, asthma, and respiratory infections. Snakes and rodents are forced out of their natural habitat and into closer contact with people, and ponded water following a flood presents a breeding 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 Thomaston are delineated on Flood Insurance Rate Maps (FIRM) and Flood Insurance Studies (FIS). An initial Flood Hazard Boundary Map was identified on May 31, 1974. The FIRMs delineate areas within Thomaston that are vulnerable to flooding and were originally published on July 5, 1982. The FIS was originally published on January 5, 1982 and also has not been updated. Refer to Figure 3-1 for the areas of Thomaston susceptible to flooding based on FEMA flood zones. Table 3-1 describes the various zones depicted on the FIRM panels for Thomaston.

Table 3-1
FIRM Zone Descriptions

Zone	Description
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.
D	An area where there are possible but undetermined flood hazards. No analysis of flood hazards has been conducted.
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 Thomaston



Source: "Roads", c1984 - 2008 Tele Atlas, Rel. 04/08.
"Town Boundary", "Hydrography", "Flood Zones", DEP
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In some areas of Thomaston, flooding occurs with a much higher frequency than those mapped by FEMA. This nuisance flooding occurs from heavy rains with a much higher frequency than those used to calculate the 100-year and 500-year flood events, 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, as occurs on the Naugatuck River, Northfield Brook, and Branch Brook in Thomaston.

The recurrence interval level of a precipitation event also generally differs from the recurrence interval level of the associated flood. Another example would be of tropical storm Floyd in 1999, which caused rainfall on the order of a 250-year event while flood frequencies were slightly greater than a 10-year event on the Naugatuck River in Beacon Falls. 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 throughout its recorded history, the Town of Thomaston 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, or periods of rainfall on frozen ground. Other flood events have been caused by excessive rainfalls upon saturated soils, yielding greater than normal runoff.

According to the FEMA FIS, major historic floods have occurred in Thomaston in March 1936, September 1938, December 1948, and August and October 1955. In terms of damage to the Town of Thomaston, the most severe of these was damage associated with the August 1955 hurricane and flood which had a recurrence interval of 300 years. The October 1955 flood had a recurrence interval of 100 years, and the 1936, 1938, and 1948 floods had recurrence intervals of 50, 50, and 20 years, respectively. All of these floods were the result of high intensity rainfall falling on saturated or frozen ground.

The flood of record at the USGS gauge on the Naugatuck River in Thomaston was recorded during Hurricane Diane on August 19, 1955, when the instantaneous discharge reached an estimated 41,600 cubic feet per second (cfs). This value is thirteen times higher than the mean annual flood discharge of 3,200 cfs at the station and was the result of 11 to 12 inches of rainfall in 48 hours on saturated ground. The peak discharge on Branch Brook during this flood was 10,300 cfs, an amount greater than the 100-year flood discharge. The August 1955 flood resulted in the loss of 36 lives and caused over $193 million in physical damages in areas downstream of the Thomaston Dam.

According to the NCDC Storm Events Database, there have been 58 flooding events and 17 flash flood events in Litchfield County since 1993. The following are descriptions of more recent examples of floods in and around the Town of Thomaston as described in the NCDC Storm Events Database, and based on correspondence with municipal officials.

- July 28, 1994: A heavy rain storm began in the early morning hours and continued into the afternoon, producing three to five inches of rain in the Route 84 corridor. The storm caused localized street flooding in Thomaston and Washington.

- August 21, 1994: A flash flood caused approximately $5 million in property damage in Litchfield County.

- January 19, 1996: An intense area of low pressure over the Mid-Atlantic region produced unseasonably warm temperatures, resulting in the rapid melting of one to three feet of snow. This snowmelt combined with one to three inches of rainfall to result in flooding across Litchfield County particularly along small streams. This flooding caused approximately $300,000 in property damage.

- July 13, 1996: The remnants of Hurricane Bertha tracked northeast over Connecticut, producing three to five inches of rain across Litchfield County. The storm resulted in minimal property damage, but caused flooding in several roads and streams, and the strong winds accompanying the storm caused scattered power outages when water-laden tree branches were downed on wires.

- September 16, 1999: Torrential record rainfall preceding the remnants of Tropical Storm Floyd caused widespread urban, small stream, and river flooding. Fairfield County was declared a disaster area, along with Litchfield and Hartford Counties. Initial cost estimates for damages to the public sector was $1.5 million for those three counties. These estimates do not account for damages to the private sector and are based on information provided by the Connecticut Office of Emergency Management. Serious wide-spread 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.

- December 17, 2000: Unseasonably warm and moist air tracked northward from the Gulf of Mexico, bringing a record-breaking rainstorm to Litchfield County. The storm produced two to four inches of rain, strong winds, and combined with melting snow to produce flooding conditions. The bulk of the rainfall occurred in a short

interval of time, with some localities receiving an inch per hour. In Torrington, the Naugatuck River washed construction equipment downstream, and widespread street flooding was reported in Litchfield.

- June 17, 2001: The remnants of Tropical Storm Allison combined with a slow-moving cold front to produce torrential rainfall over much of Litchfield County. Two to six inches of rain fell in a short time in the central and southeastern portions of the county, causing a total of $55,000 in property damage. Roads were washed out in the Town of Bethlehem, and numerous small streams overflowed and roads flooded in Woodbury.

- October 2005: Although the consistent rainfall of October 7-15, 2005 caused flooding and dam failures in most of Connecticut (most severely in northern Connecticut), the precipitation intensity and duration was such that only minor flooding occurred in Thomaston.

- April 22-23, 2006: A sustained heavy rainfall caused streams to overtop their banks and drainage systems to fail throughout New Haven County. The heavy rainfall caused a surge of water to leave Plymouth Reservoir, resulting in the unnamed stream under Altair Avenue in Thomaston to overtop the road and cause considerable damage to the road structure.

- June 2, 2006: Up to eight inches of heavy rainfall caused widespread damage in Waterbury, Wolcott, and Prospect. The storm caused slumps and drainage failures throughout Waterbury and several streets were flooded in all three municipalities.

- April 15-16, 2007: A spring nor'easter dropped over six inches of rain in the Greater Waterbury area, causing widespread flooding. The heavy rainfall caused a surge of water to leave Plymouth Reservoir, resulting in the unnamed stream under Altair

Avenue to overtop the road by six inches causing additional damage to the road structure.

3.4 Existing Programs, Policies, and Mitigation Measures

The Town of Thomaston has in place a number of measures to prevent flood damage. These include regulations, codes, and ordinances preventing encroachment and development near floodways. Regulations, codes, and ordinances that apply to flood hazard mitigation in conjunction with and in addition to NFIP regulations include:

- ***Lot, Area, Shape and Frontage*** (Section 5.2 of Thomaston Zoning Regulations). This section notes that "wetlands, watercourses, or their setback area containing any significant predevelopment slopes in excess of 25% shall not be present within the buildable square."

- ***Flood Plain District*** (Section 7 of Thomaston Zoning Regulations). This section defines the boundaries of the flood plain district and states that no building or structure within the boundaries of this district may be constructed, moved, or substantially improved without a Flood Hazard Area Permit in accordance with the *"Floodplain Management Ordinance, Town of Thomaston, Connecticut."*

- ***Floodplain Management Ordinance*** (Part III, Chapter 280 of the Code of the Town of Thomaston, Connecticut). This ordinance establishes the floodplain management regulations in the Town of Thomaston, and includes definitions, general development requirements including anchoring, construction materials and methods that minimize flood damage, placement of utilities and buildings, and floodproofing. The ordinance also regulates floodways, placement of manufactured homes, alterations to watercourses, changes to existing structures, elevation of buildings, and regulations for streams without established base flood elevations or floodways.

- ***Unsuitable Building Lots*** (Section 9.4 of Thomaston Subdivision Regulations). This section notes that a building lot may not be suitable for construction purposes due to adverse or sensitive environmental conditions, such as flooding, seasonal runoff, excessive slope, exposed ledge or bedrock, soil conditions, or wetlands.

- ***Terrain*** (Section 9.5 of Thomaston Subdivision Regulations). This section notes that "unless the lot has been specifically approved by the Inland Wetlands and Watercourses Commission, each lot shall be able to accommodate primary buildings, driveway access and parking spaces without disturbing wetlands and watercourses."

- ***Channel Encroachment and Building Lines*** (Section 11.31 of Thomaston Subdivision Regulations). This section states that channel encroachment/building lines based on sound engineering judgment shall be provided on the site plans for all subdivisions to prevent encroachment upon the natural water channel. The Commission may also require the placement of such lines around natural features, wetlands, and other watercourse areas.

- ***Design Standards for Minimizing Flood Damage*** (Section 12 of Thomaston Subdivision Regulations). This section notes that "subdivisions shall be designed to control and mitigate potential flood damage…and have drainage facilities and other systems in place to reduce exposure to flood hazards." Proposals exceeding 50 lots of five acres in size are required to provide base flood elevations.

- ***Inland Wetlands and Watercourses Regulations***. This document defines in detail the Town of Thomaston's regulations regarding development near wetlands, watercourses, and water bodies that are sometimes coincident with the Flood Plain District. Section 2 defines "Significant Activities" covered by the Regulations. Section 6 states that no person may conduct or maintain a regulated activity without obtaining a permit. Section 6.1 states that the Commission must consider the environmental impact of the proposed action, including the effects on the

watercourse's natural capacity to prevent flooding, to supply water, to control sediment, and to facilitate drainage; any alternatives; and any measures that would mitigate the impact of the proposed activity, such as technical improvements or safeguards to reduce the environmental impact as described above. Section 7 outlines the application requirements

The intent of these regulations is to promote the public health, safety, and general welfare and to minimize public and private losses due to flood conditions in specific areas of the Town of Thomaston by the establishment of standards designed to:

- Protect human life and public health;
- Minimize expenditure of money for costly flood control projects;
- Minimize the need for rescue and relief efforts associated with flooding;
- Ensure that purchasers of property are notified of special flood hazards;
- Ensure that all land approved for subdivision shall have proper provisions for water, drainage, and sewerage and in areas contiguous to brooks, rivers, or other bodies of water subject to flooding, and that proper provisions be made for protective flood control measures;
- Ensure that property owners are responsible for their actions;
- Ensure the continued eligibility of owners of property in Thomaston for participation in the National Flood Insurance Program.

Since 1955, extensive flood control modifications have been made to the Naugatuck River basin, including the construction of five flood control dams by the ACOE. Three of these dams are located in the Town of Thomaston: Thomaston Dam, Northfield Dam, and Black Rock Dam. These dams are further described in Section 8.3. Two others are located upstream in Torrington. Together, these five dams can store all runoff up to a 100-year storm and provide a controlled release to the channel downstream. According to the FEMA FIS, these flood control reservoirs will decrease the stage of a flood with the same magnitude as that of August 1955 from an elevation of 342.0 feet to 323.4 feet

at the confluence of Branch Brook and the Naugatuck River. In addition, Wigwam Reservoir, located upstream from Black Rock Dam, provides some storage to delay the timing of peak discharge to the Naugatuck River.

The Town of Thomaston Land Use Officer serves as the NFIP administrator and oversees the enforcement NFIP regulations. The Town has not completed an update of its flood hazard regulations, and currently has no plans to enroll in the Community Rating System program. The Town of Thomaston 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 base 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 Thomaston Inland Wetlands and Watercourses Commission also reviews new developments and existing land uses on and near wetlands and watercourses.

The Thomaston Highway Department is in charge of the maintenance of the Town's drainage systems, and performs clearing of bridges and culverts and other maintenance as needed. Drainage complaints are routed to the Highway Department and Zoning and recorded. The Town uses these documents to identify potential problems and plan for maintenance and upgrades. The Town can also 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 Town of Thomaston has a current Stormwater Management Plan from 2006. There are 919 catch basins in the Town, and they are inspected on an annual basis. Cleaning of all catch basins occurs at least biannually, with Litchfield Street, Twin Pond Road, Reynolds Bridge Road, and Hotchkiss Avenue cleaned multiple times per year due to their vicinity to watercourses. The Town also has a street-sweeping program, with all

roadways and parking lots swept at least once per year. Old Waterbury Road, Jackson Street, West Hill Road, Treadwell Avenue, and River Street are swept multiple times per year to reduce loading to the Naugatuck River.

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 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 Thomaston 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.

In summary, the Town of Thomaston primarily attempts to mitigate flood damage and flood hazards by restricting building activities inside flood-prone areas. This process is carried out through both the Planning and Zoning Commission and the Inland Wetlands and Watercourses Commission. All watercourses are to be encroached minimally or not at all to maintain the existing flood carrying capacity. These regulations rely primarily on the FEMA-defined 100-year flood elevations to determine flood areas.

FEMA has commenced its "Map Mod" program to revise the FIRMs for each County in Connecticut, but it will be several years before this program begins for Litchfield County. This program will create a single FIRM for Litchfield County. Many municipalities with revised FIRMs from the Map Mod program are finding that more properties are in floodplains than originally believed.

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

FIRMs, 574 acres of land in Thomaston are located within the 100-year flood boundary. In addition, indirect and nuisance flooding occurs near streams and rivers throughout Thomaston due to inadequate drainage and other factors. Based on correspondence with the State of Connecticut NFIP Coordinator, zero repetitive loss properties are located in the Town of Thomaston (Appendix B).

The primary waterway in the Town is the Naugatuck River which flows north to south through the Town. The secondary waterway in Thomaston is Branch Brook, which forms much of Thomaston's southwestern boundary. The remaining waterways in Thomaston are mostly small streams and brooks significant for water supply and conservation purposes, but are not recreational resources. Recall from Figure 3-1 that floodplains with elevations are delineated for the Naugatuck River and Branch Brook, while several smaller brooks and streams, including the major water bodies, have floodplains delineated by approximate methods. All of these delineated floodplains are generally limited to the areas adjacent to the streams.

Due to the large amount of buffer capacity provided by the ACOE flood control dams, there is little wide-scale flooding in Thomaston. 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. Most flooding occurs due to large amounts of rainfall falling in conjunction with snowmelt and occurs due to undersized road culverts, as noted below.

- Bayberry Drive – Bayberry drive is the only means of egress into a 40-unit subdivision. An unnamed tributary to Branch Brook crosses under the entranceway. The upstream side has an aluminum flared end section that is loose, allowing water to bypass the pipe under the road. Some evidence of spalling above the upstream embankment of the pipe was evident during 2008 field inspections.

- Black Rock Condominiums – There are beavers on Branch Brook that have built dams as recently as 2004 that almost flooded the condos. Town staff slowly took down the dams to prevent flooding of the units.

- Brownfield Sites – Some of these properties are located in the floodplain of the Naugatuck River. These properties may be eligible for funding that will convert them to permanent open space.

- Carter Road – The culvert carrying Nibbling Brook under the road is undersized. An 18-inch metal culvert replaced a larger concrete culvert that failed. The road regularly overtops, and the driveway of the house downstream often floods. A nearby culvert also clogs regularly, contributing to the roadway flooding. According to the Department of Public Works, this area may be eligible for funding through the Connecticut Department of Transportation Bridge Program.

- Hickory Hill Road – This road is a Federal Highway Administration (FHWA) road based on its status as a connector road between Route 254 and Route 109. As such, FEMA could not provide disaster funding when the road washed out in April 2007 because the funding would duplicate another federal program, and the FHWA denied funding because the road has too little traffic. The problem is that two streams cross the road at a low point known as "Peck Hollow". Wetland areas are near the road level and the two culverts running underneath the road are undersized. The major culvert at the west end of Peck Hollow was washed out during the April 2007 nor'easter partially because of a poorly located side drain that eroded the endwall. Poor drainage along the roadside also contributes to flooding in this area.

- High Street Extension – A stream exits a culvert near High Street and runs parallel to road. The discharge is causing bank erosion on both sides of the stream, with the east bank only a few feet from the side of the road. The embankment is fairly steep to the streambed.

- Hillside Avenue and Gilbert Street – This area has no storm drainage systems and all nearby basements run their sump pumps to the street.

- Leigh Avenue – The end of the road is private and the residents experience drainage problems due to the nearby pond and wetlands.

- Park Street at Main Street – This intersection flooded during the April 2006 nor'easter due to the clogging of a culvert at a bend beneath a manhole access that had been previously paved over by the State Department of Transportation. The Town found the manhole and unclogged the pipe.

- Railroad Street at Altair Avenue – Bridge #140-001 is in disrepair, with the upstream wing walls deteriorated and the top of the bridge structure cracking through the pavement. The unnamed tributary to the Naugatuck River flowing under the bridge receives outflow from Plymouth Reservoir to the east. The bridge overtopped by six inches during the April 2007 nor'easter. According to the bridge report prepared by Maguire Group, Inc. in April 2006, this crossing is overtopped by less than the 20-year flood event. This area is particularly a problem regarding emergency response, because there is reportedly a three-mile detour for emergency vehicles to access the other end of this road. Repairs began July 28, 2008 and are on schedule to be completed by the end of the year.

- Reynolds Bridge Road – Portions of this road do not have drainage systems, a situation could exacerbate flooding in the Pond View Active Adult community that is under construction.

- Watertown Road (Route 6) – Water backs up at an undersized culvert on the upstream side of Route 6. The drainage swale leading to the culvert is heavily vegetated. When this intersection floods, the water almost reaches nearby businesses. The water

flows over Route 6, but doesn't generally impact the residences downstream along Stumpf Avenue.

Critical Facilities and Emergency Services

Critical facilities are not regularly impacted by flooding in the Town of Thomaston. The electric substation on Electric Avenue and the Sewage Treatment Plant on Old Waterbury Road are both located in the mapped 100-year floodplain, but neither has any regular issues with flooding. Route 6 (Watertown Road), a major northeast-southwest thoroughfare has occasional flooding issues north of Route 109. Such flooding could potentially slow emergency response times due to detours around this area.

3.6 Potential Mitigation Measures, Strategies, and Alternatives

A number of measures can be taken to reduce the impact of a local or nuisance 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*. All of the recommendations discussed in the subsections below are reprinted in a bulleted list in Section 3.7.

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 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. In addition, Aquifer Protection Areas (APA) are often located near floodplains and can indirectly provide a level of protection against the development of certain commercial and industrial properties.

The Connecticut Water Company operates a public water supply wellfield along Branch Brook that lies within the delineated floodplain. The wellfield has a preliminary APA that extends into non-floodplain areas of Thomaston. After formal APA mapping has been developed by The Connecticut Water Company, the Town of Thomason will be required to develop APA regulations to control land use and development in the affected part of Town. The Thomaston Planning and Zoning Commission has been designated the official Aquifer Protection Agency and will be developing the APA Regulations.

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.

The Town should consider joining FEMA's Community Rating System to reduce the cost of flood insurance for its residents, and should consider using Town topographic maps to develop a more accurate regulatory flood-hazard map using the published FEMA flood elevations. 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. 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 11.

Reductions in floodplain area or revisions of a mapped floodplain can only be accomplished through revised FEMA-sponsored engineering studies or Letters of Map Change (LOMC). To date, one Letter of Map Amendment (LOMA) has been submitted under the LOMC program for the Town of Thomaston, so such updates are considered rare for the Town.

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 topography, Thomaston is situated in the upper and 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 to ensure efficiency and functionality. Maintenance, as laid out in the 2006 Stormwater Management Plan, 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 Thomaston Inland Wetlands & Watercourses Commission (IWC) administers the wetland regulations and the Thomaston Planning and Zoning Commission (PZC) administers the Zoning and Subdivision regulations. The regulations simultaneously restrict development in floodplains, wetlands, and other flood prone areas. The Land Use Officer and the Wetland Enforcement Officer 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 PZC, and the Zoning Enforcement Officer, one final *preventive* mitigation 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 list could be provided to an applicant at any Town department. A sample checklist for the Town of Thomaston 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.

> ***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.

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 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 Thomaston residents to prevent damage from inland and nuisance flooding. The Building Inspector should consider outreach and education in these areas.

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 inland 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 floodwater 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.

These mitigation measures are already in practice in the Town of Thomaston. Based on the above guidelines, a number of specific proposals for improved *emergency services* area recommended to prevent damage from inland and nuisance flooding. These are common to all hazards in this plan, and are listed in Section 10.1.

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 *public education* are recommended to prevent damage from inland and nuisance flooding. These are common to all hazards in this plan, and are listed in Section 10.1.

3.6.5 Natural Resource Protection

Floodplains can provide a number of natural resources and benefits, including storage of floodwaters, 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.

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.

Projects that improve the natural condition of areas or to 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.

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

- Pursue the acquisition of additional municipal open space properties.
- Selectively pursue conservation objectives listed in the Plan of Conservation and Development and/or more recent planning studies and documents.
- Continue to regulate development in protected and sensitive areas, including steep slopes, wetlands, and floodplains.
- Pursue plans to redevelop Brownfield sites, or to remediate them and convert them to open space.

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 inland and nuisance flooding:

- Repair the Bayberry Drive culvert or replace with a properly sized box culvert.

- Replace the undersized culvert on Carter Road with a properly sized culvert, and tie in nearby storm sewers.
- Install drainage systems on Hillside Avenue and Gilbert Street.
- Finish repair of Altair Avenue bridge and culvert.
- Install riprap along stream banks for unnamed stream parallel to High Street Extension to protect the roadway and the private property above.
- Pursue funding to install drainage systems on Reynolds Bridge Road.
- Investigate alternatives to facilitate the proper completion of the Valley View drainage system such that it functions as approved.
- Coordinate with the State Department of Transportation regarding maintenance of debris and vegetation in the swale upstream of the culvert that drains under Watertown Road (Route 6) towards Stumpf Avenue. Encourage the State DOT to enlarge the culvert under the road.

3.7 Summary of Recommended Mitigation Measures, Strategies, and Alternatives

While many potential mitigation activities were addressed in Section 3.6, the recommended mitigation strategies for addressing inland flooding problems in the Town of Thomaston 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. A sample checklist for the Town of Thomaston is included as Appended Table 3.
- Consider performing a Town-wide inventory of drainage pipes as part of the next Stormwater Management Plan update to help identify undersized and failing portions of the drainage system.

- Consider joining FEMA's Community Rating System.
- Continue to require Flood Hazard Area Permits for activities within SFHAs.
- Consider requiring buildings constructed in floodprone areas to be protected to the highest recorded flood level, regardless of being within a defined SFHA.
- Ensure new buildings be designed and graded to shunt drainage away from the building.
- Assist with the Map Mod program to ensure an appropriate update to the Flood Insurance Study, Flood Insurance Rate Maps, and Flood Boundary and Floodway Maps.
- 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.
- Adopt an aquifer protection area overlay zone to regulate development after Connecticut Water Company has completed their final mapping of the Aquifer Protection Area for their wellfield along Branch Brook. Ensure that the aquifer protection area regulations are consistent with principles for regulating floodplains where the area intersects floodplains.

Property & Natural Resource Protection

- Pursue the acquisition of additional municipal open space properties inside SFHAs and set it 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.
- Pursue plans to redevelop Brownfield sites, or to remediate them and convert them to open space.

Structural Projects

- Repair the Bayberry Drive culvert or replace with a properly sized box culvert.
- Replace the undersized culvert on Carter Road with a properly sized culvert, and tie in nearby storm sewers.
- Install drainage systems on Hillside Avenue and Gilbert Street.
- Finish repair of Altair Avenue bridge and culvert.
- Install riprap along stream banks for unnamed stream parallel to High Street Extension to protect the roadway and the private property above.
- Pursue funding to install drainage systems on Reynolds Bridge Road.
- Investigate alternatives to facilitate the proper completion of the Valley View drainage system such that it is as designed and approved.
- Coordinate with the State Department of Transportation regarding maintenance of debris and vegetation in the swale upstream of the culvert that drains under Watertown Road (Route 6) towards Stumpf Avenue. Encourage the State DOT to enlarge the culvert under the road.

In addition, mitigation strategies important to all hazards are included in Section 10.1.

4.0 HURRICANES

4.1 Setting

Hazards associated with tropical storms and hurricanes include winds, heavy rains, and inland flooding. While only some of the areas of Thomaston 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 Thomaston. A hurricane striking Thomaston is considered a possible event each year that could cause critical damage to the Town and its infrastructure (refer to Appended Table 1).

4.2 Hazard Assessment

Hurricanes are a class of tropical cyclones that 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.

- **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 Allison 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 4-1 lists the hurricane characteristics mentioned above as a function of category, as well as the expected central pressure.

Table 4-1
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 Thomaston, 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.

4.3 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 130 mile per hour 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, the Farmington, and the Quinebaug River in northeastern Connecticut caused the most damage. The floodwaters resulted in over 100 deaths, left 86,000 unemployed, and caused an estimated $200 million in damages (1955 USD). For comparison, the total property taxes levied by all Connecticut municipalities in 1954 amounted to $194.1 million. As a result of the 1955 flooding, the ACOE installed flood control dams in the Naugatuck River watershed, as detailed in Section 3 and Section 8.

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 in some areas and heavy winds which damaged structures and uprooted trees. Over 500,000 people suffered significant power outages.

Hurricane Bob, a Category 2 hurricane that made 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.

4.4 Existing Programs, Policies, and Mitigation Measures

Existing mitigation measures appropriate for inland flooding have been discussed in Section 3. These include ordinances, codes, and regulations that have been enacted to minimize flood damage. In addition, various structures exist to protect certain areas, including dams and riprap.

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 Thomaston is 95 miles per hour. Thomaston has adopted the Connecticut Building Code as its building code.

Parts or all of tall and older trees may fall during heavy wind events, potentially damaging structures, utility lines, and vehicles. The Town performs annual tree maintenance, both near roadways and for property owners who request it. The Town does not cable trees to keep them standing; they cut any that are dead or are in danger of falling. According to Town personnel, many dangerous trees have been removed. CL&P 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. In addition, all utilities in new subdivisions must be located underground whenever possible in order to mitigate storm-related damages.

During emergencies, the Town of Thomaston has space designated to use as shelter for evacuees (Section 2.9). Thomaston Fire Department is currently the primary shelter with a generator, while the secondary shelter (Thomaston High School) features a cafeteria with substantial food supply available. Other schools in Town can be made available that for additional shelter space if the need arose. As hurricanes generally pass an area within a day's time, additional shelters can be set up after the storm as needed for long-term evacuees.

The Town relies on radio and television to spread information on the location and availability of shelters. During a disaster, the Town will notify residents of emergency information on a neighborhood basis using its CodeRED emergency notification service, but this feature is still relatively new in Thomaston. Prior to severe storm events, the Town ensures that warning/notification systems and communication equipment is working properly, and prepares for the possible evacuation of impacted areas.

4.5 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 Thomaston 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 Thomaston 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, and tornadoes will be discussed in Section 5. 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 from heavy winds can also start 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 that cannot be quantitatively estimated.

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

4.6 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.

4.6.1 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 in diminished.
- Continue location of utilities underground in new developments or as related to redevelopment.
- Continue to review the currently enacted Emergency Operations Plan for the Town and update when necessary.

4.6.2 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, 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.

4.6.3 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 10.1.

4.6.4 Emergency Services

The Emergency Operation Plan of the Town of Thomaston 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, which could be accomplished by placing this information on the Town website and by creating informational displays in local municipal buildings. In addition, Thomaston 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.

4.6.5 Structural Projects

Structural projects for wind damage mitigation are not possible.

4.7 Summary of Recommended Mitigation Measures, Strategies, and Alternatives

While many potential mitigation activities were addressed in Section 4.6, the recommended mitigation strategies for mitigating hurricane and tropical storm winds in the Town of Thomaston are listed below.

- Increase tree limb maintenance and inspections, especially along Route 6, Route 109, Route 254, 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 Thomaston, and post evacuation and shelter information on the Town website and in municipal buildings.

- Provide for the Building Department to have literature available regarding appropriate design standards for wind.

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

5.0 SUMMER STORMS & TORNADOES

5.1 Setting

Like hurricanes and winter storms, summer storms and tornadoes have the potential to affect any area within the Town of Thomaston. 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 Thomaston 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 Thomaston 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 Litchfield County each year that could cause significant damage to a small area (refer to Appended Table 2).

5.2 Hazard Assessment

Heavy wind (including tornadoes and downbursts), lightning, heavy rain, hail, and flash floods are the primary hazards associated with summer storms. Inland flooding and flash 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 F5, 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 5-1.

Fujita Tornado Scale

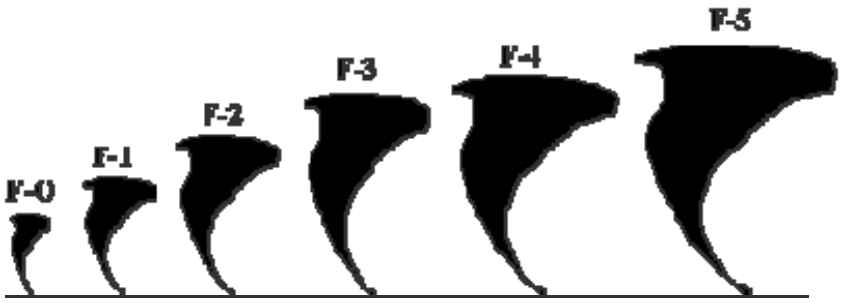


Table 5-1
Fujita Scale

F-Scale Number	Intensity	Wind Speed	Type of Damage Done
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 5-1 (Continued)
Fujita Scale

F-Scale Number	Intensity	Wind Speed	Type of Damage Done
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 F-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 5-2 relates the Fujita and enhanced Fujita scales.

Table 5-2
Enhanced Fujita Scale

Fujita Scale			Derived EF Scale		Operational EF Scale	
F Number	*Fastest 1/4-mile (mph)*	*3 Second Gust (mph)*	*EF Number*	*3 Second Gust (mph)*	*EF Number*	*3 Second Gust (mph)*
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 5.3. 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 is Litchfield and Hartford Counties, followed by New Haven, Fairfield, Tolland, Middlesex, Windham, and finally New London County. By virtue of its location in Litchfield County, the Town of Thomaston 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 Hamonassett 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 is 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 Thomaston area is very high during any given thunderstorm, although no one 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.

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 Thomaston 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 Thomaston is moderate in any given year.

5.3 Historic Record

The National Climatic Data Center (NCDC) lists 22 tornado events in Litchfield County since 1950. This includes nine F2 rated tornadoes, 11 F1 rated tornadoes, and two F0

rated tornadoes. Property damages from tornados in the County totaled approximately 51 million dollars. Table 5-3 lists the tornado events for Litchfield County.

Table 5-3
Tornado Events in Litchfield County Since 1950

Date	Fujita Tornado Scale	Property Damage	Wind Speed
August 21, 1951	F2	$250,000	113 – 157 mph
August 21, 1958	F1	$0	73 – 112 mph
May 12, 1959	F2	$2,500	113 – 157 mph
June 18, 1962	F2	$25,000	113 – 157 mph
August 11, 1966	F2	$25,000	113 – 157 mph
August 20, 1968	F1	$2,500	73 – 112 mph
August 7, 1972	F1	$250,000	73 – 112 mph
August 9, 1972	F1	$25,000	73 – 112 mph
June 12, 1973	F2	$0	113 – 157 mph
June 29, 1973	F1	$2,500	73 – 112 mph
July 3, 1974	F1	$2,500	73 – 112 mph
June 19, 1975	F1	$0	73 – 112 mph
July 20, 1975	F1	$2,500	73 – 112 mph
June 30, 1976	F2	$25,000	113 – 157 mph
July 10, 1989 2:45 P.M.	F2	$25,000,000	113 – 157 mph
July 10, 1989 3:15 P.M.	F2	$25,000,000	113 – 157 mph
May 31, 1998	F1	$4,000	73 – 112 mph
June 23, 2001 1:00 P.M.	F1	$150,000	73 – 112 mph
June 23, 2001 1:50 P.M.	F2	$250,000	113 – 157 mph
July 1, 2001	F0	$75,000	40 – 74 mph
June 5, 2002	F1	$40,000	73 – 112 mph
June 16, 2002	F0	$10,000	40 – 74 mph

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

- July 10, 1989 – A particularly powerful thunderstorm produced 80 mile per hour winds and spawned two tornadoes that cut a path from Salisbury to New Haven. Two people were killed and 67 homes were destroyed. One of the fatalities occurred in Black Rock State Park in nearby Watertown. Damages from the storm totaled $125 million (1989 dollars), and a Presidential Disaster Declaration was issued.
- June 27, 1994 – Thunderstorm winds brought down trees and power lines in Litchfield, with a few hundred customers losing electric service.

- May 21, 1996 – Severe thunderstorms produced damage across parts of Litchfield County and caused approximately $5,000 in property damage.
- July 9, 1997 – Severe thunderstorms produced flooding and damaging winds that downed trees throughout Litchfield County, causing approximately $5,000 in damage. The wind downed trees and a power pole in Thomaston.
- October 1, 1998 – Gusty winds knocked down large limbs, trees, and power lines during the middle of the day throughout Litchfield County, resulting in as many as 7,800 electric customers being without power and bringing commerce to a halt. Approximately $100,000 in property damage was reported.
- July 6, 1999 – Powerful thunderstorms brought down trees in Litchfield and Bethlehem, causing $2,000 in damage.
- 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 Litchfield County, causing widespread downing of trees and power lines. Up to 5,000 were left without power, and approximately $100,000 in wind damage was reported.
- November 2, 1999 – A storm produced high wind across the higher elevations of Litchfield County, bringing down some trees and a few power lines. Scattered power outages and approximately $11,000 in damages were reported.
- May 31, 2002 – Severe weather in Litchfield County produced hail up to two inches in diameter in Thomaston, blew down trees, and caused 37,000 power outages and $10,000 in damages across the county.
- July 15, 2007 – Strong thunderstorm winds blew a large tree onto a house in Thomaston, causing structural damage.
- July 19, 2007 – Trees were reported down in Thomaston due to strong thunderstorm winds that gusted up to 50 miles per hour.

5.4 Existing Programs, Policies, and Mitigation Measures

Warning is the primary method of existing mitigation for tornadoes and thunderstorm-related hazards. Tables 5-4 and 5-5 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.

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.

Table 5-4
NOAA Weather Watches

Weather Condition	Meaning	Actions
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 5-5
NOAA Weather Warnings

Weather Condition	Meaning	Actions
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 Thomaston. 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 include guidelines for Wind Load Criteria that are specific to each municipality, as explained in Section 4.0. In addition, specific mitigation measures address debris removal and tree trimming.

In the Town of Thomaston, the local utilities are responsible for tree branch removal and maintenance above and near their lines. In addition, all new developments in Thomaston must place utilities underground wherever possible. The Highway Department also performs annual tree maintenance on municipal right of ways, and also approaches residents on a case-by-case basis when trees and branches on their property look hazardous. The Highway Department will also perform tree maintenance for private homeowners who request it.

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.

5.5 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. Thomaston 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 Thomaston 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.

According to Town personnel, the most susceptible area of Town to wind damage is the 20-30 unit mobile home park located near the Naugatuck River off Waterbury Road near Carter Road. Other areas of Town are more susceptible to damage from falling branches and trees than from actual wind damage.

5.6 Potential Mitigation Measures, Strategies, and Alternatives

> ***More information is available at:***
>
> FEMA – http://www.fema.gov/library/
> NOAA – http://www.nssl.noaa.gov/NWSTornado/

Both the FEMA and the NOAA websites contain valuable information regarding preparing for a 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 recent implementation of the CodeRED emergency notification system in Thomaston is beneficial for warning residents of an impending tornado. The Police Department has a page on its website (http://www.thomastonpolice.com/) to encourage residents to become part of the CodeRED database. 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 stuck at about 3:15 AM. According to National Public Radio, local broadcast stations had difficultly 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.

5.7 Summary of Recommended Mitigation Measures, Strategies, and Alternatives

While many potential mitigation activities were addressed in Section 5.6, the recommended mitigation strategies for mitigating wind, hail, tornadoes, and downbursts in the Town of Thomaston are listed below.

- Increase tree limb maintenance and inspections, especially in the downtown areas
- 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 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 10.1.

6.0 WINTER STORMS

6.1 Setting

Similar to summer storms and tornadoes, winter storms have the potential to affect any area of the Town of Thomaston. However, unlike summer storms, winter events and the hazards that result (wind, snow, and ice) have more widespread geographic extent. The entire Town of Thomaston 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 Appended Tables 1 and 2).

6.2 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, flooding, heavy winds, and extreme cold. The National Weather Service defines a blizzard as having winds over 35 mph with snow with 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 6-1 presents the NESIS categories, their corresponding NESIS values, and a descriptive adjective.

Table 6-1
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

6.3 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 20th out of 33 major winter storms ranked by NESIS for the northeastern United States since 1956.

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 in public sector damages.

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

- January 13, 1993 – Six inches of snowfall beginning during the morning rush hour created slippery roads and resulted in numerous accidents.
- February 12, 1993 – Five to seven inches of snow was reported in Litchfield County, followed by freezing rain and drizzle. This storm caused up to 10,000 power outages throughout the state.
- March 13 to 14, 1993 – A powerful storm caused blizzard conditions and up to 21 inches of snow in Litchfield County, with 40,000 power outages and $550,000 in property damage reported throughout Connecticut.
- December 26, 1993 – Heavy arctic winds brought 40 to 60 mph gusts to the State.
- February 11, 1994 – A major storm produced eight to 13 inches of snow across 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.
- December 19, 1995 – A winter storm produced six to eight inches of snow in Litchfield County.

- January 2, 1996 – A winter storm originating near the Gulf of Mexico produced ten to 12 inches of snow across Litchfield County.
- January 7, 1996 – An intense winter storm caused heavy snow throughout Litchfield County, causing many power outages, several roofs to collapse, and approximately $80,000 in damages. Reported snowfall totals included 24 inches in New Hartford and 22 inches in Harwinton.
- January 19, 1996 – An intense area of low pressure created damaging winds throughout Litchfield County, causing $10,000 in property damage. Many downed trees, limbs, and power lines were reported.
- March 7, 1996 – A large winter storm caused heavy snow throughout Litchfield County, including eight inches in Thomaston.
- February 22, 1997 – High winds downed trees and wires across Litchfield County, resulting in approximately $6,000 in property damage.
- March 14, 1997 – A storm brought heavy snow, sleet, and freezing rain to Litchfield County, producing two to four inches of snow, treacherous driving conditions, and downed trees and power lines.
- March 31, 1997 – A late season storm produced rain and wet snow across Litchfield County, with 12 inches of snow reported in Litchfield. This storm caused over one million dollars in property damage to the County.
- January 25, 2000 – A winter storm produced snow, sleet, and freezing rain in Litchfield County with accumulations of six to ten inches. $25,000 in property damage was reported.
- April 9, 2000 – A late-season snowstorm produced snowfall rates of more than an inch per hour, with blizzard conditions reported at times. Four to eight inches accumulated throughout Litchfield County, with $35,000 in property damage reported.
- December 25, 2002 – Six to 12 inches of snow fell throughout Litchfield County, with six inches reported at the Thomaston Dam.
- March 6, 2003 – A winter storm produced nine inches of snow at the Thomaston Dam.

- March 16, 2007 – A winter storm beginning during the Friday afternoon rush hour produced eight to 12 inches of snow throughout Litchfield County, including 7.5 inches in Thomaston. The storm caused treacherous travel conditions that resulted in many accidents.

6.4 Existing Programs, Policies, and Mitigation Measures

Existing programs applicable to inland flooding and wind are the same as those discussed in Sections 3.0 and 4.0. 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.

As it is almost guaranteed that winter storms will occur annually in Connecticut, 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 Thomaston primarily uses Town staff for plowing operations. The Highway Department utilizes seven plow trucks to clear and treat all Town-owned roadways, properties, and sidewalks. Private contractors perform snow removal at the schools. The Connecticut Department of Transportation plows Routes 6, 8, 109, 222, and 254. Snow removal practices are posted on the Thomaston Police Department website at http://www.thomastonpolice.com. During emergencies, a plow vehicle can be dispatched ahead of an emergency vehicle. Town roads are sanded and/or plowed in the following order of importance:

1) Emergency locations, including Fire, Ambulance, and accident locations;
2) School bus routes;
3) Through roads; and
4) Cul-de-sacs and other areas.

As there is over 500 feet in elevation difference between the high point and low point in Town, Thomaston can experience snow in the hills while it rains in the downtown area. The Town uses Meteorlogix Weather Service's MxVision WeatherSentry Online® Transportation Edition with Roadcast® software, which provides radar, weather and pavement temperature forecasts, to prioritize plowing and sanding operations. As additional mitigation, the Town website has a page dedicated to winter driving tips at http://www.thomastonct.org/Content/Winter_Driving_Tips.asp.

6.5 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 Thomaston 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 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 and traffic jams 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 from exposure 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 Thomaston 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 Thomaston, including Blakeman Road and the condominium access road at 143 Pine Hill Road. In some places, such at road cuts on Route 254 north of the center of Town, blocks of ice fall on the side of the roadway from the rocks above. Drifting snow is not as large a problem in Thomaston as other areas, but it still occurs. This problem is mitigated through municipal plowing efforts. Ice jams are not a problem along the Naugatuck River in Thomaston.

Recall from Figure 2-7, Figure 2-8, and Figure 2-9 that elderly, linguistically isolated, and disabled populations reside in the Town of Thomaston. It is possible that several hundred of the population impacted by a severe winter storm could consist of the elderly, a few could consist of linguistically isolated households, and several hundred could be disabled. Thus, it is important for Thomaston's emergency personnel to be prepared to assist these special populations during emergencies such as winter storms.

6.6 Potential Mitigation Measures, Strategies, and Alternatives

Potential mitigation measures for flooding caused by nor'easters include those appropriate for flooding. These were 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.

6.6.1 Prevention

Cold air, wind, snow, and ice can not 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 4.0 and 5.0 are thus applicable to winter storm hazards, as well. As mentioned previously, utilities in Thomaston 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.

6.6.2 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. 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.

6.6.3 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.

6.6.4 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.

The Town of Thomaston has established plowing routes that prioritize access to and from critical facilities. Residents are made aware of the plow routes in order to plan how to best access critical facilities via posting of the general routes on the Town website. Such routes should also be posted other municipal buildings, such as the library and the post office. It is recognized that plowing critical facilities may not be a priority to all residents, as people typically expect their own roads to be cleared as soon as possible.

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.

6.7 Summary of Recommended Mitigation Measures, Strategies, and Alternatives

Most of the recommendations in Sections 3.6 for mitigating flooding are suitable for mitigation of flooding caused by winter storms. These are not repeated in this subsection. While many potential mitigation activities for the remaining winter storm hazards were

addressed in Section 6.6, the recommended mitigation strategies for mitigating wind, snow, and ice in the Town of Thomaston are listed below.

- Increase tree limb maintenance and inspections, especially in the downtown areas
- 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 Thomaston.
- Post a list of Town sheltering facilities in the Town Hall and on the Town's website so residents can best plan how to access to critical facilities during a winter storm event. Post the snow plowing prioritization in Town buildings each winter to increase public awareness, and continue to post the information on the Town's police website.
- Provide educational materials to property owners regarding the use of shutters, storm windows, pipe insulators, and removing snow from flat roofs.
- Provide educational materials with safety tips and reminders regarding cold weather.
- 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 10.1.

7.0 EARTHQUAKES

7.1 Setting

The entire Town of Thomaston 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 (Appended Table 1).

7.2 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 telephone 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 intra-plate activity. Bedrock in Connecticut and 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.

7.3 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 Timiskarning, 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, Marion, New Haven, and Meriden, 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.

7.4 Existing Programs, Policies, and Mitigation Measures

The Connecticut Building Codes include design criteria for buildings specific to a municipality, as adopted by the Building Officials and Code Administrators (BOCA).

These include the seismic coefficients for building design in the Town of Thomaston. 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 Thomaston do not address earthquake hazards.

The Subdivision Regulations of the Town of Thomaston (Section 11.16) restricts the angle of slopes beyond the sidewalk area to no more than one foot of rise or fall for each three feet of horizontal distance. The Town reserves the right to impose more stringent regulations on a site to maintain the stability of the bank under the proposed conditions.

7.5 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 Thomaston 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 30th 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.

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 Thomaston 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.

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.

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 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 in the Town of Thomaston are underlain by sand and gravel. 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 new construction. The areas that are not at increased risk during an earthquake due to unstable soils 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.

7.6 Potential Mitigation Measures, Strategies, and Alternatives

As earthquakes are difficult to predict and can affect the entire Town of Thomaston, 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 requiring proposed grading to be no more than a 33% slope beyond the sidewalk, and consider decreasing this limit to a maximum slope of 30%.
- Continue to require adherence to the state building codes.
- Ensure that municipal departments have adequate backup facilities in case earthquake damage occurs.

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

8.0 DAM FAILURE

8.1 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 10 registered dams and potentially several other minor dams in the Town, dam failure can occur almost anywhere in Thomaston. In addition, the Town maintains a dam in Litchfield. While flooding from a dam failure generally has a medium geographic extent, the effects are potentially catastrophic. Fortunately, a major dam failure is considered only a possible natural hazard event in any given year (Appended Table 2).

8.2 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 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.

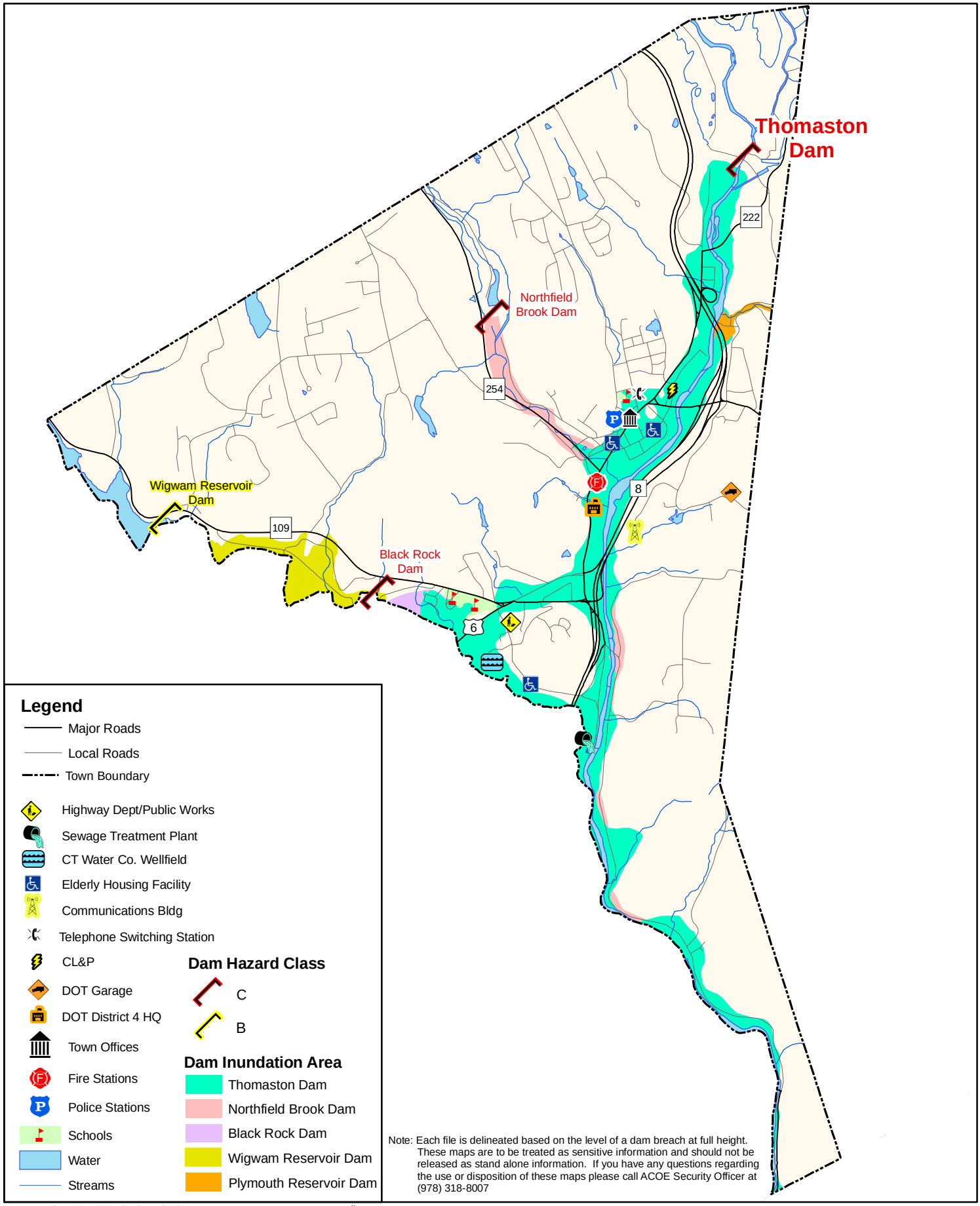
As of 1996, there were 11 DEP-registered dams within or managed by the Town of Thomaston, of which three are Class A, one is Class BB, one is Class B, three are Class C, and three are undefined. The list of Class B and C dams was updated by the DEP in 2007. These are listed in Table 8-1.

Table 8-1
Dams Registered with the DEP Associated with the Town of Thomaston

Number	Name	Class
7402	Nystrom Pond Dam (In Litchfield)	BB
14001	Thomaston Dam	C
14002	Wigwam Reservoir Dam	B
14003	Hychko Pond Dam	-
14004	Stevens Dam	A
14005	Westside Dam	A
14006	Morton Pond Dam	A
14007	Black Rock Dam	C
14008	Northfield Brook Dam	C
14009	Northerly Pond Dam	-
14010	Southerly Pond Dam	-

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. The three Class C dams include the Thomaston Dam, Black Rock Dam, and Northfield Brook Dam, each owned and maintained by the ACOE. The Class B dam is Wigwam Reservoir Dam, which is owned and operated by the City of Waterbury. Because the hazard areas overlap, these dams and their failure inundation areas are shown in Figures 8-1 to 8-3.

Figure 8-1: High Hazard Dams in Thomaston



Note: Each file is delineated based on the level of a dam breach at full height. These maps are to be treated as sensitive information and should not be released as stand alone information. If you have any questions regarding the use or disposition of these maps please call ACOE Security Officer at (978) 318-8007

Source: "Roads", c1984 - 2008 Tele Atlas, Rel. 04/08.
"Town Boundary", "Dams", DEP
"Facilities", Thomaston
"Inundation Area", Army Corps of Engineers
For general planning purposes only. Delineations may not be exact. July 2008.

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Figure 8-2: High Hazard Dams in Thomaston

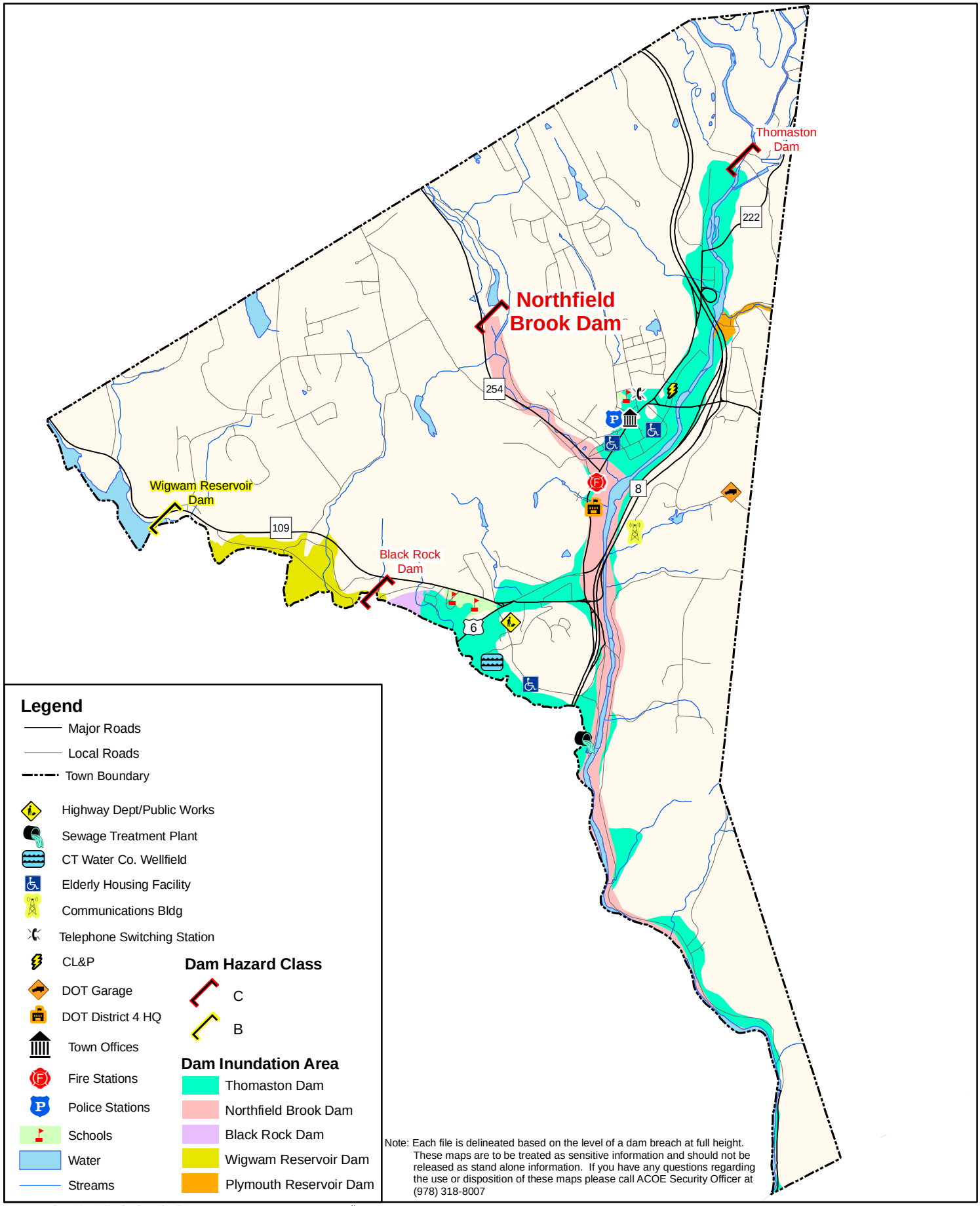
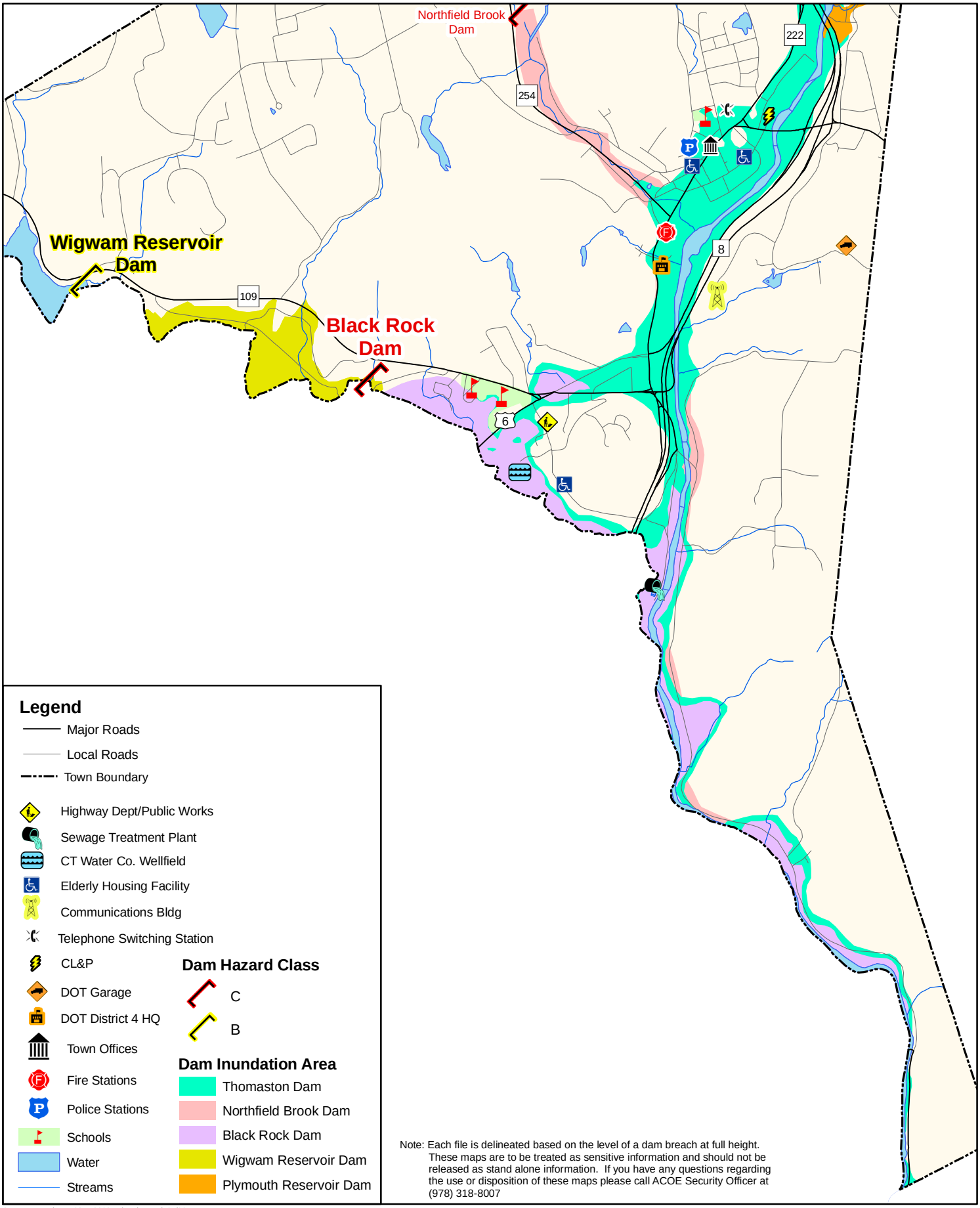


Figure 8-3: High Hazard Dams in Thomaston



8.3 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 is a listing of some of the more catastrophic dam failures in Connecticut's 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 8-2:

Table 8-2
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 Thomaston. According to Town personnel, the dams throughout Town are in varying stages of condition, with the dams maintained by the ACOE and the City of Waterbury being in good to excellent condition. The ACOE dams are flood control dams as described in Section 3.4, whereas Wigwam Reservoir Dam is used primarily for water supply purposes. All four dams provide storage for flood control. The following paragraphs provide a description and highlight the general condition of each Class C & B dam based on information in the FEMA FIS and information available at the Connecticut DEP:

- Thomaston Dam – This ACOE flood control dam is located on the Naugatuck River in northeastern Thomaston and consists of an earth and rock-fill dam that was completed in 1970. The dam is 142 feet high and 2,000 feet long. Outlet works are founded on bedrock under the dam, and there is a side channel spillway 450 feet long on the left abutment. The reservoir has a storage capacity of 42,000 acre-feet. At spillway height, a 950 acre pool would extend about 6.5 miles upstream. The ACOE owns all the land behind the dam that would be affected by the backwater conditions up to 465 feet, and has flood easements in this area up to an elevation of 499 feet, which is 5 feet above the spillway. The dam is maintained by the ACOE and is believed to be in excellent condition.

- Black Rock Dam – This ACOE flood control dam is located on Branch Brook downstream of Wigwam Dam along the Thomaston-Watertown boundary in Black Rock State Park. It consists of an earth-fill dam 933 feet long and 154 feet high and was completed in 1970. Outlet works include a gated four-foot by five-foot concrete conduit in the right abutment of the dam, and a chute spillway with a 140-foot long crest adjacent to the right abutment. The reservoir has a storage capacity of 8,700 acre-feet. At spillway height, a 190 acre pool would extend approximately 1.8 miles upstream. The ACOE owns all the land behind the dam that would be affected by the backwater conditions and has easements up to the spillway crest elevation. The dam is maintained by the ACOE and is believed to be in excellent condition.

- Northfield Brook Dam – This ACOE flood control dam is located on Northfield Brook approximately 1.3 miles upstream of the Naugatuck River in the Town of Thomaston. It consists of an earth-fill dam 810 feet long and 118 feet high and was completed in 1966. Outlet works include a chute spillway with an ogee weir that is 72 feet long, and a three-by-three-foot gate controlling discharged into a 36-inch conduit founded on rock in the right abutment. The reservoir has a storage capacity of 2,430 acre-feet. At spillway height, a 67 acre pool would extend approximately 1.25 miles upstream. The dam is maintained by the ACOE and is believed to be in excellent condition.

- Wigwam Reservoir Dam – This dam is owned by the City of Waterbury. It consists of a masonry dam with a gate house to control the lower outlet and a concrete spillway on the north side of the dam by Route 109 as the upper outlet. An EOP is on file with the Connecticut DEP as of September 1989. It is believed that the dam is in good to excellent condition.

The net result of the above flood control reservoirs in the Naugatuck River basin, including those upstream in Torrington, CT, is to reduce the peak flood elevation in the Naugatuck River as described in Section 3.4.

8.4 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 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.

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.

Owners of Class C dams are required to maintain emergency operations plans. The ACOE is responsible for maintaining the plan for the Thomaston Dam, Northfield Dam, and Black Rock Dam. The City of Waterbury also has an emergency operation plan for

Wigwam Reservoir Dam. The Town of Thomaston maintains the Class BB dam on Nystrom Pond in Litchfield as part of its maintenance of its Town Park.

8.5 Vulnerabilities and Risk Assessment

The dam failure inundation areas described below for the three ACOE Class C dams were redrawn from inundation maps provided by the ACOE. Thus, the dam failure inundation areas shown in Figures 8-1, 8-2, and 8-3 are for planning purposes only and do not replace the official ACOE maps. As these inundation areas are considered sensitive information by the ACOE, Figure 8-1, Figure 8-2, and Figure 8-3 in this Plan may not be reprinted as stand-alone information; they may only be disseminated within the confines of this Plan. For any questions regarding the use or disposition of these maps please contact the ACOE Security Officer at (978) 318-8007. Similarly, the inundation area for the Plymouth Reservoir Dam is redrawn from inundation maps provided by CWC and is for planning purposes only.

By definition, failure of Class C dams may cause catastrophic loss of life and property. Of the three Class C dams in the Town of Thomaston, the failure of Thomaston Dam would likely have the highest impact on the residents and infrastructure of the Town. However, the failure of any of these dams would have significant impacts both within and downstream of Thomaston. These impacts are described in general detail below.

Thomaston Dam

Thomaston Dam is owned by the ACOE and is designed to impound floodwaters from the Naugatuck River and Leadmine Brook. Based on dam failure inundation maps provided by the ACOE, a dam failure at full pool height (worst-case scenario) would cause flooding along the Naugatuck River corridor all the way to the Housatonic River in Derby. Much of downtown Thomaston to the area of Thomaston High School would experience some degree of flooding, including most of the critical facilities in Town

(Figure 8-1). Such a failure would cause backwater conditions along Branch Brook and Northfield Brook, and flooding along Waterbury Road. A breach at full height would cause flooding greater than the mapped 500-year flood event for Thomaston.

Northfield Brook Dam

Northfield Brook Dam is owned by the ACOE and provides flood control along Northfield Brook. Based on dam failure inundation maps provided by the ACOE, a dam failure at full pool height would cause flooding along Northfield Brook and the Naugatuck River corridors all the way to Naugatuck. The Town Fire Department and the State Department of Transportation District Four Headquarters are critical facilities located within the inundation area (Figure 8-2). Further downstream, the inundation area would primarily be confined to the Naugatuck River floodplain, although some additional low-lying areas would also be affected. The Thomaston Waste Water Treatment Plant (WWTP) may also be affected by flooding from the failure of Northfield Brook Dam.

Black Rock Dam

Black Rock Dam is owned by the ACOE and provides flood control along Branch Brook in Black Rock State Park. Based on dam failure inundation maps provided by the ACOE, a dam failure at full pool height would cause flooding along the Branch Brook and Naugatuck River corridors all the way to Beacon Falls. Thomaston High School, the Thomaston WWTP and the Connecticut Water Company wellfield are the critical facilities that would be affected (Figure 8-3). Further downstream, the inundation area would primarily be inside the Naugatuck River floodplain, although some inland areas would also be affected.

Wigwam Reservoir Dam

Wigwam Reservoir is owned by the City of Waterbury. It covers a surface area of approximately 96.3 acres, with much of this area outside the Town of Thomaston. The reservoir receives its inflow from Morris Reservoir, Moosehorn Brook, Fenn Brook, and several unnamed tributaries. The outflow from this reservoir is the headwaters of Branch Brook. The downstream corridor is predominately undeveloped, with an aqueduct running parallel to the brook through Black Rock State Park before it enters Watertown. As shown on Figure 8.3, the dam failure inundation area extends along Route 109 to Black Rock Dam. Few houses are in the dam failure inundation area, with no critical facilities with the exception of Route 109. The largest danger from a dam failure of this Class B dam is the damage it could cause to Black Rock Dam. If the pool behind Black Rock Dam was near capacity, the failure of Wigwam Reservoir dam could cause Black Rock Dam to fail.

Other Dams

There are additional dams that could affect the residents of Thomaston. A Class C dam in Plymouth has a dam failure inundation area passing through Thomaston into the Naugatuck River. In addition, two other smaller impoundments in Thomaston have been noted by Town personnel as having the potential for problems. These are discussed briefly below.

- Plymouth Reservoir Dam: This Class C dam is owned and operated by Connecticut Water Company and is located in the west part of Plymouth. The outflow from this 36.5 acre reservoir is an unnamed stream that enters Thomaston near Altair Avenue and passes under Railroad Street and Sanderson Lane before passing into the Naugatuck River. As noted in Section 3, this stream has recently caused damage to the bridge on Altair Avenue that is being repaired. The dam failure inundation area

for this dam (Figure 8-1) extends throughout the residential area in the vicinity of Railroad Street and downstream to the Naugatuck River.

- Leigh Avenue Dam: This private dam is located in a remote rural area above Leigh Avenue. The dam is not registered with the DEP. According to Town personnel, the dam is an earthen dam with a pipe through the dam to act as a spillway. The dam impounds approximately 1.8 acres. While a formal dam failure analysis has not been performed, Town personnel are concerned that a dam failure could impact five homes on Edgewood Avenue and Leigh Avenue and potentially Route 6 if it failed suddenly.

- Southerly Pond Dam: This dam is registered with the DEP but was not assigned a hazard classification as of 1996. The dam impounds approximately 2.4 acres. The pond is primarily used for stormwater management and receives inflow from storm sewers on the surrounding roads. According to Town personnel, the pond has been slowly filling over the past 14 years since Twin Pond Road was installed, resulting in a loss of available storage for the mitigation of peak stormwater. If the dam should fail, it could affect as many as four houses downstream on Smith Road and cause considerable damage to an underground culvert under Smith Road that conveys the outflow from the pond.

8.6 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 Connecticut DEP also administers the Flood and Erosion Control Board program, which can provide non-competitive state funding for repair of municipality-owned dams.

Funding is limited by the state bond commission. The Town of Thomaston established a Flood and Erosion Control Board in 1956 to oversee local flooding and erosion problems and municipal dams under CGS section 25-84, and this Board is comprised of the Board of Selectmen. The Town of Thomaston should pursue funding through this program for flooding and erosion control projects and to repair municipal dams as needed.

The Town of Thomaston should work with the ACOE, the City of Waterbury, the Connecticut Water Company, 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 and around Thomaston. When possible, copies of these documents should be made available at the Town Hall for reference and public viewing.

With regard to Nystrom Pond Dam, the Town of Thomaston should review and update the Emergency Operations Plan, and coordinate with the Town of Litchfield to prepare or update the dam failure analysis in order to minimize Town liability and maximize Town emergency preparedness should the dam ever fail. The Town should continue its ongoing program of inspection and maintenance. In addition, all Class C & B dams in the Town should continue to be regularly inspected by their respective owners, with maintenance performed as required to keep the dams in safe and functional order. The Town should also consider implementing occasional Town inspections of Class A, AA, and unranked dams.

The Town of Thomaston should consider including dam failure areas in its CodeRED emergency notification system. This system combines database and GIS mapping technologies to deliver outbound emergency notifications to geographic areas or specific groups of people such as emergency responder teams at a rate of up to 60,000 calls per hour. This technology should be used to warn downstream residents of an impending dam failure and facilitate evacuation.

The Town should consider assigning of creating a new shelter facility outside of the dam failure inundation areas of Class C dams. Dam failure is a potentially catastrophic event that can displace large portions of Thomaston's population, and a dam failure that damages the Town's shelters would greatly hinder emergency response and assistance to affected populations.

The Town should encourage the DEP to investigate the hazard potential of the dam above Leigh Avenue, require registration, and ensure that proper maintenance is being performed to keep the dam in safe and functional working order. The Town should also install a sediment trap in Southerly pond to prevent the further filling, and consider dredging the pond to restore available head for stormwater management.

In addition, there are several suggested potential mitigation strategies which are applicable to all hazards in this plan. These are outlined in the Section 10.1.

9.0 WILDFIRES

9.1 Setting

The ensuing discussion about wildfires is focused on the undeveloped wooded and shrubby areas of Thomaston, 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.

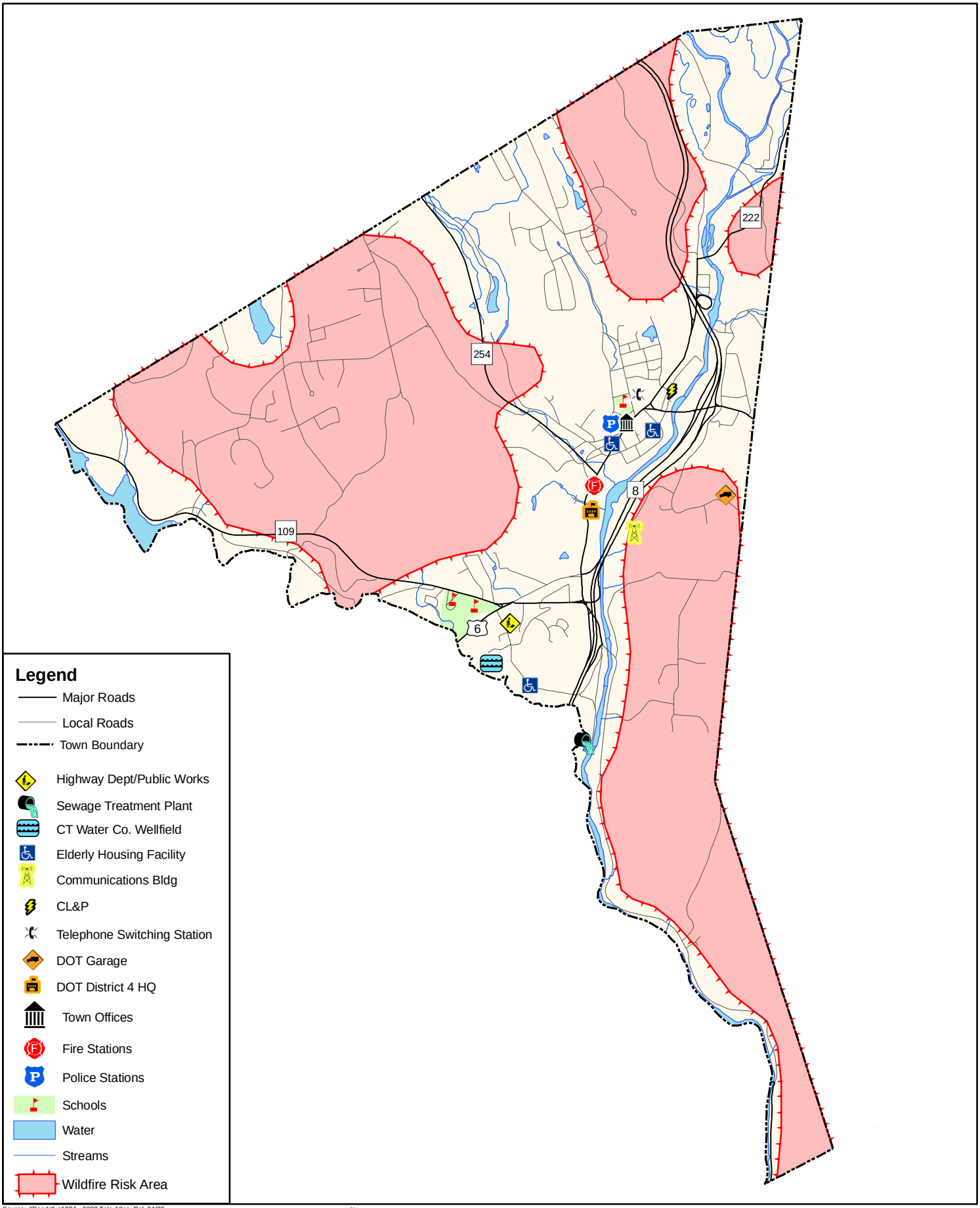
The Town of Thomaston is considered a low-risk area for wildfires. Wildfires are of particular concern in wooded areas and other areas with poor access for fire-fighting equipment. Figure 9-1 presents the wildfire risk areas for the Town of Thomaston. Hazards associated with wildfires include property damage and loss of habitat. Wildfires are considered a likely event each year, but when one occurs it is generally contained to a small range with limited damage to non-forested areas.

9.2 Hazard Assessment

The current Connecticut Hazard Mitigation Plan does not specifically define wildfires separate from forest fires, but 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 9-1: Thomaston Wildfire Risk Area



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

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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.

9.3 Historic Record

According to the Connecticut Natural Hazards 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 20th 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 USDA Forest Service Annual Wildfire Summary Report for 1994 through 2003, an average of 600 acres per year in Connecticut was burned by wildfires. In general, the fires are small and detected quickly, with most wildfires being contained to less than 10 acres in size. The number one cause of wildfires is arson, with about half of all wildfires being intentionally set.

Traditionally, the highest forest fire danger in Connecticut occurs in the spring from mid-March to mid-May. The worst wildfire year for Connecticut in the past decade occurred during the extremely hot and dry summer of 1999. Over 1733 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, CT 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. Much of Thomaston is protected open space, and fires have occurred throughout the Town. Specifically, Town personnel noted that fires have occurred in the southeastern part of Town off Waterbury Road.

9.4 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

Thomaston Zoning Regulations and Subdivision Regulations also have special use standards regarding fire protection for commercial and municipal facilities, and the creation of fire ponds for new subdivisions outside the range of public water service. In addition, new roads and subdivisions are required to allow 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 Thomaston Fire Department goes to the fires. This proactive approach is believed to be effective for controlling wildfires. The fire department has some water storage capability, but primarily relies on the Connecticut Water Company's water service to fight fires in the central part of Town. In the remainder of Town, the fire department relies heavily on the use of local water bodies to supply fire fighting water.

The Thomaston Fire Department is often the first responder for fires that happen in the Mattatuck State Forest in Watertown, and coordinates with the Watertown Fire Department to control these forest fires. While the Thomaston Fire Department does not have a four-wheel drive brush truck, it does have a tanker truck capable of carrying water to remote locations. The Town also has mutual aid agreements with all of its neighbors.

Finally, the DEP Forestry Division uses the rainfall data recorded by the Automated Flood Warning system (see Section 3.4) to compile forest fire probability forecasts. This allows the Division and the Town of Thomaston to monitor the drier areas of the state in an effort to reduce forest fire risk.

9.5 Vulnerabilities and Risk Assessment

The most common causes of wildfires are arson, lightning strikes, and fires started from downed trees hitting electrical lines. Thus, wildfires have the potential to occur anywhere and at any time in both undeveloped and lightly developed areas. 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 fire fighting 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 9.3, most wildfires in Connecticut are relatively small. In the drought year of 1999, the average wildfire burned five acres in comparison to the two most extreme wildfires recorded since 1986 that burned 300 acres each. Given the availability of fire-fighting water in the Town, including the use of nearby water bodies, and long-standing mutual aid assurances the Town Fire Department has with neighboring communities, it is believed that these average and severe values are applicable to the Town as well.

The wildfire risk areas presented in Figure 9-1 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 wooded water company lands, federally owned forests associated with the flood control dams, land trust

property, and Town-owned open space. As each area borders residential sections of the Town, residents on the outskirts of these risk areas are the most vulnerable to fire, heat, and smoke effects of wildfires.

Despite having a large amount of forest/urban interface, the overall risk of wildfires occurring in the Town of Thomaston 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 fire fighting equipment. The Town also has the support of the local water companies to provide access to their extensive watershed lands in case of a wildfire.

Recall from Figure 2-7, Figure 2-8, and Figure 2-9 that elderly, linguistically isolated, and disabled populations reside in the Town of Thomaston. In comparing these figures with the wildfire risk areas presented in Figure 9-1, it is possible that several hundred of the population impacted by a wildfire could consist of the elderly, a few could consist of linguistically isolated households, and several hundred with disabilities could reside near wildfire impact areas. Thus, it is important for the Thomaston Fire Department to be prepared to assist these special populations during emergencies, including wildfire.

In summary, fragmented forest areas in the southern part of Town near new development are considered most at risk from wildfires. In addition, there is concern about fires in the wooded eastern, northern, and southern sections of Town. While fires are less frequent in these areas, they can often be difficult to access. The Town has the support of the owners of the tracts of open space to provide access to their lands in case 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 period 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 fire response in the Town.

9.6 Potential Mitigation Measures, Strategies, and Alternatives

Potential mitigation measures for wildfires include a mixture 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 forest fire risk:

- The Connecticut Water Company should continue to extend the public water supply systems into areas that require water for fire protection.
- The Connecticut Water Company 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 Thomaston should consider the construction of dry hydrants throughout the Town to provide a more reliable supply of firefighting water in areas without public water supply.

Other potential mitigation strategies for preventing wildfires include:

- Continue to promote inter-municipal cooperation in fire fighting efforts;
- Continue to support public outreach programs to increase awareness of forest fire danger and how to use common fire fighting 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.

10.0 RECOMMENDATIONS

10.1 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 or Fire Department should be charged with creating and disseminating informational pamphlets and guides to public locations such as the library, post office, senior center, and town hall. In particular, additional guides are recommended regarding fire protection, fire safety, and the importance of prevention. Such pamphlets include *"Are you ready? A Guide to Citizen Preparedness"* co-published by the American Red Cross, FEMA, and the National Oceanic & 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 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 boon for emergency response in Thomaston. Databases should be set up as 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 at least once annually.

10.2 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.

All Hazards

- Disseminate informational pamphlets regarding natural hazards to public locations.
- Add pages to the Town website (http://www.thomastonct.org) dedicated to citizen education and preparation for natural hazard events.
- Continue implementation of the CodeRED system, including encouraging residents to contribute their phone numbers to the database.
- Encourage residents to purchase and use NOAA weather radios with alarm features.

- Continue to review and update the Town Emergency Operations Plan at least once annually.

Inland 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. See Appended Table 3 for a sample checklist for the Town of Thomaston.
- Consider performing a Town-wide inventory of drainage pipes as part of the next Stormwater Management Plan update to help identify undersized and failing portions of the drainage system.
- 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.
- Ensure new buildings be designed and graded to shunt drainage away from the building.
- Assist with the Map Mod program to ensure an appropriate update to the Flood Insurance Study, Flood Insurance Rate Maps, and Flood Boundary and Floodway Maps.
- 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.

- Adopt an aquifer protection area overlay zone to regulate development after Connecticut Water Company has completed their final mapping of the Aquifer Protection Area for their wellfield along Branch Brook.

Property & Natural Resource Protection

- Pursue the acquisition of additional municipal open space properties inside SFHAs and set it 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.
- Pursue plans to redevelop Brownfield sites, or to remediate them and convert them to open space.

Structural Projects

- Repair the Bayberry Drive culvert or replace with a properly sized box culvert.
- Replace the undersized culvert on Carter Road with a properly sized culvert, and tie in nearby storm sewers.
- Install drainage systems on Hillside Avenue and Gilbert Street.
- Finish repair of Altair Avenue bridge and culvert.
- Install riprap along stream banks for unnamed stream parallel to High Street Extension to protect the roadway and the private property above.
- Pursue funding to install drainage systems on Reynolds Bridge Road.
- Investigate alternatives to facilitate the proper completion of the Valley View drainage system such that it is as designed and approved.
- Coordinate with the State Department of Transportation regarding maintenance of debris and vegetation in the swale upstream of the culvert that drains under

Watertown Road (Route 6) towards Stumpf Avenue. Encourage the State DOT to enlarge the culvert under the road.

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

- Increase tree limb maintenance and inspections, especially along Route 6, Route 109, Route 254, 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 Thomaston.
- Provide for the Building Department to have literature available regarding appropriate design standards for wind.
- Continue outreach regarding dangerous trees on private property.
- Continue to require compliance with the amended Connecticut Building Code for wind speeds.

Winter Storms

- Review and post evacuation plans to ensure timely migration of people seeking shelter in all areas of Thomaston.
- Post a list of Town sheltering facilities in the Town Hall and on the Town's website so residents can best plan how to access to critical facilities during a winter storm event. Post the snow plowing prioritization in Town buildings each winter to increase public awareness, and continue to post the information on the Town's police website.
- Provide educational materials to property owners regarding the use of shutters, storm windows, pipe insulators, and removing snow from flat roofs.
- Provide educational materials with safety tips and reminders regarding cold weather.

- 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 requiring proposed grading to be no more than a 33% slope beyond the sidewalk, and consider decreasing this limit to a maximum slope of 30%.
- Continue to require adherence to the state building codes.
- Ensure that municipal departments have adequate backup facilities in case earthquake damage occurs.

Dam Failure

- Stay current on the evolution of EOPs and Dam Failure Analyses for Class C and Class B dams whose failure could impact areas of Thomaston.
- Continue maintenance and inspections of Nystrom Pond dam, and review and update the EOP for the dam as necessary.
- Consider implementing Town inspections of Class AA, A, and unranked dams.
- Include dam failure areas in the CodeRED database.
- When possible, have copies of the Class C dam EOPs and Dam Failure Analyses on file in the Town hall for public viewing.
- Create or assign a new shelter facility outside of dam failure inundation areas of Class C dams.
- Petition the DEP to inspect the dam above Leigh Avenue, investigate its hazard potential, and have the property owner register the dam.
- Install a sediment trap in Southerly pond and consider dredging to restore available storage.

- Continue using the Town Flood and Erosion Control Board to oversee municipal dam maintenance and problems with flooding and erosion, and to pursue funding for projects and municipal dam repairs.

Wildfires

- The Connecticut Water Company should continue to extend the public water supply systems into areas that require water for fire protection.
- The Connecticut Water Company 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 Thomaston should consider the construction of dry hydrants throughout the Town to provide a more reliable supply of firefighting water in areas without public water supply.
- Continue to promote inter-municipal cooperation in fire fighting efforts;
- Continue to support public outreach programs to increase awareness of forest fire danger and how to use common fire fighting 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.

10.3 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 provided 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 grand 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

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 twenty-five 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 if 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.*

11.0 PLAN IMPLEMENTATION

11.1 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 Thomaston, and guide it through the FEMA approval process. The Thomaston Board of Selectmen is the governing body that will formally adopt the plan subsequent to conditional approval from FEMA.

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 Highway Department in the Town of Thomaston will primarily be responsible for developing and implementing selected projects. 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 Town Highway Department.

11.2 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 its 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 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 11.1.

Matters to be reviewed will include the goals and objectives of the original plan, hazards or disasters that occurred during the preceding period, 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 meeting will be conducted in August or September, at least two months before the annual application cycle for pre-disaster grants (applications are typically due to DEP in November of any given year). 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 Thomaston.

11.3 Updating the Plan

The Council of Governments of the Central Naugatuck Valley will update the hazard mitigation plan if a consensus to do so is reached by the Board of Selectmen of Thomaston and a request is presented to the Council of Governments of the Central Naugatuck Valley, or at least once every five years. 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;
- Naugatuck River Watershed Association;
- Key organizations from the list presented on Page 1-10;
- Town of Harwinton Public Works Department and Planning Department;
- Town of Morris Public Works Department and Planning Department;
- Town of Watertown Public Works Department and Planning Department;
- Town of Litchfield Public Works Department and Land Use Department;
- Town of Plymouth Public Works Department and Land Use Department; and
- City of Waterbury Public Works Department, Fire Department, and Mayor's Office.

Updates may include deleting recommendations as projects are completed, adding recommendations as new hazard effects 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.

11.4 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, 6th 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, 19th 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, 6th 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

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
Earthquakes	3	1	2	6
Wildfires	1	2	1	4

Location

1 = small isolated to specific area during one event
2 = medium mulitple 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 ilnesses 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 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.

Natural Hazard Effects	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**	
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
Flooding from Dam Failure	2	1	4	7
Thunderstorm Winds	2	2	2	6
Tornado Winds	2	1	3	6
Shaking	3	1	2	6
Inland Flooding	1	3	1	5
Flooding from Poor Drainage	1	3	1	5
Lightning	1	3	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	mulitple 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 ilnesses 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

	Zoning Regulations	Flood Plain Management Ordinance	Subdivision Regulations	Inland Wetland Regulations
Lot, Area, Shape and Frontage Wetlands, watercourses, or their setback area containing any significant predevelopment slopes in excess of 25% shall not be present within the buildable square.	**5.2** ☐			
Flood Plain District No building or structure within the boundaries of this district may be constructed, moved, or substantially improved without a Flood Hazard Area Permit.	**7** ☐			
Anchoring All new construction and substantial improvements shall be anchored to prevent flotation, collapse or lateral movement of the structure		**280-10** ☐		
Construction material and methods All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage and by using methods and practices that minimize flood damage.		**280-11** ☐		
Building Location and Floor Location No new construction or substantial improvement of buildings and other structures for human occupancy shall be located in any special flood hazard area. Any new construction or substantial improvement of buildings and other structures for other than human occupancy shall either have the lowest floor, including basement, elevated to or above the base flood elevation or shall, together with attendant utility and sanitary facilities, conform to the following: A. Be floodproofed so that up to one foot above the base flood elevation the structure is watertight with walls substantially impermeable to the passage of water; B. Have structural components capable of resisting hydrostatic and hydrodynamics loads and the effects of buoyancy; and C. Be certified by a registered professional engineer or architect that the above standards are satisfied, which certifications shall be provided to the Building Official.		**280-13** ☐		

Appended Table 3
Development Permit Checklist for Hazard Mitigation and Effective Emergency Management

	Zoning Regulations	Flood Plain Management Ordinance	Subdivision Regulations	Inland Wetland Regulations
Floodways Floodways are extremely hazardous areas due to the velocity o floodwaters which cause erosion and carry debris and potential projectiles. In areas where floodways have been designated or determined the following additional standards are applicable: A. Encroachment. There shall be no encroachments, including fill, new construction, substantial improvements, and other development, unless certification by a registered professional engineer or architect is provided demonstrating that encroachments will not result in any increase in flood levels during the occurrence of the base flood discharge. B. If the requirement of Subsection A is satisfied, all new construction and substantial improvements shall comply with all other applicable standards of this article.		**280-14** ☐		
Manufactured Homes No manufactured homes shall be located in a special flood hazard area		**280-15** ☐		
Alteration of Watercourse In any portion of a watercourse which is altered or relocated the flood-carrying capacity shall be maintained		**280-16** ☐		
Changes to Existing Structures A structure already in compliance with the provisions of this regulation shall not be made noncompliant by any alteration, repair, reconstruction o improvement to the structure		**280-17** ☐		

Appended Table 3
Development Permit Checklist for Hazard Mitigation and Effective Emergency Management

	Zoning Regulations	Flood Plain Management Ordinance	Subdivision Regulations	Inland Wetland Regulations
Elevated Buildings New construction or substantial improvements of elevated buildings that include fully enclosed areas formed by foundation and other exterior walls below the base flood elevation shall be designed to preclude finished living space and designed to allow for the entry and exit of floodwaters to automatically equalize hydrostatic flood forces on exterior walls. A. Designs for complying with this requirement must either be certified by a professional engineer or architect or meet the following minimum criteria: (1) A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided; (2) The bottom of all openings shall be no higher than one foot above grade; and (3) Openings may be equipped with screens, louvers, valves or other coverings or devices provided that they permit the automatic flow of floodwaters in both directions. B. Electrical, plumbing and other utility connections are prohibited below the base flood elevation. C. Access to the enclosed area shall be the minimum necessary to allow fo D. The interior portion of such enclosed area shall not be partitioned or fi		**280-18** ☐		
Streams without established BFEs or floodways Located within the areas of special flood hazard established in § 280-2 where small streams exist but no base flood data has been provided or where no floodways have been provided, the following provisions apply: (1) In A Zones where base flood elevations have been determined, but before a floodway is designated, no new construction, substantial improvement, or other development (including fill) shall be permitted which would increase base flood elevations more than one foot at any point along the watercourse when all anticipated development is considered cumulatively with the proposed development. (2) New construction or substantial improvements of structures shall be elevated or floodproofed to elevations established in accordance with § 280-13.		**280-19** ☐		

Appended Table 3
Development Permit Checklist for Hazard Mitigation and Effective Emergency Management

	Zoning Regulations	Flood Plain Management Ordinance	Subdivision Regulations	Inland Wetland Regulations
Unsuitable Building Lots A building lot may not be suitable for construction purposes due to adverse or sensitive environmental conditions, such as flooding, seasonal runoff, excessive slope, exposed ledge or bedrock, soil conditions, or wetlands.			**9.4** ☐	
Terrain Unless the lot has been specifically approved by the Inland Wetlands and Watercourses Commission, each lot shall be able to accommodate primary buildings, driveway access and parking spaces without disturbing wetlands and watercourses.			**9.5** ☐	
Access Proposed streets shall be constructed to the required width and have suitable travelway, grade and alignment to provide safe access for police, fire, ambulance, emergency vehicles…			**10.4 (b)** ☐	
Deadend or No Outlet Streets / Cul-de-sacs Cul-de-sacs shall not exceed 1,000 feet in length. Permanent dead-end streets shall be avoided unless connecting streets are impracticable. A 100-foot turn around shall be provided at the closed end…			**11.1** ☐	
Width of Pavement Streets shall be designed with a 26-foot width of pavement			**11.2** ☐	
Channel Encroachment and Building Lines Channel encroachment/building lines based on sound engineering judgment shall be provided on the site plans for all subdivisions to prevent encroachment upon the natural water channel.			**11.31** ☐	
Design Standards for Minimizing Flood Damage Subdivisions shall be designed to control and mitigate potential flood damage…and have drainage facilities and other systems in place to reduce exposure to flood hazards			**12** ☐	
Standards and Criteria for Decision - Environmental Impact Consider the environmental impact, including effects of the activity on the natural capacity to… prevent flooding… to control sediment, to facilitate drainage, and to promote public health and safety				**10.3 (a)** ☐

Appended Table 3
Development Permit Checklist for Hazard Mitigation and Effective Emergency Management

	Zoning Regulations	Flood Plain Management Ordinance	Subdivision Regulations	Inland Wetland Regulations
Standards and Criteria for Decision - Public Health, Safety, and Use Recognition of potential damage from erosion… danger of flooding				**10.3 (e)** ☐
Standards and Criteria for Decision - On-Site Mitigation Measures Consider actions which would protect the natural capacity of the area to accomplish the following: prevent flooding and facilitate drainage, contro sedimentation and erosion, promote public health and safety				**10.3 (g)** ☐

APPENDIX A
STAPLEE MATRIX

Strategies Listed by Primary Report Section for Thomaston	Responsible Department[1]	Schedule A. Ongoing B. 2008-2013 C. 2013-2018 D. 2018-2023	Associated Report Sections							Category 1. Prevention 2. Property Protection 3. Natural Resource Prot. 4. Structural Projects 5. Public Information	STAPLEE Criteria *Good = 3, Average =2, and Poor = 1*							
			Inland Flooding	Hurricanes	Summer Storms and Tornadoes	Winter Storms	Earthquakes	Dam Failure	Wildfires		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	LEPC	A	x	x	x	x	x	x	x	1,2,5	3	3	3	3	3	3	3	**21**
Add pages to Town website dedicated to citizen education and preparation for natural hazard events	LEPC	B	x	x	x	x	x	x	x	1,2,5	3	3	2	3	3	3	3	**20**
Continue implementation of CodeRED emergency notification system	LEPC	A	x	x	x	x	x	x	x	1,2,5	3	3	3	3	3	3	1	**19**
Encourage residents to purchase and use NOAA weather radio with an alarm feature	LEPC	B	x	x	x	x	x	x	x	2,5	3	3	2	3	3	2	1	**17**
Continue to review and update Emergency Operations Plan, at least once annually	LEPC	A	x	x	x	x	x	x	x	1	3	3	3	3	3	3	1	**19**
INLAND FLOODING																		
Prevention																		
Streamline the permitting process to ensure maximum education of developer or applicant	PZC/ZEO	B	x	x	x	x	x		x	1	3	2	2	3	3	3	3	**19**
Perform a Town-wide drainage study and continue to update every five years	DPW	B,C,D	x	x	x	x		x		1	3	3	2	3	3	2	1	**17**
Consider joining FEMA's Community Rating System	First Selectman	B	x	x	x	x				2	3	3	2	3	3	2	1	**17**
Continue to require Flood Hazard Area permits for activities within SFHAs	PZC	A	x	x	x	x				1	2	3	2	3	3	3	2	**18**
Require new buildings constructed in flood prone areas to be protected to the highest recorded flood level regardless of SFHA	PZC	B	x	x	x	x				1,2	2	2	2	2	2	3	1	**14**
Require that new buildings be designed and graded to shunt drainage away from the building	PZC	B	x	x	x	x				1,2	2	2	3	3	3	3	1	**17**
Assist with the MapMod Program to ensure an appropriate update to the FIS, FIRM, and Flood Boundary & Floodway Maps for the Town	First Selectman, DPW	B, C	x	x	x	x				1	3	3	2	3	3	2	1	**17**
After the MapMod Program, use the Town two-foot contour maps to develop more exact regulatory flood maps using FEMA flood elevations	DPW	C, D	x	x	x	x				1,2	2	2	2	2	2	3	1	**14**
Adopt an aquifer protection overlay zone once Connecticut Water Company finalizes its aquifer protection area	PZC	B	x	x	x	x				1	2	3	3	3	3	2	3	**19**
Property and Natural Resource Protection																		
Acquire open space properties within SFHAs and set aside as greenways, parks, or other non-residential, non-commercial, or non-industrial use	First Selectman	A	x	x	x	x		x		2,3	3	2	2	3	3	3	3	**19**
Selectively pursue conservation objectives listed in the Plan of Conservation & Development	First Selectman	A	x	x	x	x				3	3	2	2	3	3	2	3	**18**
Continue to regulate development in protected and sensitive areas, including steep slopes, wetlands, and floodplains	PZC, IWC	A	x	x	x	x	x	x	x	3	2	3	3	2	3	2	3	**18**
Pursue plans to redevelop Brownfield sites, or remediate them and convert to open space	First Selectman	B	x	x	x	x		x		2,3	2	2	2	3	3	2	3	**17**
Structural Projects																		
Repair the Bayberry Drive culvert or replace with a properly sized box culvert	DPW	B	x	x	x	x				2,4	3	3	3	3	3	2	1	**18**
Replace undersized culvert on Carter Road with larger culvert and tie in to nearby storm sewers	DPW	B	x	x	x	x				4	3	2	3	3	3	2	1	**17**
Install drainage systems on Hillside Avenue and Gilbert Street	DPW	C	x	x	x	x				4	3	2	2	3	3	2	1	**16**
Finish repair of Altair Avenue bridge and culvert	DPW	A	x	x	x	x		x		4	3	3	3	3	3	2	2	**19**
Install riprap along unnamed stream parallel to High Street Extension to protect roadway and adjancent property	DPW	B	x	x	x	x				2,4	3	3	2	3	3	3	2	**19**
Install drainage system on Reynolds Bridge Road	DPW	C	x	x	x	x				4	3	2	2	3	3	3	1	**17**
Investigate alternatives to facilitate proper completion of Valley View development's drainage system as approved	DPW	B	x	x	x	x				4	2	1	2	2	2	1	2	**12**
Coordinate with the State DOT regarding maintenance of vegetated swale near culvert under Route 6 upstream of Stumpf Avenue	DPW	B	x	x	x	x				2,4	3	2	2	3	3	2	2	**17**
WIND DAMAGE RELATED TO HURRICANES, SUMMER STORMS, AND WINTER STORMS																		
Increase tree limb inspections and maintenance, especially along evacuation routes, and ensure minimum potential for downed power lines	DPW	B		x	x	x	x			1,2	3	2	1	3	3	2	1	**15**
Increase inspections of trees on private property near power lines and Town right-of-ways	DPW	B		x	x	x	x			1,2	3	2	1	3	3	2	1	**15**
Continue outreach regarding dangerous trees on private property	DPW	A		x	x	x	x			1	3	2	2	3	3	3	1	**17**
Continue to require that utilities be placed underground in new developments and pursue funding to move them underground in existing areas	PZC, First Selectman	A, C	x	x	x	x		x	x	1,2	3	2	2	3	3	3	1	**17**
Continue to require compliance with the Connecticut Building Code for Wind Speeds	PZC/ZEO	A		x	x	x				1	3	3	3	3	3	3	1	**19**
Provide for the Building Department to make literature available during the permitting process regarding appropriate design standards	PZC/ZEO	B		x	x	x				1	3	3	3	3	3	3	1	**19**

Strategies Listed by Primary Report Section for Thomaston	Responsible Department[1]	Schedule A. Ongoing B. 2008-2013 C. 2013-2018 D. 2018-2023	Associated Report Sections							Category 1. Prevention 2. Property Protection 3. Natural Resource Prot. 4. Structural Projects 5. Public Information	STAPLEE Criteria *Good = 3, Average =2, and Poor = 1*							
			Inland Flooding	Hurricanes	Summer Storms and Tornadoes	Winter Storms	Earthquakes	Dam Failure	Wildfires		Socially acceptable?	Technically feasible?	Administratively workable?	Politically acceptable?	Can it be legally implemented?	Economically beneficial?	Environmentally beneficial?	**STAPLEE Sum of Scores**
WINTER STORMS																		
Post a list of Town sheltering facilities in the Town Hall and on the Town's website	LEPC	B	x	x	x	x	x	x	x	5	3	3	3	3	3	3	1	**19**
Complete and disseminate evacuation plan to ensure timely evacuation of shelterees from all areas of Town	LEPC	B	x	x	x	x	x	x	x	5	3	3	3	3	3	3	1	**19**
Post the snow-plowing prioritization in Town buildings each winter, and continue to post on Town's police website	DPW, LEPC	A, B				x				5	2	3	3	3	3	3	1	**18**
Provide educational materials to property owners regarding using shutters, storm windows, pipe insulators, and removing snow from flat roofs	LEPC	B		x	x	x				2,5	3	3	3	3	3	3	1	**19**
Provide educational materials with safety tips and reminders regarding cold weather	LEPC	B				x				1,5	3	3	3	3	3	3	1	**19**
Encourage two modes of egress into every neighborhood by the creation of through streets	PZC	A	x	x	x	x	x	x	x	1	3	2	3	3	3	2	1	**17**
EARTHQUAKES																		
Consider preventing residential development in areas prone to collapse, such as below steep slopes	PZC	B					x			1	2	3	3	2	3	2	2	**17**
Continue restricting grading to 33% slope, and consider decreasing this restriction to 30%	PZC	A, B					x			1	2	3	3	2	3	2	3	**18**
Continue to require adherence to the state building codes	PZC	A		x	x	x	x			1	2	3	3	3	3	3	1	**18**
Ensure that municipal departments have adequate backup facilities (power generation, heat, water, etc.) in case earthquake damage occurs	First Selectman	B		x	x	x	x	x		1	2	2	2	2	3	2	1	**14**
DAM FAILURE																		
Stay current on the evolution of EOPs and Dam Failure Analyses for Class C and B dams that can impact Thomaston	First Selectman	A	x				x	x		2	3	3	3	3	3	3	3	**21**
Continue performing maintenance, and review and update the EOP for Nystrom Pond dam as necessary	DPW	A					x	x		2,4	3	3	3	3	3	2	2	**19**
Consider implementing Town inspections of Class A, AA, and unranked dams	DPW	B	x				x	x		2	2	3	1	2	1	3	2	**14**
Include dam failure innundation areas in the CodeRED database	LEPC	B	x				x	x		1	3	3	3	3	3	3	1	**19**
Have copies of the Class C dam EOPs and Dam Failure Analyses on file at the Town Hall for public viewing	First Selectman	B						x		5	3	2	3	3	2	1	1	**15**
Create or assign a new shelter facility outside of dam failure inundation areas of Class C dams	LEPC	B	x	x	x	x	x	x	x	1,4,5	2	2	2	3	3	3	1	**16**
Petition the DEP to investigate the hazard potential of the dam above Leigh Avenue and require registration	First Selectman	B					x	x		2	2	3	3	3	3	3	1	**18**
Install sediment trap in Southerly Pond and consider dredging to restore available storage	DPW	C	x	x	x	x	x	x		2,3	3	2	2	3	2	3	1	**16**
Use the Town Flood and Erosion Control Board to pursue funding for municpal dam maintenance and flood/erosion projects	First Selectman	B	x	x	x	x		x		1,2,3,4	3	3	3	3	3	3	2	**20**
WILDFIRES																		
Continue to have the Connecticut Water Company extend/upgrade the public water supply systems into areas requiring water for fire protection	PZC	A				x			x	2,4	3	2	3	3	3	3	2	**19**
Install dry hydtrants to provide a more reliable supply of fire fighting water outside of public water supply areas	DPW, Fire Dept.	B				x			x	1	3	2	3	3	3	3	1	**18**
Continue to promote inter-municipal cooperation in fire-fighting efforts	Fire Dept.	A				x			x	1	3	3	3	3	3	3	3	**21**
Continue to support public outreach programs to increase awareness of forest fire danger and how to use common fire fighting equipment	Fire Dept.	A							x	5	3	3	3	3	3	3	3	**21**
Continue reviewing subdivision applications to ensure proper access for emergency vehicles	PZC	A	x	x	x	x	x	x	x	1	3	3	2	3	3	2	2	**18**
Provide outreach programs that include tips on how to properly manage burning and campfires on private property	Fire Dept.	B							x	5	3	3	3	3	3	3	3	**21**
Patrol Town-owned open space and parks to prevent campfires	Police Dept.	B							x	3	2	2	2	3	3	2	3	**17**
Enforce regulations and permits for open burning	Police Dept.	A							x	1,3	2	2	2	3	3	3	3	**18**

[1]**Notes**
LEPC = Local Emergency Planning Commissioner
PZC = Planning & Zoning Commission
ZEO = Zoning Enforcement Officer
DPW = Department of Public Works / Highway Department
IWC = Inland Wetlands & Watercourses Commission

APPENDIX B
DOCUMENTATION OF PLAN DEVELOPMENT

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 Thomaston 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.

COGCNV field notes
Field inspection on February 13, 2008.
Notes typed February 14, 2008
Scott Bighinatti

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 Vince McDermott outlined areas of potential flooding in the Towns of Thomaston and Bethlehem. 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:

Camera #1:

1. North end of Reynolds Bridge Road, Thomaston
2. Northern part of Munger Lane, Bethlehem (facing north)
3. Northern part of Munger Lane, Bethlehem (facing south)
4. North end of Westshore drive, Bethlehem (facing south)
5. North end of West shore drive, Bethlehem (facing west)

Many areas of both Towns were subject to minor sheet flow. Other areas had deeper puddles due to snow inhibiting inflow to the storm sewers. No major tree falls were noted, although there were areas with small branches that had fallen into or next to the streets.

Thomaston:

a) Waterbury Road (Route 262) (South) – Nibbling Brook appears to bend around a factory, but the channel appeared well developed. The stream was flowing hard, but the water did not contain much sediment. There is a low area on the south side of the road that is in the 100-year flood plain, but appeared to be used for storage. It was not flooded at the time of inspection.

b) Waterbury Road (Route 262) (South) – At the bend in Rt. 262 where Jericho Brook enters the Naugatuck River from the west, and there was a large puddle over the northbound lane about five inches deep. This curve is south of the Stevens business. No problems were noted near the Stevens business.

c) Waterbury Road (Route 262) (South) – A factory on the west side of the road had no problems with flooding, but the east side of the road was not draining. Two to three inches of water was present in the northbound lane.

d) Naugatuck River – The Naugatuck River was high, but not close to being over bank, during field inspections in Thomaston. All the bridges over the Naugatuck River are very high and in no danger of being overtopped by normal floods.

e) Reynolds Bridge Road – The north end of this road near the Route 8 northbound off-ramp had a deep puddle (approximately eight inches in the middle). This puddle is likely due to a clogged culvert in the low spot, but this was not verified. See Picture #1.

f) Unnamed Tributary near Route 6 – An unnamed tributary to the Naugatuck River is channelized starting from Watertown Road (Route 6) and running under Sumpf Avenue, Warner Lane, and Route 262. No flooding was noted upstream of the culvert.

g) Northfield Brook – No flooding was noted along Northfield Road (Route 254). Despite several crossings under Northfield Road, the culverts appear well sized to handle the discharge along Northfield Brook that outlets from Northfield Pond Dam, which is managed by the US Army Corps of Engineers.

h) Unnamed Stream along High Street Extension – A stream drains from a small pond along the west side of the street. While it is unlikely that the stream will be high enough to overtop the road, several driveway crossings exist over the stream, indicating the potential for residents to be trapped if the crossings back up.

i) Smith Road – No flooding problems were noted here on this unnamed stream that outlets from Southerly Pond Dam. The stream is a tributary to the Naugatuck River. The new development to the northeast has a large detention basin providing storage.

j) Unnamed stream under Atwood Road – This stream takes a sharp bend and may have been redirected around a nearby field. It was flowing under Atwood road with no problems.

k) Branch Brook – No problems were noted along Branch Brook, but access was limited due to the snow, the steep grade, and the closed recreation areas.

l) Wigwam Reservoir – The area around Wigwam Reservoir is undeveloped. The reservoir was low compared to Route 109.

Bethlehem:

m) Kasson Road (Route 132) (East) – While the wetlands along East Spring Brook appeared to be near the road level, no flooding was present at the time of inspection. However, this road would certainly be overtopped should either of the upstream dams fail.

n) Kasson Avenue (private road)– Long Meadow Pond is well downgradient of the houses along the lake, and the lake would overtop Route 132 at the south end of the pond before coming close to any of the houses. The wetlands nearby the south end of the lake on Bellamy Lane were high, but the road was not flooded.

o) Munger Lane (South and Middle) – No flooding was observed along these section of Munger Lane despite the nearby agricultural fields. The unnamed tributary to the Weekeepeemee River that drains from Long Meadow Pond and Benjamin Pond was not flooding Munger Lane, but some ponding was occurring at the crossing due to the snow pack.

p) Munger Lane (North) – The large plot of agricultural fields halfway to Gros Road were producing a significant amount of runoff, leading to ponding in the roadway up to four inches in places. The storm drains on this street may be too far apart, but the snow is definitely a factor contributing to the depths of ponding. See Photos #2 and #3.

q) Lake Road – The outlet channel was flowing regularly and the road was not flooded during the inspection.

r) Westshore Drive – An unnamed tributary to Long Meadow Pond flows under the northern section of Westshore Drive. The crossing was backed up and the street was flooded. A storm drain was noted above the crossing, but was completely filled with water. See Photos #4 and #5.

s) East Street – The unnamed tributaries along East Spring Brook appeared to be flowing normally. No flooding was present. Ponded water was present on Harrison Road near the Elementary School, but this appeared primarily due to snow pack.

t) East Spring Brook at Nonnewaug Road – East Spring Brook was flowing rapidly here, and contained a lot of sediment. There are several agricultural operations upstream on Maddox Road that could have contributed to the sediment levels.

u) Nonnewaug Road at Hickory Lane – East Spring Brook is still flowing hard, but is not overbank before its confluence with the Nonnewaug River.

v) Unnamed Pond off Hickory Lane – A small pond on the west side of Hickory Lane was overflowing, but erosion was not present along the south end.

w) Town Line Highway South – No erosion was noted along the dirt road sections of Hickory Lane and Town Line Highway South.

Meeting Minutes

NATURAL HAZARD PRE-DISASTER MITIGATION PLAN FOR THOMASTON
Council of Governments Central Naugatuck Valley
Initial Data Collection Meeting
February 14, 2008

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)
- Scott Bighinatti, Milone & MacBroom, Inc. (MMI)
- Virginia Mason, Council of Governments Central Naugatuck Valley (CGCNV)
- Maura Martin, Thomaston First Selectwoman
- Mary Barton, Thomaston Land Use Officer
- Paul Pronovost, Highway Superintendent, Thomaston Highway Department
- Eugene Torrence, Jr., Thomaston Chief of Police
- Ken Koval, Thomaston Fire Department
- Marc Beneditto, Thomaston Fire Department
- Rich Tingle, Superintendent, Thomaston Water Pollution Control Authority

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. Thomaston is responsible for a 1/8 cost share through in-kind services.

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 14-month schedule was presented.

First Selectwoman Martin assigned Paul Pronovost and Gene Torrence to be the main points of contact, and Debbie Bournival of her office as the point of contact person for billing. The Board of Selectman will be the governing body to eventually approve the Plan.

IV. Hazards to Address

The Thomaston plan will likely address flooding, 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

- While Scott Bighinatti of MMI saw little flooding in Thomaston during the storm on February 13, 2008, Paul Pronovost said that there are several out of the way areas in Town that flood due to proximal wetlands or undersized culverts. Scott is going to schedule a ride-along with Paul to photograph and note problem areas.

- The FEMA FIS is in need of updating, but Litchfield is a low priority in the MapMod program.

- The informational public meeting was scheduled for the last Monday in March (March 24th) at 7:00 PM in the Lena Morton Room in the Town Hall.

Emergency Response Capabilities & Evacuation Routes

- The Town has enhanced 9-1-1 for emergency notification and response. They currently rely on a phone line to enhance their radio communications. If phone service is cut off, they rely on standard radios and the cell tower in Town. The Town currently uses a low band for radio and fire frequencies, but is looking to upgrade to a high band system. The cell tower in Town is surrounded by several cellular company maintenance buildings and while the Town facilities are supposed to move into one of these buildings, it hasn't occurred yet. The Town's "Radio Hut" is not climate controlled and does not have a generator. It is located at the end of Chapel Street.

- The Police Chief is the main emergency person. There is a one-person LEPC in Town, but generally the Town forms temporary committees when they need to accomplish a specific task related to emergency planning.

- Evacuation routes are regionally defined by the Regional Evacuation Plan. No local evacuation plan exists. The Emergency Operations Plan is currently being redrafted.

- The Fire Department is the primary shelter, but has only been used when power outages have occurred. The Fire Department can take 50 people temporarily, but overnight sheltering is an issue. The High School is currently a secondary shelter, but will become a primary shelter once funding is secured for a generator.

Critical Facilities

- There are two town-owned elderly housing facilities, but no assisted living facilities in Town. One facility is on Reynolds Bridge Road.

- Town Hall (also contains PD) – 158 Main Street

- Fire Department – 245 South Main Street

- Highway Department / Public Works Garage on Reynolds Bridge Road near Maple Avenue

- Sewage Treatment Plant. According to Rich Tingle, it is currently operating near capacity, and will likely be operating at capacity once proposed developments are built. It is located on Old Waterbury Road. The Town Transfer Station is also on Old Waterbury Road next to the STP.

- Connecticut Water Company wellfield off Reynolds Bridge Road

- Thomaston Valley Village (elderly rental units)

- Telephone switching station on High Street

- Connecticut Light & Power Substation on Electric Avenue

- Center School (mid-level) is located on Thomas Avenue / Clay Street. Thomaston High School is located on Route 109. Black Rock Elementary is also located on Route 109 near the High School.

Zoning, Subdivision, Inland Wetlands Regulations

- Regulations will be collected by Scott when he returns to Thomaston for the ride along.

- Hydrants, underground tanks, and fire ponds are recommended for new developments but these are not in the regulations.

- Virginia has PDF copies of all the mapping performed in the Plan of Conservation and Development.

Noted Flooding and/or Drainage Problem Areas

- Carter Road – an 18" metal culvert replaced a larger concrete culvert that failed and it is undersized.

- Hickory Hill Road – wetlands overtop the road in "Peck Hollow". The culvert here is undersized. There is also one house on Hickory west of Turner Road that is floodprone (Nystroms?).

- Hillside Avenue and Gilbert Street – No storm drainage systems, and all nearby basements run their sump pumps to the street. The buildings were designed that way in the 1920's.

- Leigh Avenue – The end of the road is private and they have drainage problems due to the nearby lake and wetlands

- Route 6 – Water backs up at an undersized culvert at Watertown Road upstream of Stumpf Avenue. The water flows over Route 6, but doesn't generally impact the residences downstream.

- Black Rock Condominiums – There are beavers on Branch Brook that have built dams which almost flooded the condos. The condo maintenance staff has slowly taken down the dams to prevent flooding of the units.

- The Town has 919 catch basins. Catch basins are an annual schedule for maintenance, but end up being cleaned biannually. Some catch basins are cleaned more often as per the Stormwater Management Plan.

- Railroad Street at Altair Avenue– Bridge #140-001 is collapsing. It overtopped by 6" during April '07 Nor'easter. Repairs are planned, but putting it in the plan will help. Scott will download the hydrologic report from the Town website. This unnamed tributary to the Naugatuck River receives outflow from Plymouth Reservoir to the east.

Problem Areas for Wind Damage

- There is a 20-30 unit mobile home park located off Waterbury Road in the southeastern section of Town near Carter road that is susceptible to damage from tornadoes and high winds. The park is located near the 100-year floodplain of the Naugatuck River.

- Tornadoes have not touched down in Thomaston in recent memory, but they have occurred nearby. A tornado struck Black Rock State Park in 1989 and killed a Girl Scout in her tent.

- The Town performs annual tree maintenance, both near roadways and for private property owners who request it. Paul said the Town does not cable trees. "If it's brown, it's down."

Problems Due to Snow and Ice

- There are many hills in Thomaston which can sometimes make driving difficult during icy weather.

- Icing is a problem on Blakeman Road.

- Icing is also a problem on the Condominium access road at 143 Pine Hill Road.

- Ice jams are not an issue along the Naugatuck River in Thomaston.

Dams

- The US Army Corps of Engineers maintains three dams in Town, the City of Waterbury maintains one, and several other private dams exist. The Town also owns a Dam in the Town of Litchfield.
- The Town does not currently perform inspections of lower hazard dams, only the dam it manages in Litchfield.

Wildfires and Fire Protection

- Fires often occur in the nearby Mattatuck State Forest in Thomaston and Watertown. A large fire happened in Watertown in 1986 that burned 300 acres (this is already in our other plans). Thomaston often gets the first call for fires that occur in the forest and responds with Watertown. The State won't come out unless the fire is really large. Most fires only burn a few acres before they are extinguished.

- Thomaston does not have a four-wheel drive brush truck, but they have a tanker capable of carrying water to remote locations.

- The Town does not have dry hydrants at fire ponds, but will throw a line into a pond if they need water at a remote fire.

- The Town has mutual aid agreements with all its neighbors.

- Fires also have occurred off Waterbury Road.

Development Trends

- There are two "Active Adult" 55-and-over developments planned for the Town. One is for 38 units off Humiston Circle, and the other has 47 units (planned to go in off Strawberry Park. There is also an elderly living facility consisting of rental homes located on Reynolds Bridge Road.

- The minimum road width in new developments is 24'. Cul-de-sacs are limited to 1000' in total length. Utilities are located underground in new developments whenever not inhibited by shallow depth to bedrock. Connectivity is encouraged when possible, but Thomaston is very hilly which sometimes limits through streets.

- A Brownfield property is likely to be redeveloped someday, but has been talked about for about 20 years. This property is north of Route 6 at Route 8 (Exit 39).

- There is an existing approval for a 12 lot Industrial Park off Reynolds Bridge Road. It has yet to be built, but the developer is applying for an extension of the approval.

- There are redevelopment contracts in Town for certain business buildings. One of these buildings is located on Watertown Road across from the end of the Exit 38 ramp from Route 8 southbound.

- The Naugatuck River Greenway is currently under the Planning and Zoning Commission.

- Thomaston already has 23% protected open space, primarily due to the three US Army Corps of Engineers dams in Town, and the Wigwam reservoir lands owned by the City of Waterbury. General consensus in Town is that there is enough open space and that developments should be allowed.

VI. Acquisitions

None

COUNCIL OF GOVERNMENTS CENTRAL NAUGATUCK VALLEY
60 NORTH MAIN STREET. • 3RD FLOOR • WATERBURY, CT 06702-1403 (203) 757-0535
Web Site: www.cogcnv.org *E-Mail:* cogcnv@cogcnv.org

February 28, 2008

Joe Fainer
Inland Wetlands Commission
158 Main Street
Thomaston, CT 06787

Re: Pre-Disaster Natural Hazard Mitigation Planning
Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston

Dear Mr. Fainer,

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.

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, COGCNV invites your participation at one or more of the public informational meetings listed below:

Meeting	*Date*	*Time*	*Location*
Naugatuck	March 3, 2008	6:00 PM	Town Hall
Southbury	March 19, 2008	6:30 PM	Town Hall
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Middlebury	April 7, 2008	6:30 PM	Town Hall
Bethlehem	*To Be Determined*		

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 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

William Guerrera
Planning & Zoning Commission
158 Main Street
Thomaston, CT 06787

Re: Pre-Disaster Natural Hazard Mitigation Planning
Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston

Dear Mr. Guerrera, Bill

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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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

James Rokos
Director of Health
Torrington Area Health District
350 Main Street
Torrington, CT 06790

Re: Pre-Disaster Natural Hazard Mitigation Planning
Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston

Dear Mr. Rokos,

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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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. Stubbs, Rich

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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February 28, 2008

Chairman
Conservation Commission
158 Main Street
Thomaston, CT 06787

Re: Pre-Disaster Natural Hazard Mitigation Planning
Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston

Dear Chairman,

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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Virginia Mason

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February 28, 2008

AnnMarie DeLuca
Economic Development Commission
158 Main Street
Thomaston, CT 06787

Re: Pre-Disaster Natural Hazard Mitigation Planning
Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston

Dear Ms. DeLuca,

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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February 26, 2008

Bob Gregorski
President
Naugatuck River Watershed Association
PO Box 122
Middlebury, CT 06762

Re: Pre-Disaster Natural Hazard Mitigation Planning
Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston

Dear Mr. Gregorski,

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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60 NORTH MAIN STREET. • 3RD FLOOR • WATERBURY, CT 06702-1403 (203) 757-0535
Web Site: www.cogcnv.org *E-Mail:* cogcnv@cogcnv.org

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.

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, COGCNV invites your participation at one or more of the public informational meetings listed below:

Meeting	*Date*	*Time*	*Location*
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	*To Be Determined*		

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 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, AA
Virginia Mason

T:\Projects\Emergency Planning\Pre-Disaster Mitigation\Predisaster FY 06\Letter to Stakeholders.doc

COGCNV field notes
Field inspection on March 5, 2008
Notes typed March 5 2008
Scott Bighinatti

Paul Pronovost, Superintendent of the Thomaston Highway Department, escorted Scott Bighinatti of Milone & MacBroom, Inc. during field inspections of several problematic crossings in Thomaston. Approximately one inch of rain fell in the 24-hours prior to inspections.

a) Reynolds Bridge Road – Paul mentioned that Reynolds Bridge Road was declared a "low-income" area and eligible for a grant to put drainage on the street. More details are to be available after his grant meeting on March 7th. The area in question is from Route 8 to just past Pond View, an active adult community that is under construction.

b) Carter Road (Nibbling Brook) – The culvert under Carter Road is undersized. When the culvert is blocked or overwhelmed, water floods the road. The culvert was nearly full after one inch of rain the previous day (see photo). The house on the downstream side is not affected, but his lower driveway is cut off by the floodwaters. The FEMA representative who inspected Thomaston after the nor'easter of April 2007 stated that this replacement may be eligible for PDM grant funds, but was too small a project for disaster relief funds. A nearby catch basin was clogged and full of water. Paul said this culvert is overwhelmed constantly.

Upstream face of Carter Road culvert

c) Altair Avenue – An unnamed tributary to the Naugatuck River crosses Altair Avenue. The stream has its headwaters in Plymouth Reservoir. This bridge is in bad shape. The wingwalls on the upstream side are heavily deteriorated, and the remainder of the structure is also deteriorating. The top of the bridge concrete has cracked through the pavement (see

photo). The Town is currently waiting on a diversion permit from DEP to begin putting the bridge work out to bid.

Altair Avenue (bridge concrete peeking through pavement)

d) Park Street at Main Street – This intersection flooded two years ago (likely late spring 2006). The DOT had buried a manhole access on Main Street for a culvert running under Park Street, and it had become clogged. The Town found the manhole (from 1902 maps) and unclogged the pipe. They have had no problems since.

e) Waterman Road (Route 6) – The unnamed tributary to the Naugatuck River is culverted at Stumpf Avenue, but the box culvert is large enough such that the Town has not had problems with flooding in this neighborhood. The problem is at Route 6, where the culvert appears undersized and the channel is heavily vegetated (see photo). When this intersection floods, the water almost reaches nearby businesses. This would be a DOT project.

DOT culvert under Waterman Road (Route 6)

f) Black Rock Condominiums – This condo complex off Old Branch Road had flooding problems due to beavers damming up Branch Brook. They haven't had problems in almost four years. It's a private road in the condominiums, and Paul was unsure if they used to pull down the beaver dams as a favor to the residents or if the Town had actual jurisdiction.

g) Old Northfield Road – An unnamed tributary to Branch Brook runs parallel to this road for a while, and also crosses it once. The culvert under this bridge was extended once and patched recently. It will eventually need to be replaced (currently has an eight-ton limit). It is a steep grade into the tributary where the stream parallels the road.

h) Hickory Lane (Part 1) – This road is a Federal Highway Administration (FHWA) road based on its status as a "connector road" between Route 254 and Route 109. As such, FEMA would not provide disaster funding when it washed out in April 2007 because it would duplicate another federal program. FHWA refused to provide funding because the road had too little traffic, so the Town performed repairs. Two streams cross the road at a low point. The first is the same unnamed tributary discussed in part g. The corrugated metal pipe was damaged on the downstream side during April 2007 partially because of a side drain from the street. The Town put a black corrugated pipe on the end of the side drain and ran a new black pipe most of the way under the road (see photo).

Unnamed Tributary to Branch Brook at Hickory Lane, downstream side

i) Hickory Lane (Part 2) – This stream is an unnamed tributary to the unnamed tributary to Branch Brook discussed in parts g and h. The crossing pipe here is undersized (see photo) and is additionally overwhelmed when overflow from the stream at part h makes its way down the road. This pipe was last replaced in the early 2000's and was not properly sized. Drainage from the street and nearby properties also is eroding the road side.

Unnamed tributary to unnamed tributary to Branch Brook at Hickory Lane, upstream

j) Bayberry Drive – This road crosses a different unnamed tributary to Branch Brook and is the only egress to a 40 unit subdivision. The upstream side has an aluminum flared end section that has come loose at the pipe (see photo). Paul is worried that the collapsed flared end section is allowing water to bypass the pipe under the road, which will eventually lead to

structural problems. There is a gully on the top of the inlet side of the pipe that at first glance could be caused by erosion from road runoff, but there is a functional storm drain just above it. The gully may have occurred from spalling caused by the stream bypassing the pipe.

Bayberry Drive culvert, upstream

k) Town Center – There is a box culvert (maximum dimensions are 8'x8') that runs from behind the Town Hall and throughout the center of Town past Elm Street. It carries an unnamed tributary to the Naugatuck River that has its headwaters in a small impoundment near Humiston Hill Road. Part of this culvert runs underneath the corner of the Library and several commercial buildings, so proper maintenance of this culvert is important.

l) South Main Street – Thomaston has many high ledges that have been cut to make room for roads and highways. South Main Street (Route 254) has a corner just south of Strawberry Park where the ledge is next to the road. Chunks of ice fell onto the road while inspections were underway. Paul says this is a common problem that is dealt with every year.

Meeting Minutes

NATURAL HAZARD PRE-DISASTER MITIGATION PLAN FOR THOMASTON
Council of Governments Central Naugatuck Valley
Public Information Meeting
March 24, 2008

I. Welcome & Introductions

Several 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)
- Maura Martin, First Selectwoman
- Mary Barton, Land Use Officer
- ___, American Red Cross

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, Thomaston, Connecticut"

Mr. Murphy and Mr. Eisenbeiser presented the power point slideshow.

III. Questions, Comments, and Discussion

- A 2.6-magnitude earthquake in New York last week was felt in Bridgeport.
- Altair Avenue above Railroad Street is a potential problem. If cut off, the route to one house would reportedly be three miles.
- Gilbert Street suffers from a lack of storm drainage systems.
- Private dams are a concern. A failure of the Leigh Avenue private dam could affect five homes and Route 6. This dam needs to be included in the plan. The nearby unpaved road is now acting as a watercourse.
- Detention basins are an important issue. The Town may want to do a study or broad-scale maintenance project. The plan should address this. Northfield Brook area detention basins should be discussed.
- It was asked if flooding due to developments would be addressed in the plan.

- At least one drainage system was not installed correctly; this could be Hickory Hill, installed in the 1980s. Someone needs to check/verify.

- The Wetlands Commission recently updated their regulations using the DEP model regulations.

- Would this program and the plan provide funding for the Naugatuck River greenway? It is not likely. Would it provide funding for tearing down brownfields? Their brownfields are in the floodplain and need to be redeveloped. If there is a way to address this in the plan, we should.

- Does the plan address adjacent towns? They are all uphill from Thomaston and should be discussed.

Natural Hazard Pre-Disaster Mitigation Plan Thomaston, Connecticut

Presented by:

David Murphy, P.E. – Associate

Milone & MacBroom, Inc.

March 24, 2008

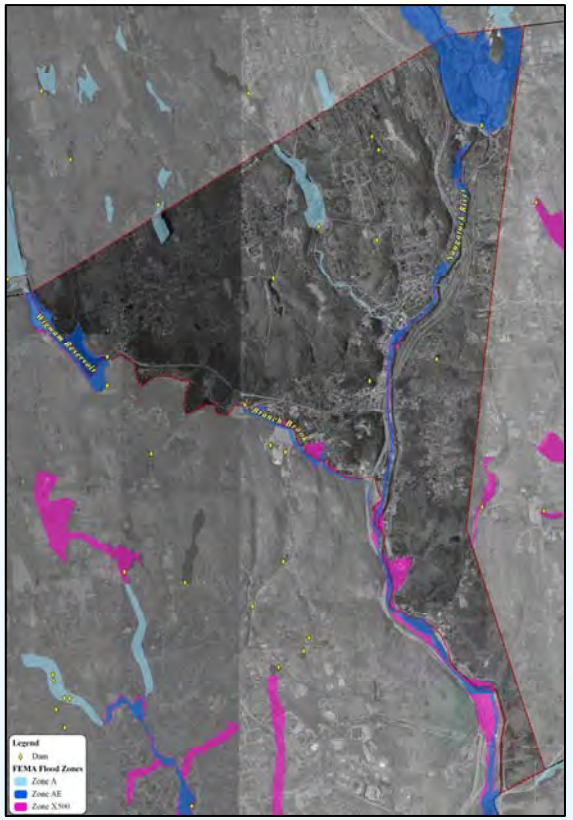
History of Hazard Mitigation Plans

- **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

State	*Description*	*Grant*
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

Long-Term Goals of Hazard Mitigation

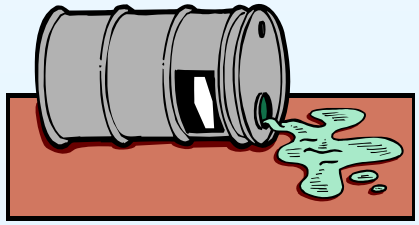
- Reduce loss / damage to life, property, and infrastructure
- Reduce the cost to residents and businesses
- Educate residents and policy-makers about natural hazard risk and vulnerability
- Connect hazard mitigation planning to other community planning efforts
- Enhance and preserve natural resource 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 Thomaston
- 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

Thomaston's Critical Facilities

- Emergency Services – Police Department, Fire Department (Primary Shelter), Ambulance
- Municipal Facilities – Town Hall, Department of Public Works
- High School – Secondary Shelter

Thomaston Fire Department

Thomaston High School

Thomaston's Critical Facilities

- Health Care and Assisted Living

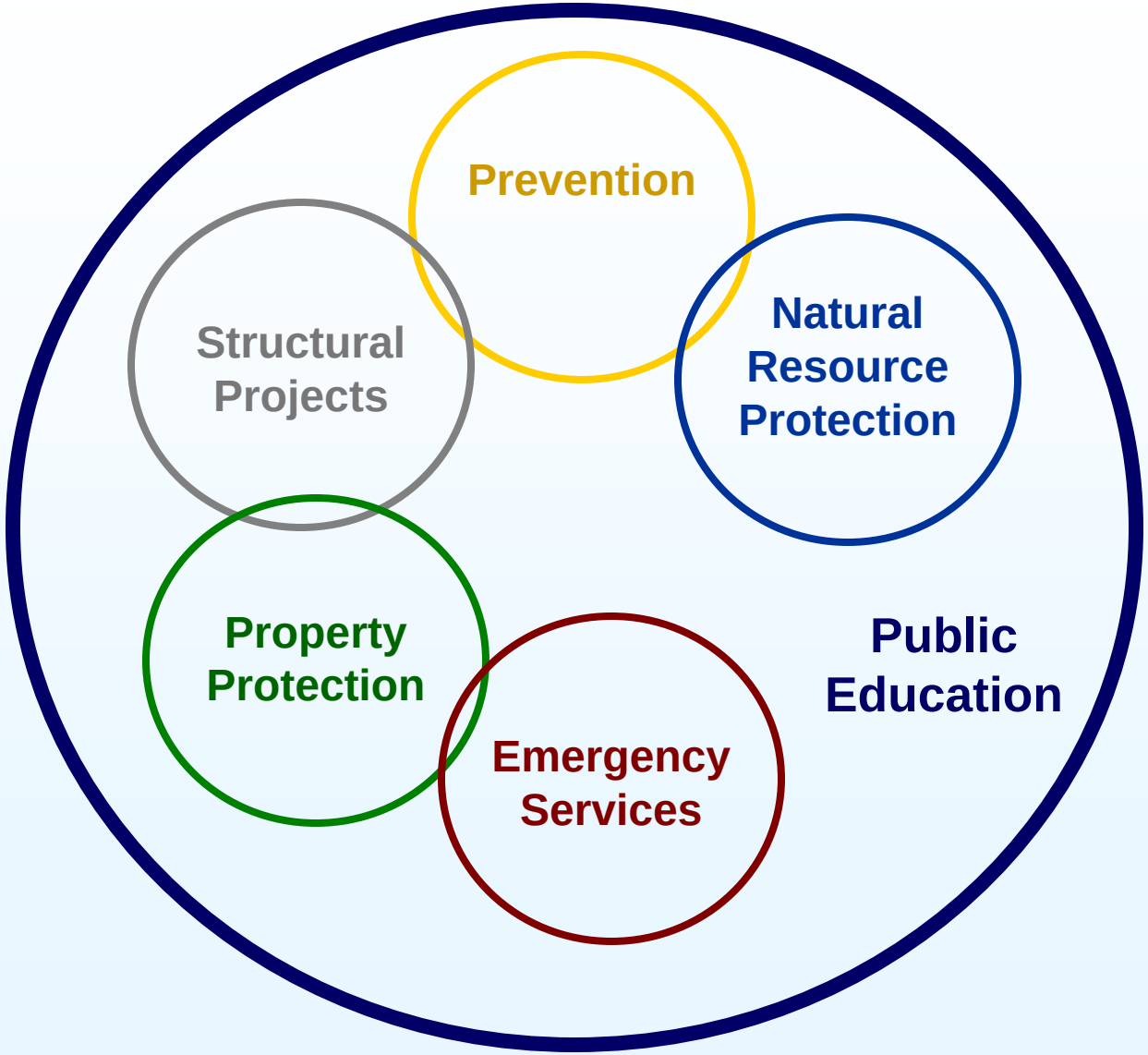
CWC Wellfield

- Utilities – Water Tanks, Pumping Stations, Electric Substations, Communications Towers

- Wastewater Utilities – Pumping Stations and Treatment Plants

Thomaston Wastewater Treatment Plant

Potential Mitigation Categories



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
- Research and / or technical assistance for local officials

Primary Natural Hazards Facing Thomaston

- Inland flooding
- Winter storms, nor'easters, heavy snow, blizzards, ice storms
- Hurricanes
- Summer storms, tornadoes, thunderstorms, lightning, hail
- Dam failure
- Wildfires
- Earthquakes

Partially Blocked Culverts Pose Threats During Heavy Rain Storms

Hurricanes

- Winds
- Heavy rain / flooding

Plume & Atwood Manufacturing
Waterbury, CT

Church Street & Park Place in
Naugatuck

Church Street Road Damage in
Naugatuck

Summer Storms and Tornadoes

Lightning over Boston

- Heavy wind / tornadoes / downbursts
- Lightning
- Heavy rain
- Hail

Tornado in KS

Flooding in MN

Winter Storms

- Blizzards and nor'easters
- Heavy snow and drifts
- Freezing rain / ice

Blizzard of 1978 - CT

CT River April 2007

Dam Failure

- Severe rains or earthquakes can cause failure
- Possibility of loss of life and millions of dollars in property damage

ACOE Northfield Pond Dam

Nystrom Pond Dam, Litchfield
(owned by Thomaston)

Wildfires

- Thomaston has low to moderate risk of wildfires
- Fire
- Heat
- Smoke

Photo courtesy of FEMA

Earthquakes

- Thomaston 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 Flooding Problems

- Watertown Road (Route 6)
- Carter Road
- Hickory Hill Road
- Hillside Avenue / Gilbert Street
- Altair Avenue
- Bayberry Drive

Flooding

- Tributaries to the Naugatuck River

Watertown Road

Carter Road

Flooding

- Unnamed tributary to the Naugatuck River at Hickory Hill Road (FHWA Connector Road)

Hickory Hill Road Downstream

Stream Draining Nearby Wetlands

Wetlands and Brook Overflow Area

Flooding

- Atlair Avenue Corridor:
  - Overtopped during April 07 nor'easter
  - Currently in permitting phase

Altair Avenue Upstream

Altair Avenue Downstream

Flooding

- Other Streams and Localized Problems:
  - Hillside Avenue / Gilbert Street – No drainage systems; basements pump out into street
  - Bayberry Drive – Stream crosses only entrance to subdivision

Bayberry Drive Upstream

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

Questions and Additions

Engineering,
Landscape Architecture
and Environmental Science

MILONE & MACBROOM®

John M. Milone, P.E.
James G. MacBroom, P.E.
Vincent C. McDermott, FASLA, AICP

Robert A. Jackson, L.S.
John R. Gilmore, P.E.
Edward A. Hart, P.E.
Thomas R. Sheil, L.A.
Stephen R. Dietzko, P.E.
Jeanine Armstrong Bonin, P.E.
Alan Wm. Mess, P.E.

David W. Dickson, L.A.
Thomas J. Daly, P.E.
W. Andrew Greene, P.E.
Darin L. Overton, P.E.
Anthony A. Ciriello, P.E.
Nicolle Burnham, P.E.
Mark Arigoni, L.A.
Michael J. Joyce, P.E.
Michael F. Mansfield, L.S.
David Murphy, P.E.
Henry Ditman, P.E.
David Sullivan, P.E.

Rodney I. Shaw, L.A.
David R. Bragg, P.E., L.S.
William A. Root, M.E.S.
Garret Harlow, L.A.
Thomas P. Balskus, P.E.
Paul F. Mills, P.E.
Penelope B. Saulnier, L.A.
Kishor Patel, P.E.
Ted G. Crawford, P.E., LEED AP
Steven D. George, P.E.
Ryan R. Chmielewski, L.A.
Reuben S. Jones, III, P.E.
Keith S. Robbins, L.A.
Bruce S. Surface, P.E.
John Hammer, L.A.
Scott G. Bristol, LEP
Gary Fontanella, P.E.
William J. Nagle, Jr., L.S.
John Mike Wilson, P.E.
Ryan McEvoy, P.E.
Nicholas M. Fomenko, P.E.
Andrew T. Manning, P.E.
George G. Caufman, P.E.

June 9, 2008

Mr. Steven A. Andon
United States Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742

RE: Natural Hazard Pre-Disaster Mitigation Planning
Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston
MMI #2937-02

Dear Steve:

As I discussed with you in our phone conversation on Friday, June 6, 2008, the Council of Governments Central Naugatuck Valley (COGCNV) is coordinating the development of pre-disaster natural hazard mitigation plans for the municipalities of Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury, and Thomaston, Connecticut. Milone & MacBroom, Inc. (MMI) has been hired by the COGCNV to assist in the preparation of these six plans. These plans are being funded under a grant from the Federal Emergency Management Agency (FEMA) under its Pre-Disaster Mitigation (PDM) program.

The purpose of these plans is two-fold. First, plan development and adoption is required in order for each municipality to be eligible for certain pre-disaster mitigation funds from FEMA under the PDM program, as well as a greater portion of post-disaster funding under the Hazard Mitigation Grant Program (HMGP). Second, these plans are designed to be used as planning documents in each municipality, similar to existing Plans of Conservation and Development. The plans will be used by the municipalities in land use, development, emergency operations, and other long-range planning decisions. One of the main emphases of the plan is to provide a list of problematic areas related to natural hazards (flooding, wind, blizzards, lightning, hail, earthquakes, dam failure, and wildfires) and a list of proposed projects that can reduce or eliminate the effect of the hazard to that area. Thus, these plans will also be used in the formulation of capital budget decisions. As such, these plans must be officially adopted by the local municipality and approved by FEMA in order to be considered valid. Once adopted, information in these plans is in the public domain and available in the local town halls and library.

MMI has already prepared four plans for the COGCNV, three of which have been approved by FEMA and adopted by its respective municipality. The fourth is conditionally approved by FEMA but not yet adopted by the town. During the review process for the initial plans, FEMA requested "hazards with a geographic boundary (wildfire, dam failure…) must specifically

address where the hazard will occur." This request is shown at the bottom of page 6 of the attached crosswalk for the town of Cheshire.

In the previous four plans, no dams managed by the United States Army Corps of Engineers (ACOE) were present, and dam failure inundation areas were available for several of these dams at the Connecticut Department of Environmental Protection (DEP) to fulfill the FEMA requirement. Unfortunately, the dam failure analyses for the ACOE dams in Thomaston (Thomaston Dam, Black Rock Dam, and Northfield Dam) and Naugatuck (Hop Brook Dam) were not available at the time of our review. DEP personnel suggested contacting the ACOE directly to review the inundation areas for inclusion in the current set of plans.

MMI would like to obtain copies of the dam failure inundation area mapping for the above-mentioned dams managed by the ACOE in the municipalities of Thomaston and Naugatuck, Connecticut. If provided, these areas will be presented in the plans but will be labeled "for planning purposes only." The ACOE documents will remain the official source of the hazard area.

MMI understands that much of the information contained within the Dam Failure Analysis for each dam is now considered sensitive information for official use only and that this request is subject to internal ACOE legal review. We hope that you will be able to assist in this very important project, and we look forward to hearing from you soon. If you have any additional questions regarding this project, please feel free to contact me or David Murphy at (203) 271-1773.

Very truly yours,

MILONE & MACBROOM, INC.

Scott J. Bighinatti
Environmental Scientist

Attachment

2937-02-jn908-ltr.doc

COGCNV field notes
Field inspection on August 1, 2008
Notes typed August 1, 2008
Scott Bighinatti

Paul Pronovost, Superintendent of the Thomaston Highway Department, escorted Scott Bighinatti of Milone & MacBroom, Inc. during a second round of field inspections of problematic areas in Thomaston.

Valley View Road Development – This area was previously mentioned as having issues with poor drainage that affects nearby property owners. The drainage was not properly installed in that one of the major catch basins drains into an unnamed tributary that drains south eventually into Branch Brook. This tributary is in a valley approximately 100' below the level of the road. Supposedly, this catch basin was supposed to be installed further down the road, where another catch basin also carries water to a "silt pond" behind a house on Hickory Hill Road. The outlet of the silt pond eventually meets up with the unnamed tributary above the personal pond of this house.

Supposedly, the property owner of this house began having trouble with too much silt in the "silt pond" not after the Valley View development went in, but when a development west of the unnamed tributary was started. There are several odd things about this complaint:

1) The "silt pond" is not hydraulically connected to the new development, so silt should not be affecting it, though it could affect the homeowner's front yard pond
2) The drainage pipe that the homeowner is complaining about does not drain to the silt pond
3) The Town of Thomaston does not use sand on the roads in the winter, so sand isn't coming from the roadways from either pipe
4) The stream has a lot of energy, particularly downstream of Hickory Hill Road, so small, unregistered private dams may be the real issue causing siltation in the ponds.
5) Rainfall has been up this year, so erosion is likely more prevalent upstream of the homeowner's property

The Highway Department and the Inland Wetlands Officer went to investigate the complaint, but found nothing wrong with the workings of the drainage system other than the fact it was improperly located. Paul feels there is little the Town can do at this point and Scott agreed that this area would not be suitable for a FEMA grant-funded project.

Twin Pond Road: Two small ponds exist below the properties off the east side of this road. Both ponds have DEP-registered dams with undetermined hazard ratings. Paul says that the south pond (known in the DEP database as Southerly Pond) is used as a stormwater detention basin for the Twin Pond Road development and potentially other roads as well. However, the pond has begun to fill in over the past 14 years, and it needs dredging to reacquire lost storage. Paul would like a project that installs a sediment trap

or filtration system on the outlet of the stormwater system, and dredges the pond back to its normal depth. If the pond continues to fill, eventually a large storm will cause water to overtop the dam, which could lead to a failure. At least three houses downstream on Smith Road could be affected, especially because the outlet stream is culverted underground past Smith Road. Discharge beyond this point flows through forest before passing under Route 8, Main Street, and then into the Naugatuck River. These downstream areas will likely not be affected.

High Street Extension: A stream exits an underground culvert near High Street and runs parallel along the west side of the road. The stream is causing bank erosion on both sides of the stream. Soil conditions appear sandy which exacerbates the problem. Paul is concerned about the scour eventually cutting to the road that is only three feet away. Rip rap is likely the best solution here.

Leigh Avenue private dam: Discussion continued regarding Leigh Avenue dam. This dam is a private, unregistered dam upstream from Leigh Avenue and thus does not appear in the DEP database. It is not the Stevens Dam as Scott thought. The area is very rural and the dam is only accessible on foot or by quad. Paul says that it is an earthen dam with a pipe through it for a spillway. The best course of action is likely to ask the DEP to come out and inspect it to determine what hazard it may cause.

Grant to put drainage on Reynolds Bridge Road: Paul says the grant funding he pursued in March did not come through. However, he mentioned that the Town replaced the catch basin that I saw clogged back during field inspections in February, so we can take that area out of our recommendations.

From: KNadeau@ctwater.com
Sent: Thursday, August 14, 2008 9:25 AM
To: Scott Bighinatti
Subject: Re: Hazard Mitigation Planning in CTWC service areas

Scott,
I will scan the inundation maps that I have and email them to you, and then see what we have or think for expanded service area.
Keith

From: "Scott Bighinatti" <scottb@miloneandmacbroom.com>
To: <KNadeau@ctwater.com>
Cc:
Sent: 08/13/2008 03:18 PM
Subject: Hazard Mitigation Planning in CTWC service areas

Hi Keith,

As you may be aware, David Murphy and I are writing Natural Hazard Mitigation Plans for the Council of Governments of the Central Naugatuck Valley. These plans will cover several natural hazards that could cause damages and/or loss of life due to flooding, wildfires, dam failure, hurricanes, etc. Municipalities that have these plans in place will be able to apply for funding for hazard mitigation projects through various FEMA grant programs before and after a disaster event. Would you be willing to assist us in this project by providing us the following information?

1. A brief description of any plans Connecticut Water Company has to expand or upgrade water service for fire protection in Thomaston, Middlebury, and Naugatuck (plans to expand water service will be included in the "Wildfires" section of the associated plans to show where the existing wildfire risk area will be reduced in the near future);

2. A copy of the Dam Failure Inundation Maps from the EOPs for the following Connecticut Water Company dams (such mapping has been requested by FEMA for these plans for Class C and B dams which may impact infrastructure and critical facilities):
    a. New Naugatuck Reservoir Dam in Bethany (Beacon Hill Brook which flows into Beacon Falls)
    b. Mulberry Reservoir Dam in Naugatuck
    c. Straitsville Reservoir Dam in Naugatuck
    d. Plymouth Reservoir in Plymouth (outflows into Thomaston)

In the case of the dam failure inundation maps, the figures in each plan will not replace those within the EOP for the respective dam. These figures will instead show a general

inundation area in relation to critical facilities. A pdf copy of these maps would be perfect.

Please let myself or David Murphy know if you can assist us in this important project. If you have any questions, please feel free to contact us.

Thanks for your help,

Scott

Scott J. Bighinatti
Environmental Scientist
Milone & MacBroom, Inc.
99 Realty Drive
Cheshire, CT 06410
(203) 271-1773 Phone
(203) 272-9733 Fax
scottb@miloneandmacbroom.com

From: Ifkovic, Diane [Diane.Ifkovic@ct.gov]
Sent: Friday, December 12, 2008 8:54 AM
To: Jfdwk@aol.com; mmartin@thomastonct.org; susanacable@aol.com
Cc: Christian, Art; Virginia Mason; Shawn Goulet; Dave Murphy; Scott Bighinatti
Subject: No RLPs for Bethlehem, Beacon Falls or Thomaston

Importance: Low

Hi all,

According to FEMA's Repetitive Loss Property (RLP) database, there are NO RLPs in Bethlehem, Beacon Falls or Thomaston.

If you need any data, such as list of properties in town with flood insurance, please give a call or email.

diane

Diane S. Ifkovic

State NFIP Coordinator/Environmental Analyst III
Connecticut Department of Environmental Protection
Bureau of Water Protection & Land Reuse
Inland Water Resources Division
Flood Management Program
79 Elm Street, 3rd floor
Hartford, CT 06106-5127
Phone: (860) 424-3537
Fax: (860) 424-4075
Email: diane.ifkovic@ct.gov

APPENDIX C
RECORD OF MUNICIPAL ADOPTION

U.S. Department of Homeland Security
Region I
99 High St, 6th Floor
Boston, MA 02110-2320

FEMA

February 2, 2009

Maura E. Martin
First Selectmen
158 Main Street, Level 4
Thomaston, CT 06787

Dear Ms. Martin:

Thank you for the opportunity to review the Town of Thomaston Natural Hazard Rre-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'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 Thomaston. 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, Council of Governments of the Central Naugatuck Valley

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)(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	SCORE 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:** • Include a description of the impact of floods and earthquakes on the assets. **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

Planning Process	N	S
4. Documentation of the Planning Process: §201.6(b) and §201.6(c)(1)		X

Risk Assessment	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)(ii)(B)	X	
11. Assessing Vulnerability: Analyzing Development Trends: §201.6(c)(2)(ii)(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**

Thomaston, CT LOCAL MITIGATION PLAN REVIEW CROSSWALK

Local Mitigation Plan Review and Approval Status

Jurisdiction:	Title of Plan:	Date of Plan:
Thomaston, CT	Town of Thomaston, CT Natural Hazard Pre-Disaster Mitigation Plan	November 2008

Local Point of Contact: Scott Bighinatti	**Address:** 99 Realty Drive Cheshire, Connecticut 06702
Title: Environmental Scientist	
Agency: Milone & MacBroom	
Phone Number: (203) 271-1773	**E-Mail:** scottb@miloneandmacbroom.com

State Reviewer:	Title:	Date:

FEMA Reviewer: Reid Dominie	**Title:** Hazard Mitigation Specialist	**Date:** December 9, 2008
Date Received in FEMA Region [Insert #]		
Plan Not Approved		
Plan Conditionally Approved	**February 2, 2009**	
Date Approved		

	NFIP Status*			
Jurisdiction:	**Y**	**N**	**N/A**	**CRS Class**
Thomaston, CT	X			

* Notes: Y = Participating N = Not Participating N/A = Not Mapped

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	SCORE 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	SCORE 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	SCORE 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

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	SCORE S
A. Does the plan provide a narrative description of the process followed to prepare the **new or updated** plan?	Pg 1-8 to 1-11	The Plan provides a detailed description of the planning process.		X
B. Does the **new or updated** plan indicate who was involved in the **current** 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 Thomaston's Plan. The Town personnel involved in the planning process are listed on page 1-9.		X
C. Does the **new or updated** 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	"While residents were invited to the public information meeting via newspaper, only one resident attended that was not Town personnel" (1-10).		X
D. **Does the new or updated 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	"Similarly, eight municipal agencies and civic organizations were invited via a mailed copy of the press release that announced the public information meeting...Of these organizations, the American Red Cross was represented at the meeting" (1-10). 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. 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 updated plan document how the planning team reviewed and analyzed each section of the plan and whether each section was revised as part of the update process?		This is a new Plan.		N/A
		SUMMARY 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	SCORE 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	SCORE 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 3-9	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.*, magnitude or severity) of each hazard addressed in the **new or updated** plan?	Sections 3-9	See above		X
C. Does the plan provide information on **previous occurrences** of each hazard addressed in the **new or updated** plan?	Sections 3-9	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 3-9	See Above		X
		SUMMARY SCORE		X

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	SCORE S
A. Does the **new or updated** plan include an **overall summary** description of the jurisdiction's **vulnerability** to each hazard?	Sections 3-9	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 3-9	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	SCORE 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 3-12	***Note: This requirement becomes effective for all local plans approved after October 1, 2008.*** There are no repetitive loss structures in the Town of Thomaston.		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 ....*

Element	Location in the **Plan** (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan describe vulnerability in terms of the **types and numbers** of **existing** buildings, infrastructure, and critical facilities located in the identified hazard areas?	Pg 1-23 to 1-25	***Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.*** Critical Facilities in Thomaston are listed and mapped.		X
B. Does the **new or updated** plan describe vulnerability in terms of the **types and numbers** of **future** buildings, infrastructure, and critical facilities located in the	Pg 2- 22 and 3-16	***Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.*** Future development of 55-and-over developments are planned for		X

identified hazard areas?		the Town along Reynolds Bridge road, along with a 12-lot Industrial Park. The Plan states on page 3-16 that "Portions of this road [Reynolds Bridge Road] do not have drainage systems, a situation could exacerbate flooding in the Pond View Active Adult community that is under construction."		
			SUMMARY SCORE	X

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	SCORE 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	SCORE S
A. Does the **new or updated** plan describe land uses and development trends?	Pg 2-21 to 2-22	***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	SCORE 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

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	SCORE S
A Does the **new or updated** 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
		SUMMARY SCORE		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	SCORE S
A. Does the **new or updated** plan identify and analyze a **comprehensive range** of specific mitigation actions and projects for each hazard?	Sections 3-9 and Specifically Section 10	A summary of proposed mitigation actions can be found on pages 10-2 to 10-7		X
B Do the identified actions and projects address reducing the effects of hazards on **new** buildings and infrastructure?	Sections 3-9 and Specifically Section 10			X
C. Do the identified actions and projects address reducing the effects of hazards on **existing** buildings and infrastructure?	Sections 3-9 and Specifically Section 10			X
		SUMMARY SCORE		X

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	SCORE S
A. Does the new or updated plan describe the jurisdiction (s) participation in the NFIP?	Pg 3-3, 3-9, 3-12	***Note: This requirement becomes effective for all local mitigation plans approved after October 1, 2008.*** The Plan includes the adoption date of its FIRM of July 5, 1982 (pg 3-3). "Regulations, codes, and ordinances that apply to flood hazard mitigation in conjunction with and in addition to NFIP regulations include:" (pg 3-9). The Town of Thomaston Land Use Officer serves as the NFIP administrator and oversees the enforcement of NFIP regulations (pg 3-12).		X
B. Does the mitigation strategy identify, analyze and prioritize actions related to continued compliance with the NFIP?	Pg 10-2 to 10-7	***Note: This requirement becomes effective for all local mitigation plans approved after October 1, 2008.*** 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..."		X
		SUMMARY SCORE		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	SCORE 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 11-1 and Appendix A			X
C. Does the **new or updated** prioritization process include an emphasis on the use of a **cost-benefit review** to	Pg 1-8	STAPLEE		X

maximize benefits?				
D. Does the **updated** 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?		This is a new Plan.		N/A
		SUMMARY SCORE		X

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	SCORE S
A. Does the **new or updated** plan include identifiable **action items** for each jurisdiction requesting FEMA approval of the plan?				
B. Does the **updated** 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?				
		SUMMARY SCORE		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	SCORE S
A. Does the **new or updated** plan describe the method and schedule for **monitoring** the plan, including the responsible department?	Pg 11-2	"The Office of the First Selectman will be the party responsible for monitoring the Plan" (11-2). The method and schedule for monitoring the Plan is discussed.		X
B. Does the **new or updated** plan describe the method and schedule for **evaluating** the plan, including how, when and by whom (*i.e.* the responsible department)?	Pg 11-2 to 11-3			X
C. Does the **new or updated** plan describe the method and schedule for **updating** the plan within the five-year cycle?	Pg 11-3	"The Council of Governments of the Central Naugatuck Valley will update the hazards mitigation plan if a consensus to do so is reached by the Board of Selectmen of Thomaston and a request is presented to the Council of Governments of the Central Naugatuck Valley, or at least once every five years" (11-3).		X
		SUMMARY SCORE		X

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	SCORE S
A. Does the **new or updated** plan identify other local planning mechanisms available for incorporating the mitigation requirements of the mitigation plan?	Pg 11-1 to 11-2	"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" (11-1).		X
B. Does the **new or updated** 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 11-1 to 11-2	"The Office of the First Selectmen will be responsible for assigning appropriate Town officials to update the Plan of Conservation and Development, Zoning Regulations, Subdivision Regulations, and Emergency Operations Plan to include provisions in this plan." (11-1 to 11-2).		X
C. Does the **updated** plan explain how the local government incorporated the mitigation strategy and other information contained in the plan (*e.g.*, risk assessment) into other planning mechanisms, when appropriate?		This is a new Plan.		N/A
		SUMMARY SCORE		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	SCORE S
A. Does the **new or updated** plan explain how **continued public participation** will be obtained? (For example, will there be public notices, an on-going mitigation plan committee, or annual review meetings with stakeholders?)	Pg 11-3	"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 Town of Thomaston" (11-3).		X
		SUMMARY SCORE		X

ERRATA TO BE PRESENTED FEBRUARY 17, 2009
Natural Hazard Pre-Disaster Mitigation Plan
Town of Thomaston, Connecticut

Section 8

Page 8-10:

Added a line clarifying that the dam failure inundation areas for the Plymouth Reservoir Dam that were received from Connecticut Water Company are redrawn from other maps and are for planning purposes only.

THE PRE-DISASTER MITIGATION PLAN RESOLUTION:

WHEREAS, the Disaster Mitigation Act of 2000 encourages communities to prepare a Natural Hazard Pre-Disaster Mitigation Plan for natural disasters, such as hurricanes or flood; and

WHEREAS, given the personal and financial severity of recent national disasters, the Council of Governments of the Central Naugatuck Valley has been working with its member municipalities to understand local conditions and plan accordingly; and

WHEREAS, the primary goal of the Plan is to reduce the loss of or damage of life, property, infrastructure and natural, cultural and economic resources from natural disasters; and

WHEREAS, the Natural Hazard Pre-Disaster Mitigation Plan recommends many hazard mitigation actions that, provided federal funding assistance is available, will protect the people and property affected by the natural hazards that potentially face Thomaston; and

WHEREAS, a meeting was held in 2008 to solicit input and recommendations and a public hearing was held to review the Plan as required by law;

BE IT RESOLVED by the Board of Selectmen of the Town of Thomaston that the Natural Hazard Pre-Disaster Mitigation Plan is hereby adopted as an official plan of the Town of Thomaston and that First Selectman Maura Martin shall implement the plan and that the municipal departments will report regularly on their activities, accomplishments and progress for the Town of Thomaston.

BE IT FURTHER RESOLVED, the Town of Thomaston is authorized to apply and accept any future federal or state grant assistance thereto.

AND I DO FURTHER CERTIFY that the above resolution has in no way been altered, amended or revoked and is in full force and effect.

Certified by Clerk

Cathy Dupont, Town Clerk

Approved by

Maura E. Martin, First Selectman

Dated: 3/30/09