# TOWN OF WOLCOTT
# NATURAL HAZARD PRE-DISASTER MITIGATION PLAN

CENTRAL NAUGATUCK VALLEY REGION

**MARCH 2008**
***REVISED MAY 2008***

**MMI #2937-01**

***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

MILONE & MACBROOM®

# TABLE OF CONTENTS

# TABLE OF CONTENTS (Continued)

# TABLE OF CONTENTS (Continued)

# TABLE OF CONTENTS (Continued)

## TABLES



## FIGURES

# TABLE OF CONTENTS (Continued)

## APPENDED TABLES



## APPENDICES

# EXECUTIVE SUMMARY

*Town of Wolcott Natural Hazard Pre-Disaster Mitigation Plan*

## *1. Background*

The federal Disaster Mitigation Act of 2000 requires local communities to have a Federal Emergency Management Agency (FEMA)-approved hazard mitigation plan in order to be eligible to apply for and receive post-disaster Hazard Mitigation Grant Program (HMGP) grants and Pre-Disaster Mitigation (PDM) program project grant funds.

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.

Developing, adopting, and implementing this hazard mitigation plan is expected to: increase access to and awareness of funding sources for hazard mitigation projects; identify mitigation initiatives to be implemented if and when funding becomes available, and connect hazard mitigation planning to other community planning efforts.

## *2. Existing Conditions*

The four major watershed areas in Wolcott are the Eight Mile River, Hancock Brook, the Ten Mile River, and the Mad River. The Town has three additional smaller watersheds: the Pequabuck River, the Naugatuck River, and Beaver Pond Brook. The hydrology of the Town of Wolcott is dominated by the Mad River watershed and spotted with several lakes and ponds and numerous streams, most of which are unnamed.

*3. Critical Facilities*

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 Wolcott continues. The Town of Wolcott has designated three emergency shelters (all schools) and agreements are in place to use additional facilities, such as the VFW Hall, on an as-needed basis. Critical facilities are not regularly impacted by flooding in the Town of Wolcott, but some areas of egress are impacted. See Section 3.5 for specific sites.

*4. Shelters*

The Town's fire houses are not considered as shelters, but serve as important emergency supply distribution centers. The police and fire departments staff the shelters. 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.

*5. Flooding*

Flooding is the most common natural hazard event requiring mitigation. According to the FEMA FIRMs, 1,208 acres of land in Wolcott are located within a 100-year flood boundary. In addition, indirect flooding occurs near streams and rivers throughout Wolcott due to inadequate drainage and other factors. Only a few of the stream corridors are prone to chronic flooding because of the large impoundments that exist in the watershed and because the floodplains and channels have been less developed in this residential town than in neighboring communities.

Most of the chronic flooding problems in Wolcott are located within the Mad River drainage basin or areas of stratified drift geologic deposits. The frequency of flooding in Wolcott is considered likely to highly likely depending on the cause of the flooding, but flood damage only has a limited effect. To reduce the impact of a local or nuisance flood event, the Town can take measures that reduce the exposure of existing development to flood risk, and actions to preserve and restore natural resources. For site plan and subdivision regulations, these include:

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

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. The use of Geographic Information System (GIS) technology would greatly aid this mapping and the mapping of problem areas. Other prevention techniques include educating citizens, property owners, developers, and local officials to a higher state of awareness of natural hazards and the provision of technical assistance for local officials. A reference checklist to streamline and aid applicants through the local permitting process should be developed that cross-references the bylaws, regulations, and codes related to flood damage prevention.

Steps should be taken to protect existing public and private properties. Structural flood protection techniques applicable to property protection include the construction of barriers, dry floodproofing, and wet floodproofing techniques.

Emergency services that would be appropriate mitigation measures for inland flooding include:

1. Forecasting systems to provide information on the time of occurrence and magnitude of flooding;
2. Emergency protective measures, such as an Emergency Operations Plan outlining procedures for the mobilization and position of staff, equipment, and resources to facilitate evacuations and emergency flood-water control; and
3. 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. Wolcott is exploring this alternative.

Specific *natural resource protection mitigation measures* are recommended to help prevent damage from inland and nuisance flooding, including pursuing the acquisition of additional municipal open space properties such as the Boundline open space action area, and continuing to regulate development in protected and sensitive areas such as steep slopes, wetlands, and floodplains.

Some *structural mitigation measures* recommended for the prevention of damage from inland and nuisance flooding include:

1. Investigate incidences of roadway flooding in the vicinity of Cedar Swamp Pond and clear or resize drainage systems as appropriate to maintain access;
2. Raise the level of Central Avenue near Todd Lake above the highest recorded flood level;
3. Repair the bridge spanning Lily Brook at Todd Road;
4. Enlarge the culvert passing Lily Brook under Woodtick Road and elevate the road if necessary;

5. Perform a feasibility analysis to address the flooding conditions in the Town Line Road area; and
6. Replace the twin culverts underneath Town Line Road and Nutmeg Valley Road with box culverts capable of passing at least the 50-year flood event;

*6. Hurricanes*

The Town of Wolcott is less vulnerable to hurricane damage than coastal towns in Connecticut because it is not impacted by storm surge. The Town remains vulnerable to hurricane damage from wind and flooding, and from any tornadoes accompanying the storm. The public should be made aware of evacuation routes and available shelters, and tree limb maintenance and inspections should be increased, especially along Route 322, Route 69, and other evacuation routes.

*7. Winter Storms*

Winter storms are considered highly likely to occur each year, and the hazards that result (nor'easter winds, snow, and blizzard conditions) are expected to have a significant effect over a large area of the Town.

*8. Dams*

There are five Class C dams and one Class B dam in Wolcott, at least three of which are owned by the Town. Their failure would mean the loss of life and extensive property damage with Class C indicating the potential for more costly damages. Some of these dams may not have emergency operation plans in place.

*9. Wildfires*

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, but most wildfires in Connecticut are relatively small. It is important for the Wolcott Fire Department to be prepared to assist the special populations such as elderly and disabled during a wildfire or any emergency.

*10. Firefighting*

The Town of Wolcott has limited public water service available for fire fighting. To aid in fighting fires, the Town of Wolcott should continue the excavation of fire ponds throughout the Town to ensure an adequate supply of firefighting water, and 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.

*11. Specific Recommendations Include:*

- 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 implementation of an emergency notification system to warn residents of an impending hazard;

- Petitioning FEMA to more critically evaluate LOMA and LOMC applications that are received such that redevelopments do not potentially cause increased flooding to other properties;
- Encouraging residents to move personal property out of the 100-year flood plain, especially in the Woodtick Road area south of Garthwait Road;
- Designing new buildings to shunt drainage away from the building.
- Using the Town two-foot contour maps to develop more exact regulatory flood-hazard maps and data using FEMA flood elevations;
- Raising the level of Central Avenue near Todd Lake above the highest recorded flood level to prevent the road from being flooded in the future;
- Repairing the bridge spanning Lily Brook at Todd Road;
- Enlarging the culvert passing Lily Brook under Woodtick Road and elevating the road if necessary;
- Performing a feasibility analysis to determine the best way to address the flooding conditions in the Town Line Road area;
- Replacing the twin culverts underneath Town Line Road and Nutmeg Valley Road with box culverts capable of passing at least the 50-year flood event;
- Considering an extension of the road from the existing baseball fields off Nichols Road southwest through the utility easement to Tosun Road Extension or Nutmeg Valley Road to provide emergency or permanent access to the area;
- Repairing the eroding hillside at Tosun Road Extension above Old Tannery Brook and install curbing to prevent further erosion and a possible washout;
- Increasing the size of the culvert that passes the Mad River under Mad River Road. The road may need to be raised to accommodate the larger culvert;
- Performing a feasibility analysis considering ways to reduce flooding damages along the Lindsley Brook corridor from Lindsley Drive to south of Center Street / Route 322;
- Increasing the size of the Grove Street / Maple Avenue culvert to prevent backyard flooding, and petition the state to restore a 24-inch or larger culvert to Route 322 nearby;

- Investigating ways to reduce the occurrence of flooding nearby along Meriden Road;
- Performing an engineering analysis of the culverts in the Longmeadow Drive Extension area to evaluate their conveyance capacities and resize as appropriate to prevent the flooding of nearby yards;
- Posting a list of Town snow-plowing routes and 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, and
- Encouraging two modes of egress into every neighborhood by the creation of through streets.

# 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 Wolcott, Connecticut ("Wolcott" or "Town"). The HMP is relevant not only in emergency management situations, but also should be used within the Town of Wolcott'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.

***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 Wolcott'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 Wolcott 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 Wolcott:

- 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 Wolcott, 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 Wolcott's community profile, including the physical setting, demographics, development trends, governmental structure, and sheltering capacity. Next, each chapter of this Plan is broken down into six

or seven different parts. These are *Setting*; *Hazard Assessment*; *Historic Record*; *Existing Programs, Policies, and Mitigation Measures*; *Vulnerabilities and Risk Assessment*; and *Potential Mitigation Measures, Strategies, and Alternatives,* and if necessary, *a Summary of Recommendations.* These are described below.

- ***Setting*** addresses the general areas that are at risk from the hazard. General land uses are identified.

- ***Hazard Assessment*** describes the specifics of a given hazard, including general characteristics, and associated effects. Also defined are associated return intervals, probability and risk, and relative magnitude.

- ***Historic Record*** is a discussion of past occurrences of the hazard, and associated damages when available.

- ***Existing Programs, Policies, and Mitigation Measures*** gives an overview of the measures that the Town of Wolcott 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 Wolcott.

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

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

## *1.4 Discussion of STAPLEE Ranking Method*

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

- **Social**: Is the proposed strategy socially acceptable to Wolcott? Is there any equity issues involved that would mean that one segment of Wolcott could be treated unfairly?
- **Technical**: Will the proposed strategy work? Will it create more problems than it will solve?
- **Administrative**: Can Wolcott 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 Wolcott authorized to implement the proposed strategy? Is there a clear legal basis or precedent for this activity?

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

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

## *1.5 Documentation of the Planning Process*

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

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 Wolcott will also be coordinated by the COGCNV.

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

- Mr. Thomas Dunn, Mayor
- Mr. Chester Sergey, Chairman, Wolcott Local Emergency Planning Commission
- Mr. Paul Scirpo, Police Chief / Emergency Response Plan Coordinator
- Mr. Peter Parks, Building Department
- Mr. David Kalinowski, Zoning Enforcement Officer, Department of Public Works
- Mr. Dennis Dean, Assistant Fire Chief

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 May 16, 2006.*** Observations were made of flooding and problem areas within the Town.

- ***Field inspections were performed on June 7, 2006.*** Observations were made of flooding and problem areas within the Town.

- ***A project initiation meeting was held June 26, 2006.*** This meeting addressed the scope of services necessary to develop this HMP. Initial input was provided by the project team.

- ***A project meeting with Town officials was held August 9, 2006.*** Necessary documentation was collected, and problem areas within the Town were discussed.

- ***Field inspections were performed on October 28, 2006.*** Observations were made of flooding and problem areas within the Town.

- ***A public information meeting was held October 23, 2006 at 7:30 P.M.*** Preliminary findings were presented to Town personnel. No members of the public attended.

- ***A second public information meeting was held November 28, 2006 at 7:30 P.M.*** Preliminary findings were presented and public comments solicited.

While residents were invited to the public information meeting via newspaper, only two residents attended. Similarly, 28 community and civic organizations were invited via a mailed copy of the press release that announced the public information meeting. These included the following:

- Wolcott Chamber of Commerce;
- Democratic and Republican Town Committees;
- Local AARP;
- Wolcott Grange;
- Knights of Columbus;
- Lion's Club;
- Exchange Club;
- Four athletic organizations;
- Friends of the Library;
- Wolcott Landowners' Protective;
- Wolcott Land Conversation Trust;
- Hitchcock Lake Association;
- Junior Women's Club of Wolcott;
- Farmingbury Women's Club;
- Volunteer Fire Department and Ambulance;
- VFW Post 1979;
- Wolcott Education Foundation, Inc.;
- Wolcott Historical Society;
- Ehden Lebanese American Club; and

- Four places of worship.

Residents were also encouraged to contact the COG with comments via newspaper articles.

As another direct gauge of public interest, a thorough review of Public Works Department complaint files was undertaken to document problems of public concern. Finally, the Connecticut DEP was routinely briefed and consulted throughout the development process.

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 spring 2008, contingent on receiving conditional approval from FEMA. The draft that is sent for FEMA review will be posted on the Town website and the COGCNV website to provide opportunities for public review and comment. Such comments will be incorporated into the final draft when applicable. Upon receiving conditional approval from FEMA, the public hearing will be scheduled, at which time any remaining comments can be addressed. Notification of the opportunity to review the Plan on the websites and the public information meeting will be placed 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

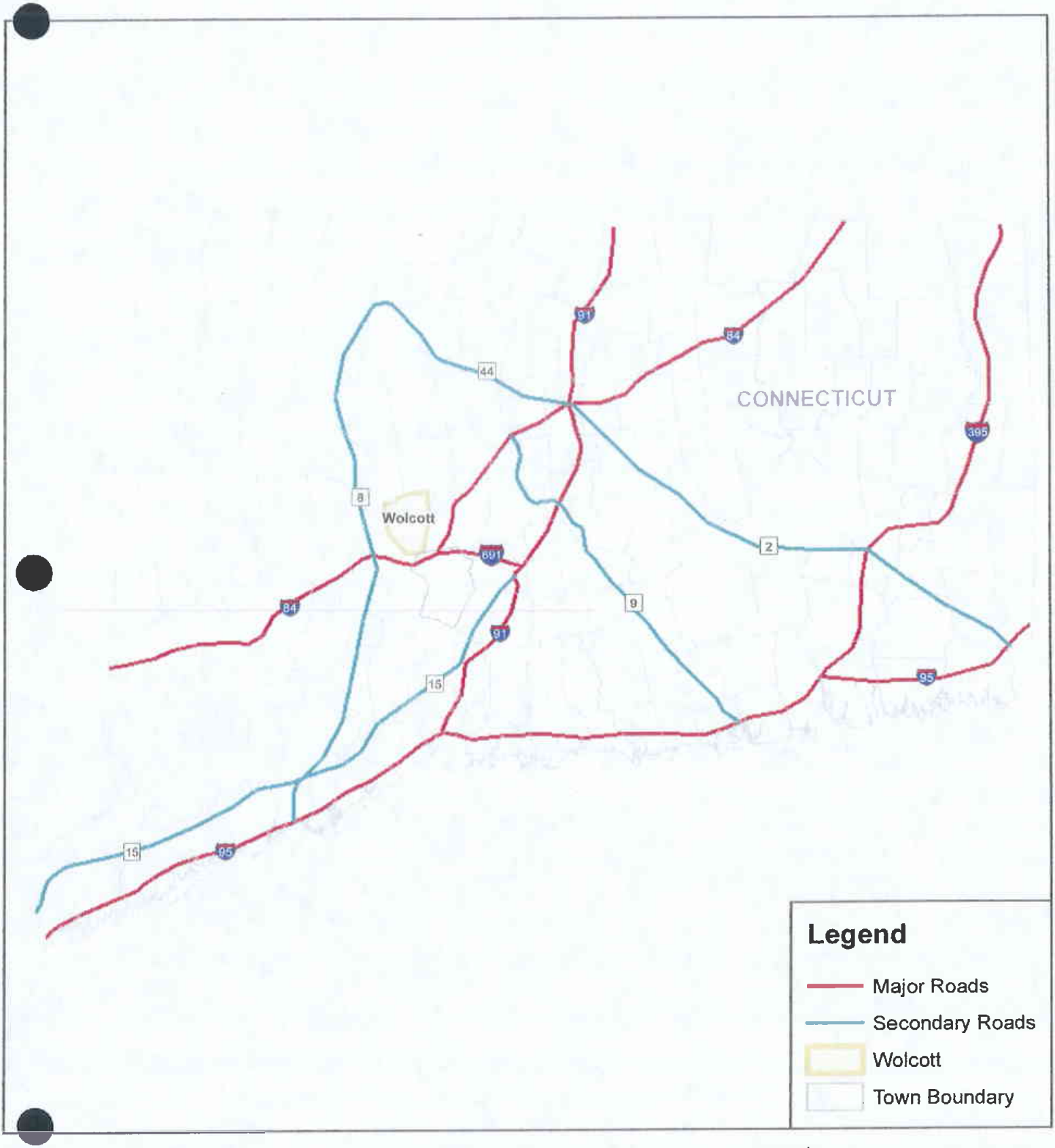
The Town of Wolcott is located in New Haven County. It is bordered by Waterbury to the west and southwest, Plymouth and Bristol to the north, Southington to the east, and Cheshire to the south. Refer to Figure 2-1 for a location schematic and Figure 2-2 for a location map. Wolcott is the fourth-most developed community in the Central Naugatuck Valley Region.

Wolcott is located within the eastern 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 low-rank 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 in several upland areas. Elevations range from 460 feet in the southwestern part of Town to 1,050 feet above sea level near Lindsley Hill in the northern part of Town, based on the National Geodetic Vertical Datum of 1929. The hilly terrain of Wolcott makes it particularly vulnerable to an array of natural hazards.

## 2.2 Existing Land Use

Wolcott is characterized by its hills and steep slopes which limit development in much of the town. A compact commercial district is located in the center of the town at the intersection of Wolcott Road and Center Street with additional commercial sites along Wolcott Road to the north and south. The commercial areas are surrounded by low-density residential districts interspersed with agricultural operations.

# Figure 2-1: Wolcott Location Map

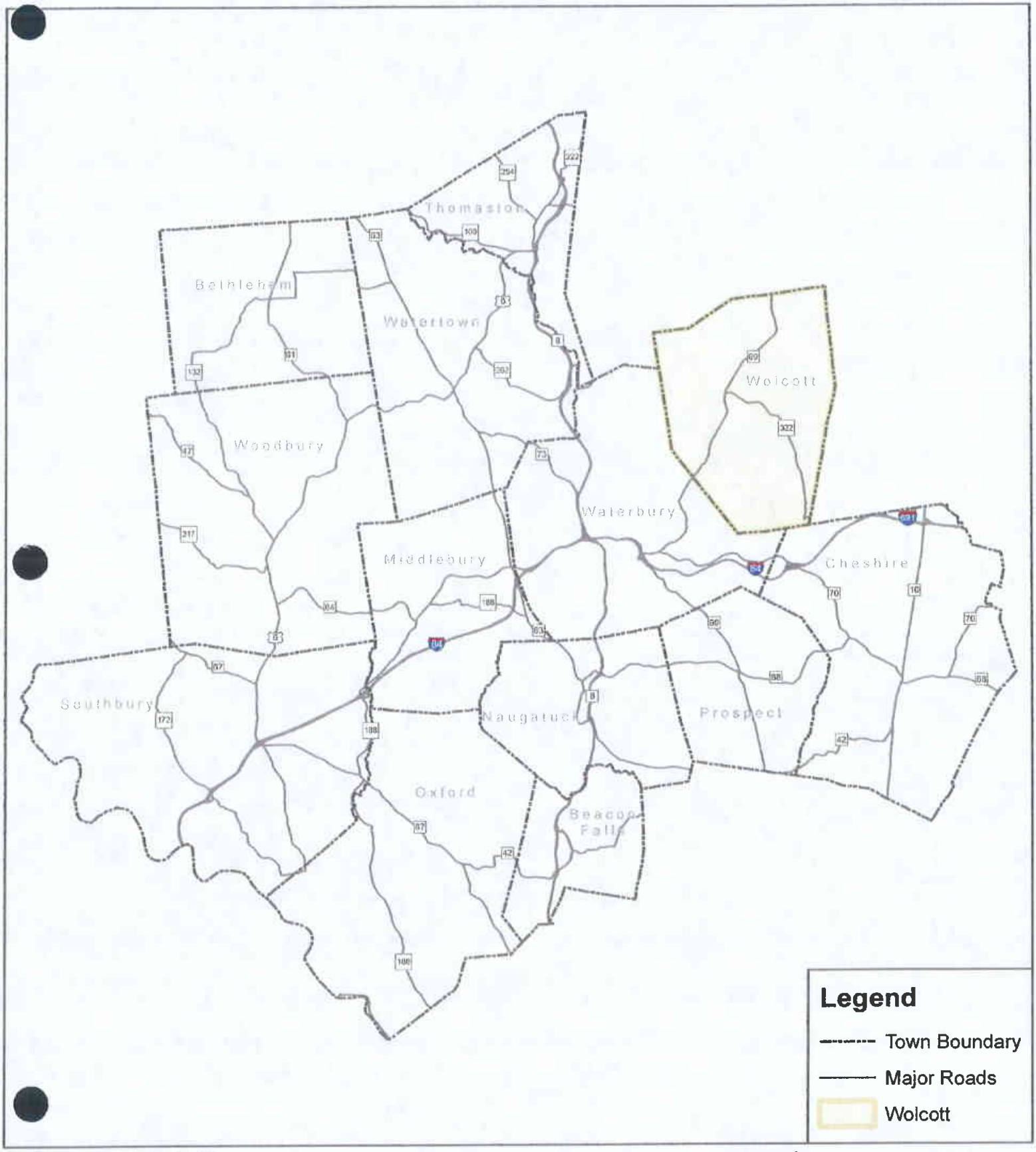



Source "Roads", GDT
"Town Boundary", DEP
For general planning purposes only. Delineations may not be exact
January 2007

0 10 20 Miles

COUNCIL OF GOVERNMENTS
CENTRAL NAUGATUCK VALLEY

# Figure 2-2: Wolcott in the CNVR




Source: "Roads", c1984 - 2006 Tele Atlas, Rel 10/06
"Town Boundary" DEP
For general planning purposes only Delineations may not be exact

April 2007

COUNCIL OF GOVERNMENTS
CENTRAL NAUGATUCK VALLEY

The largest concentration of industrial land uses is located in the southwest corner of Wolcott along Wolcott Road at the Waterbury city line. Slopes and water features limit development at the east and west borders of the town.

The Town of Wolcott encompasses 20.43 square miles. Table 2-1 provides a summary of land use in Wolcott by area. In addition, refer to Figure 2-3 for a map of generalized land use in the Central Naugatuck Valley Planning Region.

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

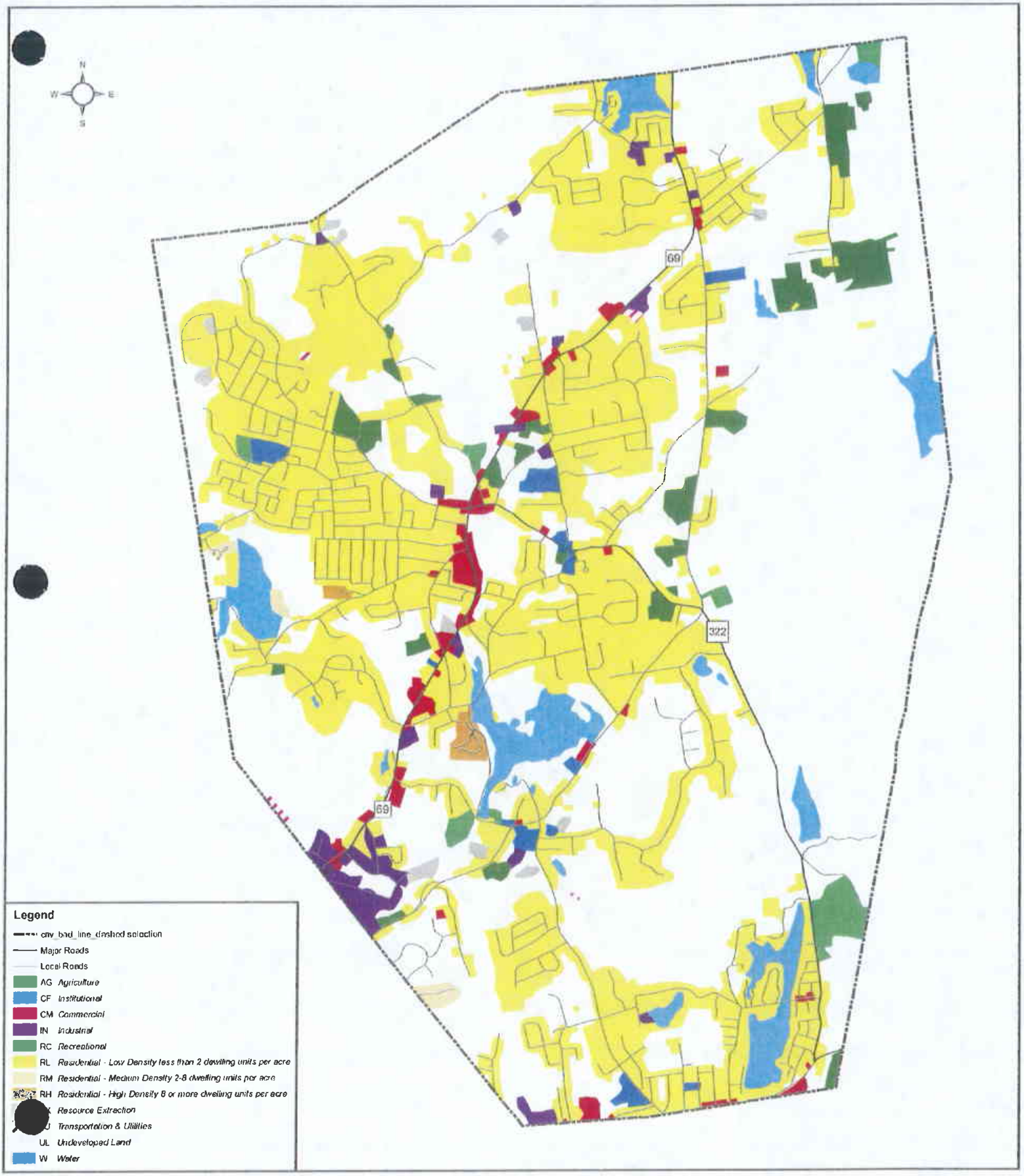
| Land Use | Area (acres) | Pct. |
|---|---|---|
| Vacant | 7,666 | 56.6 |
| Residential - Low Density | 4,427 | 32.7 |
| Water | 497 | 3.7 |
| Agricultural | 294 | 2.2 |
| Commercial | 160 | 1.2 |
| Industrial | 157 | 1.2 |
| Recreational | 112 | 0.8 |
| Institutional | 95 | 0.7 |
| Mining | 47 | 0.3 |
| Residential - High Density | 36 | 0.3 |
| Residential - Medium Density | 34 | 0.3 |
| Utilities/Transportation | 11 | 0.1 |

*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 Wolcott. The following discussion highlights Wolcott's geology at several regional scales.

# Figure 2-3: Wolcott Generalized Land Use




Source: "Roads", CDT
"Town Boundary", DEP
"Land Use", COGCNV

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

January 2007

0 0.5 1 Miles

COUNCIL OF GOVERNMENTS
CENTRAL NAUGATUCK VALLEY

In terms of North American bedrock geology, the Town of Wolcott 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.

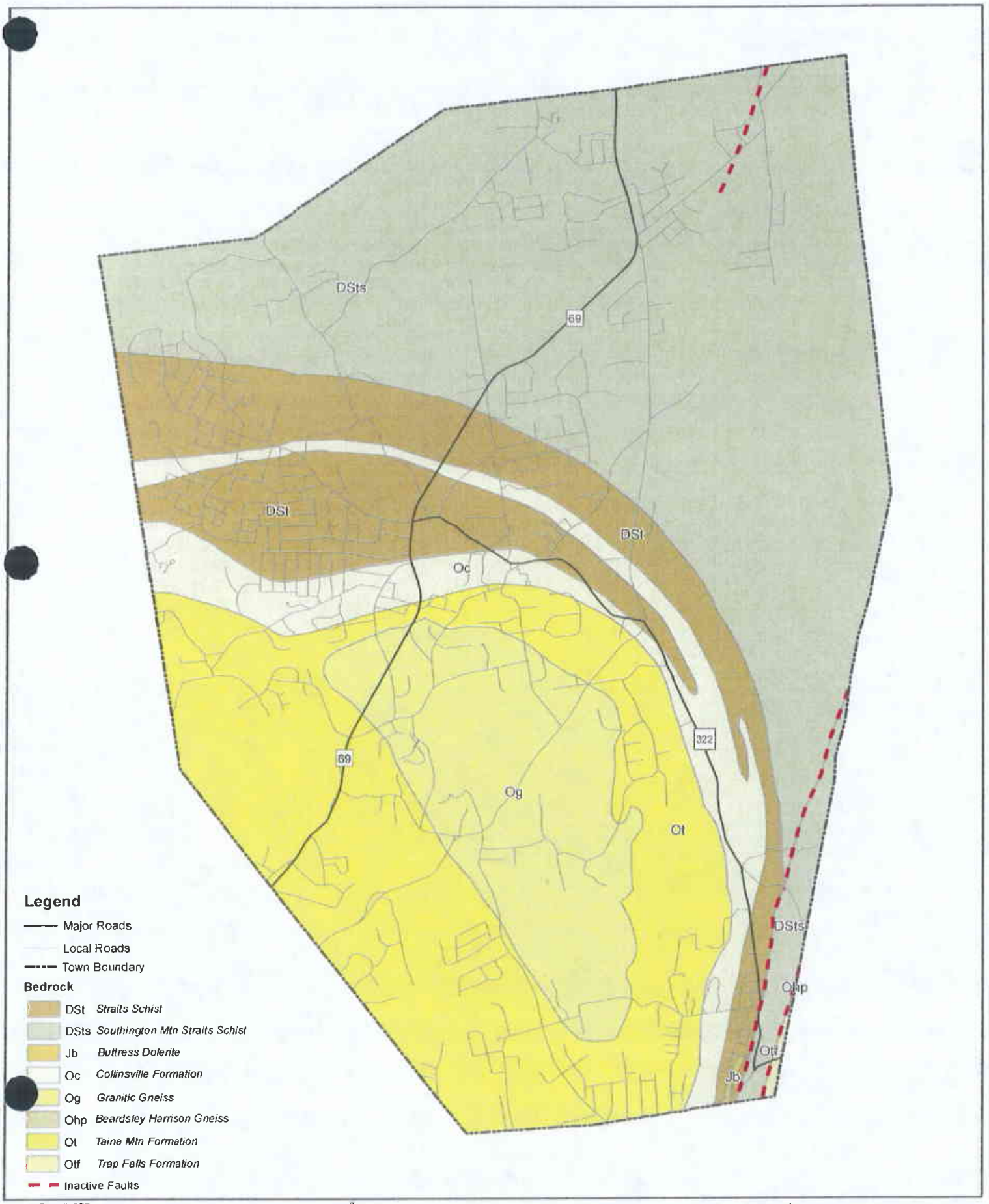
Regionally, in terms of New England bedrock geology the Town of Wolcott lies within the Eugeosyncline Sequence. Bedrock belonging to the Eugeosyncline Sequence are typically deformed, metamorphosed, and intruded by small to large igneous plutons.

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 Wolcott 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 Town of Wolcott's bedrock consists of three general lithologies: volcanic and intrusive igneous silicate gneisses, metamorphic granofels, and metasedimentary and metaigneous schists. The bedrock alignment trends northwest-southeast through the Town. Refer to Figure 2-4 for a depiction of the bedrock geology in the Town of Wolcott.

The five primary bedrock formations in the Town (from north to south) are Southington Mountain Member of the Straits Schist, The Straits Schist, Collinsville Formation, Taine Mountain Formation, and a granitic gneiss formation believed to be from the Ordovician period:

# Figure 2-4: Wolcott Bedrock Geology




Source: "Roads", CDT
"Town Boundary", "Bedrock Geology", DEP
For general planning purposes only. Delineations may not be exact
January 2007

Miles
0 0.5 1

COUNCIL OF GOVERNMENTS
CENTRAL NAUGATUCK VALLEY

- The Southington Mountain Member of the Straits Schist is a gray to silvery, 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 Taine Mountain Formation consists of gray, medium-grained, well-laminated granofels, and
- The Ordovician granitic gneiss is composed of light-colored, foliated granitic gneiss.

In addition, two other small areas of bedrock exist in the southeastern corner of the Town:

- The Trap Falls Formation, a gray to silvery, partly rusty-weathering, medium-grained schist, and
- An intrusion of Buttress Dolerite, a basalt-like dark-gray, brown- to gray-weathering dolerite, extends into Wolcott from the northwest corner of Cheshire.

Three major high-angle faults exist in the eastern portion of Town, all unnamed. Two of these faults run parallel to each other along Southington Mountain on the southeastern boundary of Town before passing into Southington. The third fault extends from the Beecher Road area north-northeast into the City of Bristol. All of these faults trace to the Jurassic period and converge with the Western Border Fault outside of Wolcott. The Western Border Fault is a large fault extending along the eastern edge of the Western Highlands and stretches from Milford northwards into Massachusetts. None of these faults are active.

Bedrock outcrops are difficult to find in Wolcott due to the forested nature of the Town, although outcrops can be found at higher elevations and on hilltops. Figure 2-4 also depicts the location of known fault lines in the Town of Wolcott.

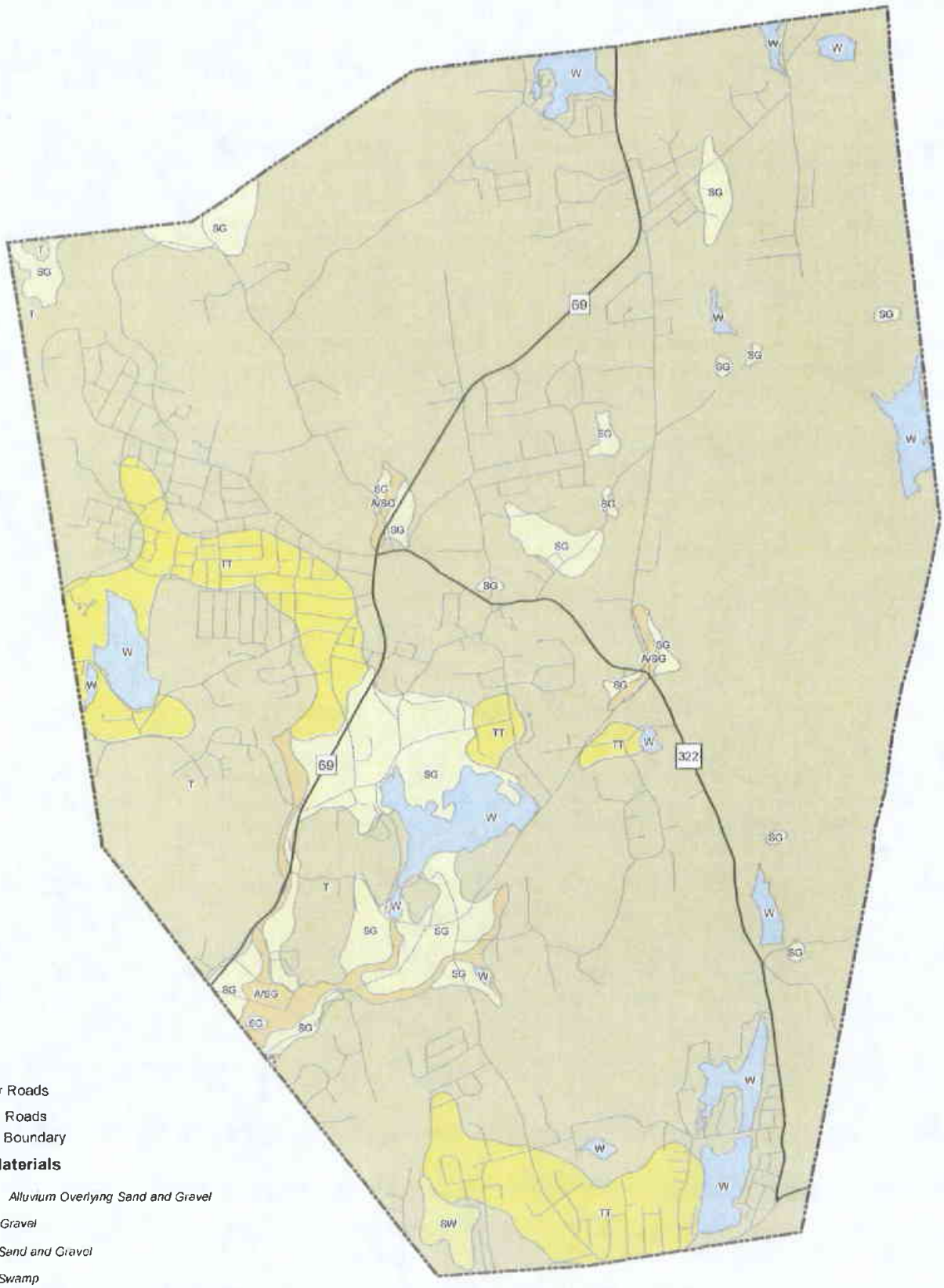
At least twice in the late Pleistocene, continental ice sheets moved across Connecticut. As a result, surficial geology of the Town is characteristic of the depositional environments that occurred during glacial and postglacial periods. Refer to Figure 2-5 for a depiction of surficial geology.

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 Wolcott with the exception of the river valleys associated with the Mad River and its tributary streams. Stratified sand and gravel ("stratified drift") areas are associated with the major rivers and brooks throughout the Town. These deposits accumulated by glacial meltwater streams during the outwash period following the latest glacial recession.

With regard to soil types, approximately 76% of the Town falls within the Canton and Charlton soils (3,449 acres), Charlton-Chatfield complex (2,491 acres), Sutton fine sandy loam (1,714 acres), Ridgebury, Leicester and Whitman soils (1,399 acres), and Hollis-Chatfield rock outcrop complex (1,236 acres). The remainder of the Town has soil types of consisting primarily of various fine to gravelly sandy loams, swamps, water, and Udorthents (disturbed soils underlying urban and built up lands where the original soil type is no longer easily identified). The following soil descriptions are taken in part from the official series descriptions from the United States Department of Agriculture (USDA) website.

- The Canton and Charlton soils consists 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 35 percent. Saturated hydraulic conductivity is high in the solum and high or very high in the substratum.

# Figure 2-5: Wolcott Surficial Geology




**Legend**

- Major Roads
- Local Roads
- Town Boundary

**Surficial Materials**

- A/SG *Alluvium Overlying Sand and Gravel*
- G *Gravel*
- SG *Sand and Gravel*
- SW *Swamp*
- T *Till*
- TT *Thick Till*
- W *Water*

Source "Roads" GDT
"Town Boundary" "Surficial Materials" DEP
For general planning purposes only. Delineations may not be exact.
January 2007

0 0.5 1 Miles

COUNCIL OF GOVERNMENTS
CENTRAL NAUGATUCK VALLEY

- 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 45 percent. Crystalline bedrock is at depths of 20 to 40 inches. Saturated hydraulic conductivity is moderately high to high in the mineral soil.

- The Sutton series consists of very deep, moderately well drained loamy soils formed in till. They are nearly level to strongly sloping soils on plains, low ridges, and hills. Slope ranges from zero to 15 percent. Saturated hydraulic conductivity is moderately high to high.

- Ridgebury, Leicester and Whitman soils consist of somewhat poorly drained to very poorly drained, nearly level or gently sloping soils formed in compact glacial till. These soils occupy wet, low-lying areas. Slope ranges from zero to 3 percent. Permeability is moderate in the surface layer and subsoil but is slow or very slow to moderately rapid in the substratum.

- 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 45 percent. Depth to bedrock ranges from ten to 40 inches with outcrops present.

The amount of stratified drift present in the Town is important for several reasons. The stratified drift could be used in the future to provide drinking water via pumping wells. With 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, central, and southern Wolcott. 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.

## 2.4 *Climate*

Wolcott 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 42 inches per year as measured at Wolcott Reservoir weather station in Wolcott (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 19$^{th}$ 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 hydrology of the town of Wolcott is dominated by the Mad River watershed and spotted with several lakes and ponds and numerous streams, most of which are unnamed. Only a few of the stream corridors are prone to chronic flooding because of the large

impoundments that exist in the watershed, and the fact that the floodplains and channels have been less developed in this residential town than in neighboring communities.

The Town lies within seven major drainage basins corresponding to the Pequabuck River, the Eight Mile River, the Ten Mile River, the Naugatuck River, Hancock Brook, Beaver Pond Brook, and the Mad River. These are described below.

*Pequabuck River*

A very small portion (69.29 acres, 0.11 square miles) of the Pequabuck River basin lies within the Town of Wolcott at the northeastern edge of the town. This drainage basin makes up 0.51% of Wolcott's land area and drains into either Dunham Millpond on the border of Wolcott and the City of Bristol, or to an unnamed pond just northeast of Cedar Swamp Pond in Bristol. Both of these ponds are impounded by dams.

The unnamed brooks leaving these two ponds join together and flow northeast into Bristol, joining the Pequabuck River near the High School after draining a total of 2.18 square miles. The Pequabuck River then flows east into Farmington to join the Farmington River, draining a total of 57.77 square miles across the towns of Farmington, Plainville, Bristol, Wolcott, Plymouth, Harwinton, and Burlington.

*Eight Mile River*

Most of the northeastern section of Wolcott (3.43 square miles) lies within the Eight Mile River basin. The Eight Mile River basin is comprised of 14.75 square miles in Wolcott, Bristol, and Southington. Its headwaters are located in southeastern Bristol near Redstone Hill, and it flows in a southern direction across Southington through Grannis Pond before emptying into the Quinnipiac River near the Village of Plantsville in Southington.

The Eight Mile River basin comprises 16.26% of the land area of Wolcott, and there are several streams in the town which drain into the major tributaries of the Eight Mile River. These streams include the North and South Branches of Hamlin Brook, which flow east into Southington and Dayton Brook; Roaring Brook, which flows southeast through two impoundments (Beecher Road Pond and the Wolcott Reservoir) before entering Southington and joining Dayton Brook; and Cussgutter Brook, which flows east into Southington and then into the Eight Mile River. Most of the lakes and ponds within this drainage basin are impounded by dams, and the majority of the stream corridor is undeveloped.

*Ten Mile River*

A small portion (1.70 square miles) of the Ten Mile River basin lies within the southeastern boundary of Wolcott, and this section is drained by Harwinton Brook. Harwinton Brook drains into the Southington Reservoir in southeastern Wolcott. The outflow becomes Judd Brook. Judd Brook joins the Ten Mile River just above its confluence with the Quinnipiac River, and drains a total of 5.53 square miles making up 8.06% of Wolcott's land area.

The Ten Mile River has its source in the Town of Prospect as the outflow of the Cheshire Reservoir at the Cheshire Reservoir Dam. The Ten Mile River flows north and northeast into and across Cheshire through several impoundments before being joined by Judd Brook and then empties into the Quinnipiac River near Milldale. In total, the Ten Mile River drains 20.261 square miles across Prospect, Waterbury, Cheshire, Wolcott, and Southington.

*Naugatuck River*

While the majority of the land area in Wolcott drains into the Naugatuck River, only a small portion (35.73 acres, 0.05 square miles) drains directly to the Naugatuck River

basin. This area is in the western part of the town near Chestnut Hill, comprising 0.26% of the land area in Wolcott, and draining into Great Brook Reservoir in Waterbury. Great Brook flows southwest from the reservoir and through several impoundments before joining the Naugatuck River just above the mouth of the Mad River. The total drainage area of Great Brook is 3.33 square miles, and most of this brook is in urban Waterbury.

The Naugatuck River originates near the City of Torrington 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 that has its headwaters within the boundaries of the state. The Naugatuck River is well-known for its industrial history.

*Hancock Brook*

The relatively undeveloped northwestern corner of Wolcott drains into Hancock Brook, which has its headwaters in the City of Bristol. The area draining to Hancock Brook in Wolcott measures one square mile, comprising 4.75% of the Wolcott's land area, and draining into unnamed streams that flow northwest into the Town of Plymouth.

Hancock Brook flows southwest through Plymouth before entering the northern part of Waterbury, eventually joining with the Naugatuck River above Steele Brook. The brook drains 12.34 square miles before entering Waterbury, and its total basin area is 15.39 square miles. The Hancock Pond Dam, the Lake Wequapauset Dam, and the Reidville Industrial Park Dam all impound waters in the basin of Hancock Brook in Plymouth.

*Beaver Pond Brook*

Two very small portions (31.89 total acres, 0.05 total square miles) of the drainage basin of Beaver Pond Brook lie within the town boundary of southern Wolcott. This combined area comprises only 0.24% of the land area of Wolcott, and is primarily residential.

Beaver Pond Brook has its headwaters in a swamp near Milloy Road in the southwestern corner of Cheshire. It flows in a westerly direction into the southeastern part of Waterbury, eventually discharging into the Mad River. The total drainage area of Beaver Pond Brook is 5.58 square miles, encompassing parts of Wolcott, Cheshire, Prospect, and Waterbury. While there are no dams of note along the reach of Beaver Pond Brook, there are dams on its tributaries: Waterbury Reservoir Dam #2 on the Waterbury / Prospect Reservoir in Prospect above Turkey Hill Brook; the East Mountain Reservoir Dam above East Mountain Brook; and Daigle Pond Dam on Daigle / DeBishop Pond that also outlets into East Mountain Brook.

*Mad River*

The majority of the land area in Wolcott (14.79 square miles, 69.93% of total land area) lies within the Mad River drainage basin. The majority of Wolcott is only lightly developed, but there are many dams present in the town that serve flood control and recreational purposes.

The Mad River drains a total of 0.48 square miles in Bristol before entering Wolcott at Cedar Swamp Pond and has its headwaters at the Cedar Swamp Pond Dam. Several unnamed streams and Break Hill Brook drain to the Mad River upstream of the Scovill Reservoir. The Mad River is joined by Lindsley Brook in the Scovill Reservoir before passing through the Scovill Reservoir Dams and being joined by Lily Brook. Downstream of the confluence of Lily Brook and the Mad River, the river flows southwest to the Waterbury city line where it is joined by Old Tannery Brook. The Mad River drains a total area of 15.8 square miles at the confluence of the Mad River and Old Tannery Brook near the Waterbury city line.

The Mad River continues in a westerly direction through the City of Waterbury, eventually discharging into the Naugatuck River. In total, the Mad River drains 25.93

square miles across Bristol, Cheshire, Plymouth, Prospect, Waterbury, and Wolcott. The river is heavily impounded with 25 registered dams within its drainage basin, and 18 of these are located in the Town of Wolcott.

## 2.6 *Population and Demographic Setting*

The total CNV Region population as indicated in the 2000 Census is 272,594 persons. The total land area is 309 square miles, for a regional population density of 882 persons per square mile. Wolcott has a population density of 745 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 177 individuals per square mile (Table 2-2).

**Table 2-2**
**Population Density by Municipality, Region and State, 2000**

| Municipality | Total Population | Land Area (square miles) | Population Density |
|---|---|---|---|
| Beacon Falls | 5,246 | 9.77 | 537 |
| Bethlehem | 3,422 | 19.36 | 177 |
| Cheshire | 28,543 | 32.90 | 868 |
| Middlebury | 6,451 | 17.75 | 363 |
| Naugatuck | 30,989 | 16.39 | 1,891 |
| Oxford | 9,821 | 32.88 | 299 |
| Prospect | 8,707 | 14.32 | 608 |
| Southbury | 18,567 | 39.05 | 475 |
| Thomaston | 7,503 | 12.01 | 625 |
| Waterbury | 107,271 | 28.55 | 3,757 |
| Watertown | 21,661 | 29.15 | 743 |
| Wolcott | 15,215 | 20.43 | 745 |
| Woodbury | 9,198 | 36.46 | 252 |
| CNV Region | 272,594 | 309.02 | 882 |
| Connecticut | 3,405,565 | 4844.80 | 703 |

*Source: United States Census Bureau, 2000 Census of Population and Housing, Summary File 1*

Wolcott is 71st out of 169 municipalities in Connecticut in terms of population, with an estimated population of 15,215 in 2000. The town is the 56th most densely populated municipality in the state. The population of Wolcott increased by 41% between 1960 and 1970, while growth dropped to 4% from 1970-80 and rose again to 11% from 1990-2000. According the 2000 Census of Population and Housing from the United States Census Bureau, the median value of owner-occupied housing in the Town of Wolcott was $143,400, which is lower than the statewide median value of $166,900.

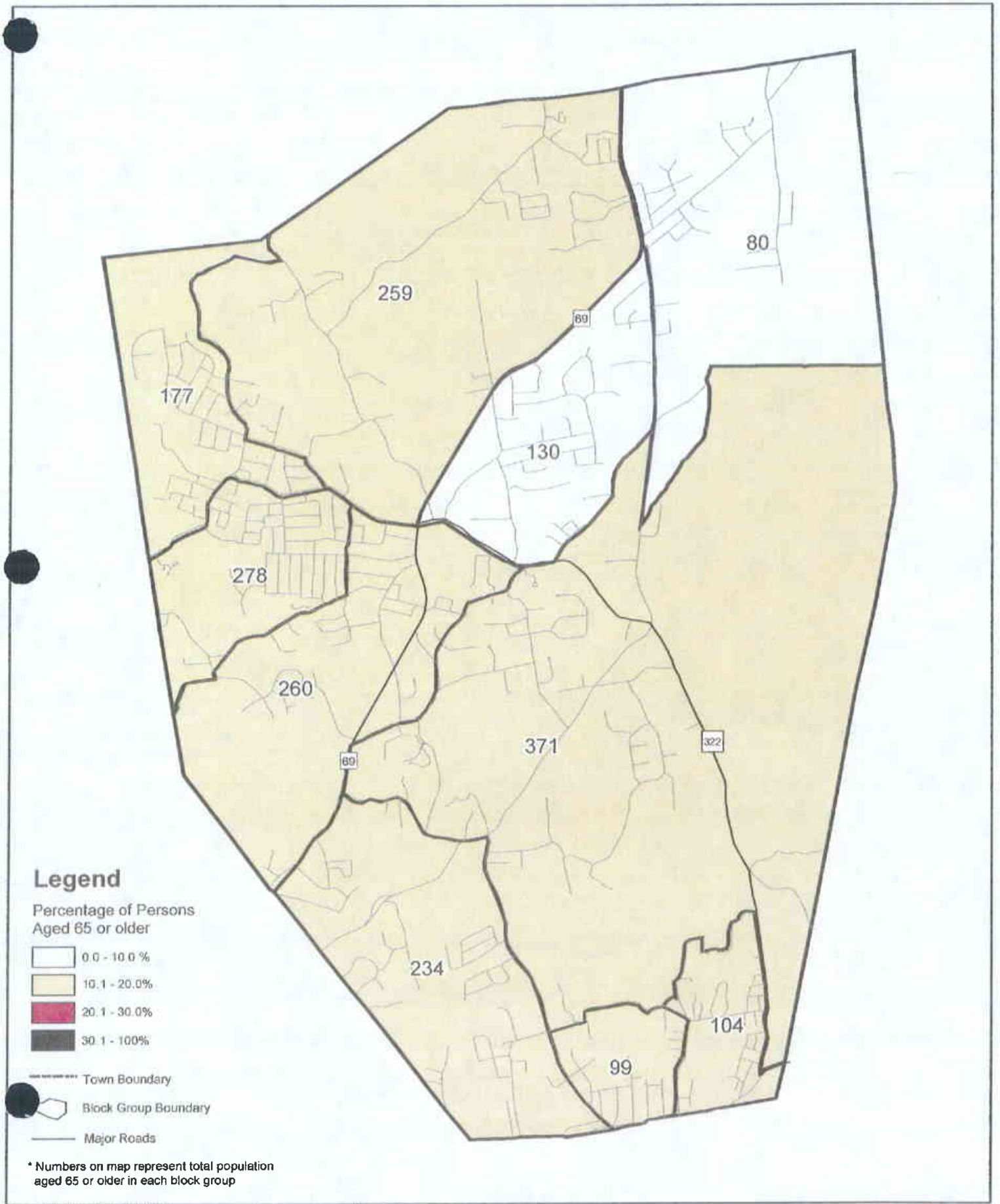
Wolcott has populations of people who are elderly, linguistically isolated, and/or disabled. These are depicted by census block on Figures 2-6, 2-7, and 2-8. The populations with these characteristics have numerous implications for hazard mitigation, as they may require special assistance or different means of notification before disasters occur. These will be addressed as needed in subsequent sections.

## 2.7 *Governmental Structure*

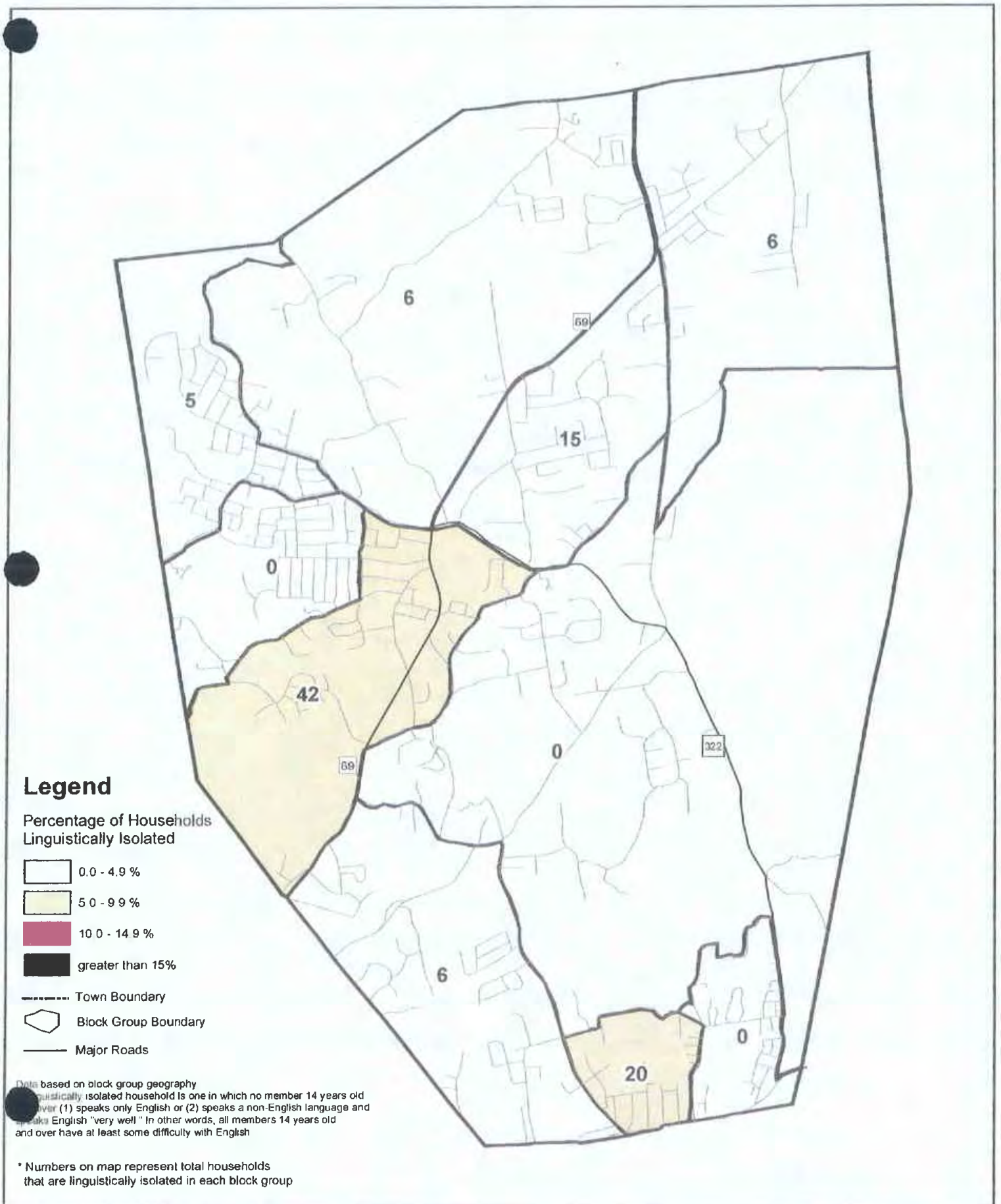
The Town of Wolcott is governed by a Mayor-Council form of government with nine council members elected at large from the three voting districts. The Town Council serves as the legislative body of the Town, responsible for policy, ordinances, and the general operating and capital budgets.

In addition to Town Council and the Mayor, there are boards, commissions and committees providing input and direction to Town Council and 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 Civil Preparedness and Local Emergency Planning Commission, the Building Official, the Fire Department, the Police Department and the Public Works and Engineering Department.

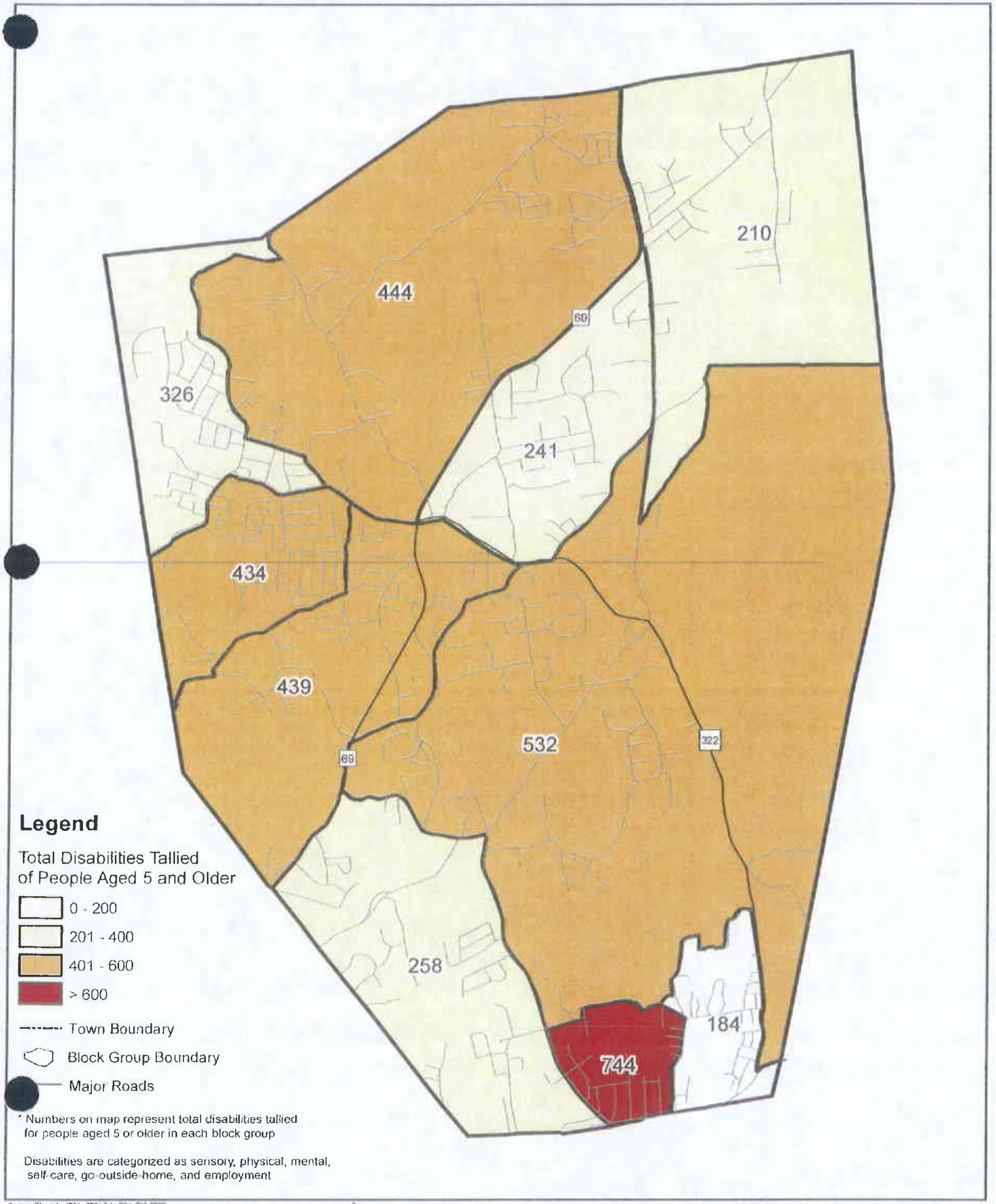
# Figure 2-6: Wolcott Elderly Population



# Figure 2-7: Wolcott Linguistically Isolated Households



# Figure 2-8: Wolcott Disabilities Map



Complaints related to Town maintenance issues are routed to Zoning or the Department of Public Works. 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*

Following its incorporation in 1796, limited industry in the form of mills and manufacturing developed in Wolcott. Agricultural production was largely limited to dairy farms due to Wolcott's steep terrain and gravelly soils. The first half of the 20th century saw increasing residential development with the improvement of the regional roadway network. Until 1933, the Waterbury & Milldale Tramway provided transportation along the southern border of Wolcott between Southington and Waterbury. Suburbanization increased dramatically in the 1960s as Wolcott became a popular location for workers commuting to nearby employment centers.

Residential development has slowed in recent years as the available land is characterized by steep topography. From 1997-2005, an average of about 67 single-family permits were issued on an annual basis.

Cul-de-sacs in new developments are discouraged and connectivity of roads is encouraged. Subdivisions featuring cul-de-sacs offer a single access point for emergency services, lengthening emergency response times and rendering those residential areas vulnerable if access is cut off by flooding or downed tree limbs. The Town of Wolcott requires a 60-foot right of way at the end of dead end streets, and dead end streets can have only 12 homes or less. In addition, utilities serving new developments must be installed underground. Exceptions due to shallow bedrock are granted on a case-by-case basis.

## 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 Wolcott continues. Convalescent homes 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. There are also two electric substations in Wolcott, one near Frisbie Elementary School and the other on Route 69 near Mad River Road.

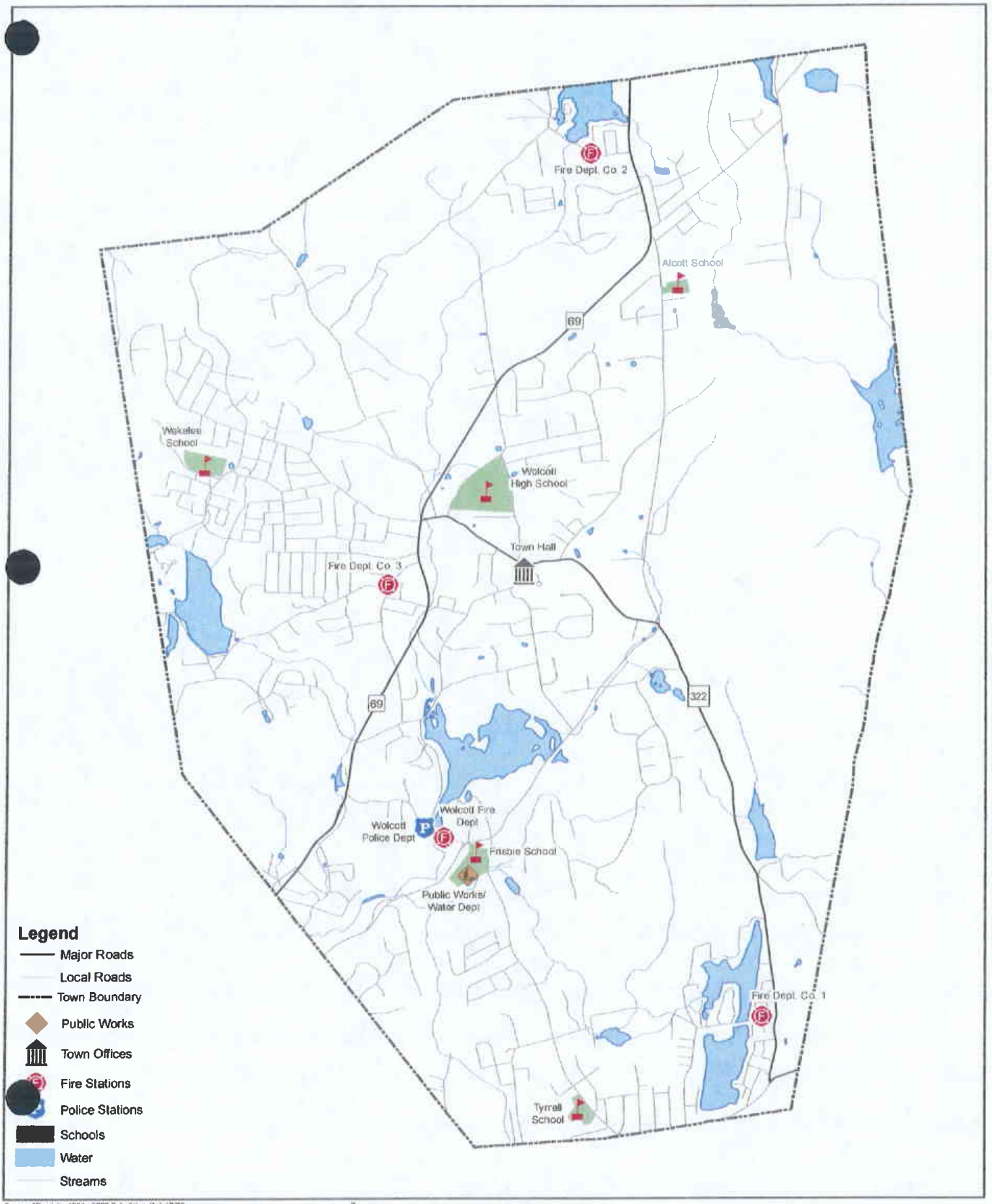
A map of critical facilities is shown in Figure 2-9, and the associated list of critical facilities is provided in Table 2-3. Shelters, transportation, communications, and the public water system are described in more detail below.

**Table 2-3**
**Critical Facilities in Wolcott**

| Type | Name | Address | Located in Floodplain? |
|---|---|---|---|
| Convalescent Home | Wolcott View Manor | 50 Beach Rd | No |
| Public Works | Public Works, Water Dept. | 48 Todd Road | No |
| Fire Dept | Fire Department Company #1 | 395 Central Ave | No |
| Fire Dept | Fire Department Company #2 | North St | No |
| Fire Dept | Fire Department Company #3 | Lyman Rd | No |
| Fire Dept | Wolcott Fire Dept | 225 Nichols Rd | No |
| Police Sta. | Wolcott Police Dept | 225 Nichols Rd | No |
| School | Alcott School | 1490 Woodtick Rd | No |
| School | Frisbie School (tertiary shelter) | 24 Todd Rd | No |
| School | Tyrrell School (primary shelter) | 500 Todd Rd | No |
| School | Wakelee School (secondary shelter) | 12 Hemple Dr | No |
| School | Wolcott High School | 457 Bound Line Rd | No |
| Town Office | Wolcott Town Offices | 10 Kenea Ave | No |

*Source: Council of Governments Central Naugatuck Valley*

# Figure 2-9: Wolcott Critical Facilities




Source: "Roads", c1984 - 2008 Tele Atlas, Rel. 10/06
"Hydrography" "Town Boundary" DEP
"Critical Facilities", COGCNV
For general planning purposes only. Delineations may not be exact.
March 2008

Miles
0 0.5 1

COUNCIL OF GOVERNMENTS
CENTRAL NAUGATUCK VALLEY

***Shelters***

Emergency shelters are also considered to be an important subset of critical facilities, as they are needed most in emergency situations. The Town of Wolcott has designated three emergency shelters, and agreements are in place to use additional facilities, such as the VFW Hall, on an as-needed basis. Tyrell Middle School is the primary shelter, Wakelee Elementary School is the secondary shelter and Frisbie Elementary School is third in order. All three facilities feature cafeterias with substantial food supply available. All three schools have auxiliary generators that can provide emergency power for lights, heat, water, and food storage. The three facilities are well-distributed through the town. Tyrell Middle School and Frisbie School are located on opposite ends of Todd Road in the southern part of Wolcott with easy access via Route 322. Wakelee Elementary School is located in a residential neighborhood in the northern part of Wolcott and is accessible from the center of town.

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 fire houses are not considered as shelters, but serve as important emergency supply distribution centers. The police and fire departments staff the shelters. 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 these 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 Wolcott does not have any hospitals or medical centers. Instead, residents use the nearby facilities in Waterbury or Bristol. As a means of accessing these facilities or evacuating the area, Wolcott has convenient access on two state routes that function as major transportation arteries. Route 69, which runs north-south through the center of Wolcott, provides access to Bristol to the north and Waterbury towards the south. Route 322 runs from the center of Wolcott to the southeast towards Cheshire. Although there are no interstate highways within the town, I-84 can be accessed to the southeast of Wolcott, about five miles from the town center.

*Communications*

Wolcott has an active Local Emergency Preparedness Commission which is constantly looking to enhance the Town's emergency response. The commission meets monthly with the police and fire departments and occasionally conducts drills and tabletop exercises. On a seasonal basis, the commission publishes articles about planning for emergencies in the local newspaper. The commission is interested in retaining a trailer with a speaker system to alert residents near their homes. A public explanation for the emergency sirens and other safety tips is provided at the Wolcott Civil Preparedness website (http://www.wolcottct.com/detail.cfm?sid=21). In addition, the COGCNV is investigating the possibility of instituting an emergency notification system in the area to further enhance emergency response.

It is important to note that effective January 1, 2008, the Town of Wolcott will be in the southeast portion of Region 5 of the Connecticut Emergency Medical Service regions. Thus, it is important that Wolcott institute emergency notification systems compatible with those of Region 5, Region 3 to the east, and Region 2 to the southeast. Region 5 will contain most of the COGCNV municipalities.

*Public Water System*

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 Town of Wolcott has limited public water service available for fire fighting. This is discussed further in Section 9.0.

# 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 Wolcott with moderate to frequent regularity. The four major watershed areas in Wolcott are the Eight Mile River, Hancock Brook, the Mad River, and the Ten Mile River. A thorough discussion of these drainage areas is included in Section 2.5. The Eight Mile River watershed is primarily water company land and drains the majority of the northeastern section of Wolcott. The Hancock Brook watershed drains the northwestern portion of Wolcott northwest into Plymouth. The Ten Mile River watershed drains the southeastern section of Town into Southington and Cheshire. Flooding is not a common problem in these drainage basins due to lack of development.

The Mad River drains the majority of the Town, including nearly all of the northern, western, central, southwestern, and southern sections, and flows in a south-southwesterly direction into the City of Waterbury. Most of the chronic flooding problems in Wolcott

are located within the Mad River drainage basin. 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, resulting from inadequate drainage and other factors. The frequency of flooding in Wolcott is considered likely to highly likely depending on the source of the flooding, but flooding damage only has a limited effect (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. This flood has a one percent chance of being equaled or exceeded each year, and is expected to be exceeded once on the average during any 100-year period. The risk of having a flood of this magnitude or greater increases when periods longer than one year are considered. 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

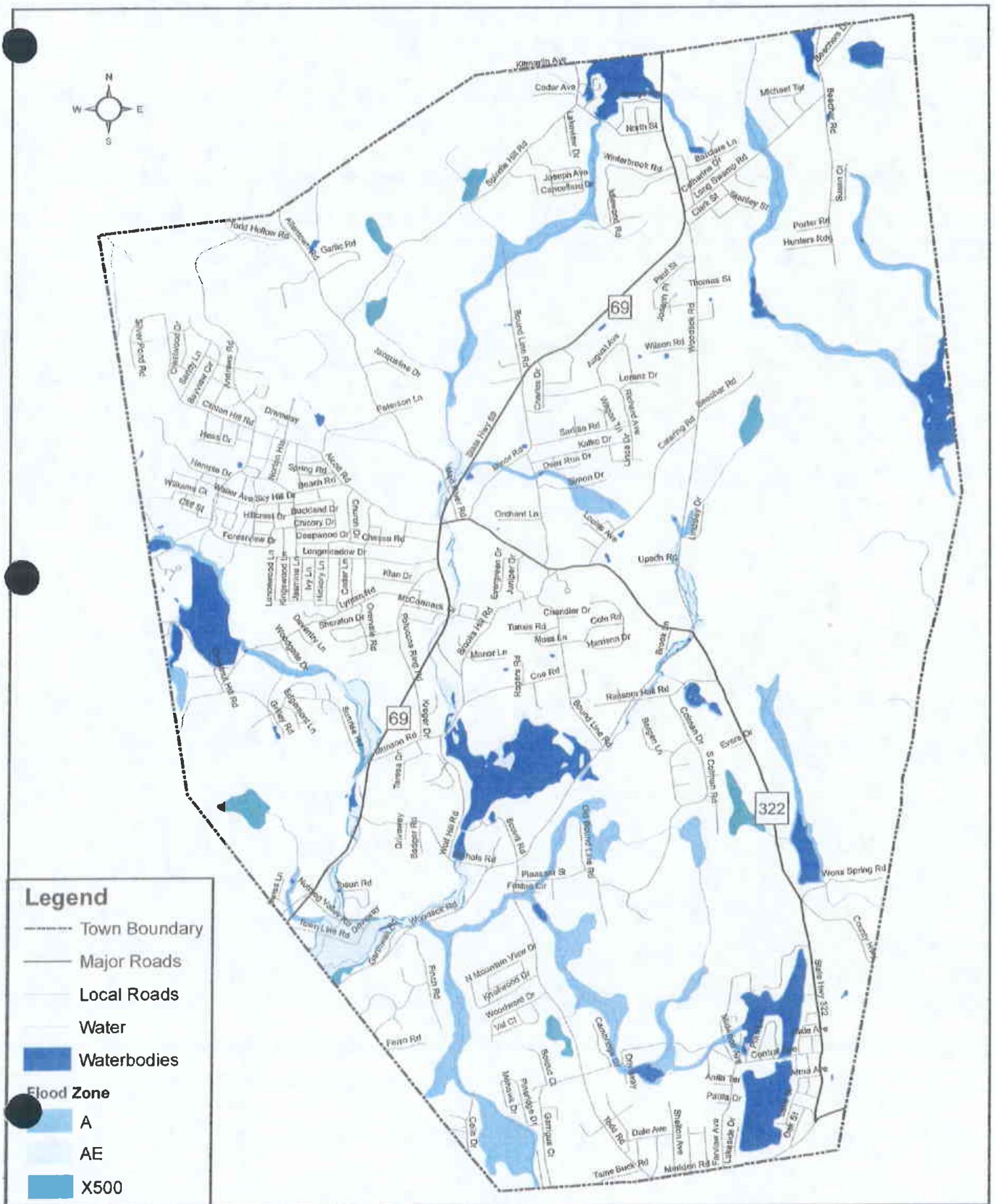
those areas of the 100-year floodplain that are outside the floodway and are subject to inundation but do not convey the floodwaters.

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 Wolcott are delineated on Flood Insurance Rate Maps (FIRM) and Flood Insurance Studies (FIS). These maps demonstrate areas within Wolcott that are vulnerable to flooding. The FIRMs were originally published on July 5, 1982. The FIS was originally published on January 5, 1982. Refer to Figure 3-1 for the areas of Wolcott susceptible to flooding based on FEMA flood zones. Table 3-1 describes the various zones depicted on the FIRM panels for Wolcott.

# Figure 3-1: FEMA Flood Zones in Wolcott




Source "Roads", GDT
"Hydrography", "Flood Zone", "Town Boundary", DEP
For general planning purposes only. Delineations may not be exact
January 2007

Miles
0 0.25 0.5

COUNCIL OF GOVERNMENTS
CENTRAL NAUGATUCK VALLEY

**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. |
| 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. |

In some areas of Wolcott, 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. For example, while the 1955 floods (See Section 3.3 below) have been estimated to be a 50- to 500-year flood across all streams in Connecticut, the floods were less than a 50-year flood events on the Mad River in Wolcott (FEMA, 1982). Dams and other flood control structures can also reduce the magnitude of peak flood flows, as occurs on the Naugatuck River, the Mad River, and their tributaries.

The recurrence interval level of a precipitation event also generally differs from the recurrence interval level of the associated flood. For example, on April 16, 1996, six inches of rain fell in 18 hours in New Haven County. This was classified as a greater than 50-year frequency storm, but caused an approximately 25-year flood event on the Quinnipiac River in Wallingford. According to the National Climatic Data Center (NCDC), this flood event caused $1.5 million in property damage in New Haven County. 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, or a deep or shallow water table, as can be seen in the following historic record.

FEMA commenced the Flood Map Modernization program for New Haven County, Connecticut in August 2007. The "Map Mod" program will result in an updated comprehensive FIS report for New Haven County and one FIRM. It is anticipated that the Map Mod program will enable a more accurate representation of floodplains in Wolcott, including those along the Mad River and other areas where inaccuracies are suspected in the current set of maps. However, the Map Mod program will not re-establish flood elevations along the Mad River or any other river where dam removals have occurred and/or flood control measures are in place.

## 3.3 *Historic Record*

In every season of the year throughout its recorded history, the Town of Wolcott 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.

Major historic floods have occurred in Wolcott in March 1936, September 1938, December 1948, and August and October 1955. In terms of damage to the Town of Wolcott, the most severe of these was damage associated with the September 1938 hurricane and flood.

The flood of record at the USGS gauge on the Naugatuck River in Beacon Falls was recorded during Hurricane Diane on August 19, 1955, when the instantaneous discharge reached an estimated 106,000 cubic feet per second. This exceeded the 500-year flood for the Naugatuck River in that area. However, the presence of several reservoirs buffered the flooding in Wolcott, and the Mad River only reached an estimated 2,070 cubic feet per second at the Waterbury city line. Still, the 1955 flood is the flood of record for many waterways in the Wolcott area. This flood was the result of 11 to 12 inches of rainfall in 48 hours on saturated ground.

The following are descriptions of additional, more recent examples of floods in and around the Town of Wolcott as described in the NCDC Storm Events Database, and based on correspondence with municipal officials.

- January 24, 1998: An early morning winter storm produced three inches of snow in Wolcott before changing over to rain. Heavy rainfall amounts of two to six inches fell across New Haven County, causing wide-spread river, small stream, and low-lying poor drainage flooding.

- 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.

- August 13, 2003: Heavy showers resulted in flash flooding along parts of Route 69 in Wolcott.

- 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 Wolcott.

- April 22-23, 2006: A sustained heavy rainfall caused streams to overtop their banks and drainage systems to fail throughout New Haven County. Rainfall amounts of approximately five inches were recorded in nearby Cheshire, and stream stages were believed to approximate the ten-year recurrence interval.

- June 2, 2006: Heavy rainfalls caused several streets to be flooded and closed including Mad River Road near Route 69, Town Line Road, and Tosun Road.

- April 15-16, 2007: A spring nor'easter dropped over six inches of rain in Wolcott. According to Town personnel, Lindsley Brook was out of bank in several places. One homeowner on Woodtick Road just south of Route 322 had part of Lindsley Brook running in the back door and out the front door of his house. The flooding at Town Line Road was also reportedly the "worst it had been in years." According to the Waterbury Republican-American, Wolcott firefighters rescued a woman stranded in her car in two to three feet of water on Nutmeg Valley Road, and responded to

55 calls throughout Town with some homes having up to four feet of water in the basement.

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

The Town of Wolcott 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 include:

- ***Flood Plain District*** (Section 35.3 of Wolcott 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 *"Flood Plain Management Ordinance, Town of Wolcott, Connecticut."* Additionally, it notes that plan drawings and site plans for properties with a portion inside the flood plain district must include certain additional information in conjunction with an application for a Zoning Permit, Special Use Permit, Site Development Plan, or Flood Hazard Area Permit. This information includes the boundaries of the Flood Plain District, base flood elevations based on mean sea level, and the lowest elevation of any floor, including basement, for any existing or proposed building.

- ***Removal or Deposit of Earth Materials*** (Section 41 of Wolcott Zoning Regulations). This section regulates the excavation or fill of earthen materials within the boundaries of the Flood Plain District.

- ***Design Standards*** (Section 4 of Wolcott Subdivision Regulations). Section 4.5 – Natural Features calls for the site design to preserve natural features, including avoiding cuts or fills which disturb water resources; avoiding relocation or encroachment of water resources; avoiding filling, excavation of or encroachment

upon swamps, floodplains, and other land subject to flooding; and provide for preservation of all swamps through easement, reservation area, or other controls to prevent filling, excavation, or encroachment. Section 4.6.9 calls for adequate storm drainage systems to be installed with each subdivision. Section 4.17.8 states that "there shall be no increase in direct runoff resulting from the construction and development of the subdivision or re-subdivision into any natural or artificial drainage system during the peak discharge period of a 50-year storm."

- ***Inland Wetlands and Watercourses Regulations***. This document defines in detail the Town of Wolcott's regulations regarding development near wetlands, watercourses, and water bodies that are sometimes coincident with the Flood Plain District. Section 2 defines "Regulated Activities" covered by the Regulations. Section 6 states that no person may conduct or maintain a regulated activity without obtaining a permit. Section 7 outlines the application requirements. Section 7.6 outlines the supporting documentation required to determine the amount of impact, including excavation, filling, grading, drainage, or hydraulic modifications, of the proposed project.

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 Wolcott 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 Wolcott for participation in the National Flood Insurance Program.

Structural flood protection measures existing in Wolcott include six lakes and reservoirs and their dams: Chestnut Hill Reservoir, Hitchcock Lake, Lower Scovill Reservoir, New Britain Reservoir, Scovill Reservoir, and Southington Reservoir No. 2. These water bodies store floodwaters and delay the time of peak discharge on each watershed so that the peak discharges do not occur simultaneously.

The Town of Wolcott 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. A flood hazard area permit must be issued for any development located in special flood hazard areas. These 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 Wolcott Inland Wetlands Commission also reviews new developments and existing land uses on and near wetlands and watercourses.

The Wolcott Department of Public Works 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 DPW 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 Wolcott Emergency Operations Plan discusses potential hazards which may affect the Town. Section III contains mitigation measures used by the Town to reduce damage from natural hazards. It notes that a reserve stock of sandbags is kept on hand to mitigate flood damage. The plan outlines steps to be taken by Town personnel to mitigate further flood damage and conduct recovery operations.

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 Wolcott 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.

The Town of Wolcott also provides many informational pamphlets free of charge related to citizen preparedness for natural hazard events. These 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"*

These pamphlets are available at the Town library, Senior Center, and Town Hall. In addition, the Town's website (http://www.wolcottct.com) has several pages dedicated to citizen education and preparation for natural hazard events.

In summary, the Town of Wolcott 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. In addition, the Town provides reference materials promoting citizen preparedness for natural hazard events.

## *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, 1208 acres of land in Wolcott are located within the 100-year flood boundary. In addition, indirect flooding occurs near streams and rivers throughout Wolcott due to inadequate drainage and other factors. Specific areas susceptible to flooding were identified by Town personnel and observed by Milone & MacBroom, Inc. staff during field visits on May 16, 2006, June 7, 2006, October 28, 2006, and April 16, 2007.

The primary waterway in the Town is the Mad River, a non-navigable body of water running north to south through the Town. The remaining waterways in Wolcott are mostly small streams and brooks significant for water supply and conservation purposes, but are not recreational resources. Floodplains with elevations are delineated for the major watercourses, including the Mad River, Old Tannery Brook, and Lindsley Brook. In addition, several smaller brooks and streams, including the upper portions of 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.

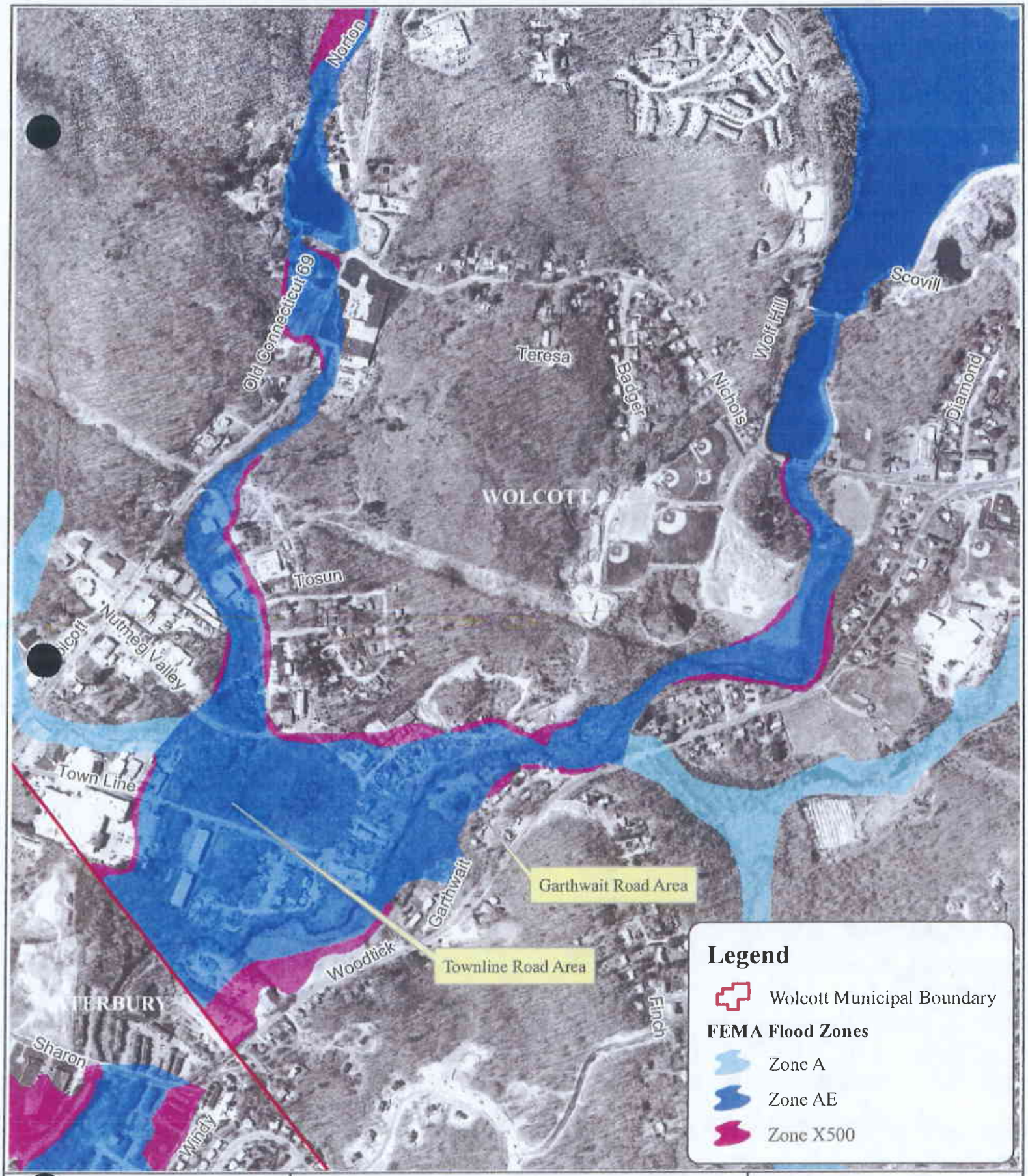
Due to the large amount of buffer capacity provided by the impounded lakes and reservoirs, there is little wide-scale flooding in Wolcott. Most flooding occurs due to large amounts of rainfall falling and occurs inside the SFHA, as described below.

- Cedar Swamp Pond – Residents reported that while homes are high relative to the unnamed streams draining into the Pond, roads in the area are sometimes flooded and impassible.

- Central Avenue at Lily Lake (also known as Todd Lake or Theriault's Ice Pond) – High rainfall events can cause the lake level to rise and impact the road. The road likely needs to be elevated. However, residents can use other roads to get in or out of the area. Note that a fire station is located at the east end of Central Avenue.

- Lily Brook at Todd Road & Woodtick Road – While neither area was reported as being flood prone, the bridge wingwalls at Todd Road are in poor condition and the culvert at Woodtick Road appears undersized to pass a large flood event.

- Town Line Road (Figure 3-2) – This area includes the Mad River corridor and floodplain from Nichols Road to the Waterbury City Line. A very wide area floods during heavy rain events. Although Wolcott DPW has taken care to clear drainageways in the vicinity of Town Line Road, Nutmeg Valley Road, and Tosun Road, backwater conditions of the Mad River caused in Waterbury can still flood the area. Culverts are undersized and the brook elevation is very close to the level of the roads. A two-inch storm can cause Town Line Road to be closed, as occurred in the spring of 2006. The April 15-16, 2007 nor'easter caused flood depths of several feet in this area, with reports of floating vehicles. Approximately 25 homes on Tosun Road must use Town Line Road and Nutmeg Valley Road to leave the area, causing this population to be vulnerable to flooding. They can get into their neighborhood via





Engineering, Landscape Architecture and Environmental Science
MILONE & MACBROOM
99 Realty Drive
Cheshire, Connecticut 06410
(203) 271-1773 Fax: (203) 272-9733
www.miloneandmacbroom.com


**Townline Road Study Area**

LOCATION: **Wolcott, CT**

MMI#: 2937-01
MXD: H:\3-2 Townline.mxd
SOURCE: CT DEP, CLEAR

N

**Town of Wolcott Natural Hazard Pre-Disaster Mitigation Plan**

DATE: Sept. 2007
SCALE: 1:9,000

SHEET: **Figure 3-2**

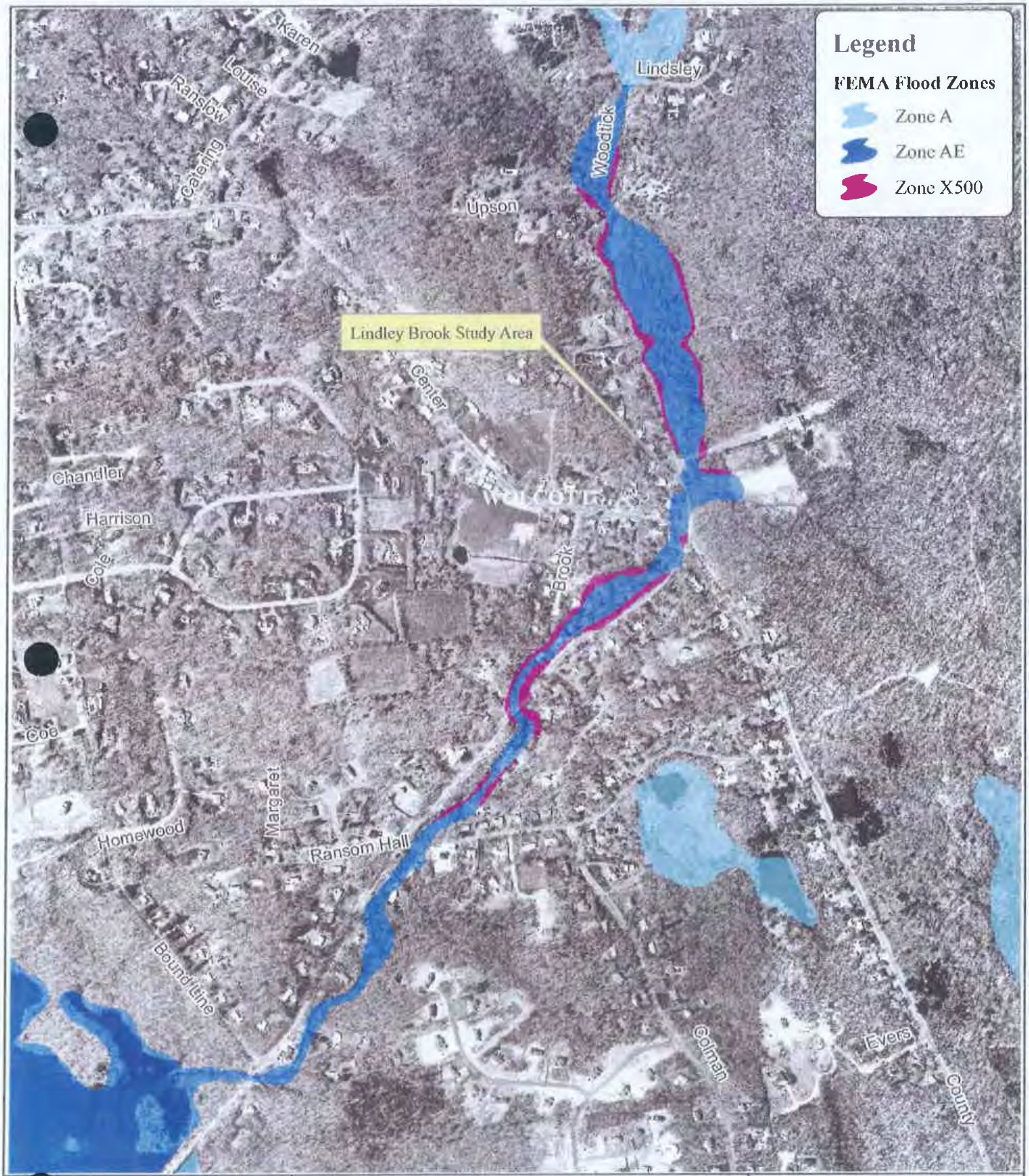
Tosun Road Extension, but that road is one-way. Even if it were used to go the other way, the hairpin turn and steep grade would make it difficult to leave.

- Tosun Road Extension – The hillside near Route 69 is eroding away into Old Tannery Brook. Curbing is needed to prevent the road from washing out and further restricting access into the Town Line Road area.

- Woodtick Road south of Garthwait Road – After Lily Brook joins the Mad River, it flows southwest behind several houses. There is a bend in the river near 200 Woodtick Road which causes erosion during flood stage, and the Mad River often floods backyards in this area causing damage to sheds and pools that are near the elevation of the river.

- Mad River Road at Route 69 – Mad River Road floods during heavy rains because the Mad River Bridge is undersized. It is at least 18 years old. The road flooded two times in June 2006. The road is not necessarily the only access for residents, but it is nevertheless very heavily utilized.

- Woodtick Road from Lindsley Drive to south of Center Street (Route 322) – This is a frequent area of flooding along Lindsley Brook (Figure 3-3). The brook flows to the south, parallel to and crossing beneath Woodtick Road a few times. Problems particularly occur near Lindsley Drive and near Center Street. Although the roads don't generally need to be closed, a culvert was washed out once and the road was undermined. South of Center Street / Route 322, the brook is on the east side of the road and numerous homeowners must cross the brook on private bridges and culverts. Thus, flooding can affect access to individual lots during very severe storms. Overall, in the course of a year, this area floods a few times. Much of the problem occurs in backyards. The April 15-16, 2007 nor'easter brought especially damaging floods to this area, as noted in the *Historic Record* above.





Engineering
Landscape Architecture
and Environmental Science

MILONE & MACBROOM®

99 Realty Drive
Cheshire, Connecticut 06410
(203) 271-1773 Fax: (203) 272-9733
www.miloneandmacbroom.com


| | | | |
|---|---|---|---|
| **Lindley Brook Study Area** | | **LOCATION:** Wolcott, CT | |
| **MMI#:** 2937-01<br>**MXD:** H:\3-3\Lindley.mxd<br>**SOURCE:** CT DEP, CLEAR | **Town of Wolcott Natural Hazard Pre-Disaster Mitigation Plan** | **DATE:** Sept. 2007<br>**SCALE:** 1:9,000 | **SHEET:** Figure 3-3 |

- Neighborhood between Route 322 and Hitchcock Lake – Drainage from Route 322 is directed toward and under Grove Avenue and Maple Avenue. When the culvert is overwhelmed, nuisance flooding can occur, particularly near the corner of Maple Avenue and Lake Street. The State downsized the culvert from a 24-inch pipe to a 12-inch pipe in some locations to slow the movement of water, but this has made the problem worse. In addition, residents reported that the area of Meriden Road between Route 322 and Hitchcock Lake is often flooded due to poor drainage.

- Longmeadow Drive Extension – According to the Waterbury Republican-American newspaper, the storm drains at a nearby intersection get overwhelmed during heavy storms and direct water towards #11 Longmeadow Drive Extension. Water reportedly cascades over the front lawn and floods the driveway and backyard of this house an average of two times per year. Water leaving the backyard also has reportedly caused damage to the neighboring house and pool at 79 Kingwood Lane.

***Critical Facilities and Emergency Services***

Critical facilities are not regularly impacted by flooding in the Town of Wolcott. Route 69 (Wolcott Road), a major northeast-southwest thoroughfare, and Route 322 (Center Street / County Road) a major central Wolcott to Southington thoroughfare, both have issues with occasional flooding. In addition, there is a fire station located at the east end of Central Avenue that can have its response times increased if Central Avenue floods at Todd Lake.

## 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.*

### *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.

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 Mayor's Office should petition FEMA to more critically evaluate any LOMA and LOMC applications such that developments do not potentially cause increased flooding to other properties. In addition, 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. Reductions in floodplain area can

only be accomplished through revised FEMA-sponsored engineering studies or Letters of Map Change (LOMC). It should be noted that the community's map will not affect the current FIRM or alter the SFHA used for setting insurance rates or making map determinations; it can only be used by the community to regulate floodplain areas. The FEMA Region I office has more information on this topic; contact information can be found in Section 11.

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 elevated location, Wolcott is situated in the headwaters and upper to middle reaches of its associated 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 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 would 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 Wolcott Inland Wetlands & Watercourses Commission (IWC) administers the wetland regulations and the Wolcott 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 Zoning Enforcement Officer is 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 *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.

### *3.6.2 Property Protection*

Steps should be taken to protect existing public and private properties. Non-structural measures for public property protection include acquisition and relocation of properties at

risk for flooding, purchase of flood insurance, and relocating valuable belongings above flood levels to reduce the amount of damage caused during a flood event.

Structural flood protection techniques applicable to property protection include the construction of barriers, dry floodproofing, and wet floodproofing techniques. Barriers include levees, floodwalls, and berms, and are useful in areas subject to shallow flooding. These structural projects are discussed in Section 3.6.6 below. Dry floodproofing refers to the act of making areas below the flood level water-tight. 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. Wet floodproofing refers to intentionally letting floodwater into a building to equalize interior and exterior water pressures. 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 Wolcott residents to prevent damage from inland and nuisance flooding. The Planning and Zoning Commission 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 flood-water control.
- Implementing an emergency notification system that combines database and GIS mapping technologies to deliver outbound emergency notifications to geographic areas; or specific groups of people, such as emergency responder teams.

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

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.

Measures for restoring diminished or destroyed resources and functions provide for re-establishment of an environment in which these functions can again operate. Measures that involve improving the natural condition of areas or restoring them to their previous natural state include 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 or more recent planning studies and documents.

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

### *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:

- Investigate incidences of roadway flooding in the vicinity of Cedar Swamp Pond and clear or resize drainage systems as appropriate to maintain access.
- Raise the level of Central Avenue near Todd Lake above the highest recorded flood level to prevent the road from being flooded in the future.
- Repair the bridge spanning Lily Brook at Todd Road.
- Enlarge the culvert passing Lily Brook under Woodtick Road. Elevate the road if necessary.
- Perform a feasibility analysis to determine the best way to address the flooding conditions in the Town Line Road area. Replace the twin culverts underneath Town Line Road and Nutmeg Valley Road with box culverts capable of passing at least the 50-year flood event. Consider extending a road from the existing baseball fields off

Nichols Road southwest through the utility easement to Tosun Road Extension or Nutmeg Valley Road to provide emergency or permanent access to the area.

- Repair the eroding hillside at Tosun Road Extension above Old Tannery Brook and install curbing to prevent further erosion and a possible washout.
- Increase the size of the culvert that passes the Mad River under Mad River Road. The road may need to be raised to accommodate the larger culvert.
- Perform a feasibility analysis considering ways to reduce flooding damages along the Lindsley Brook corridor from Lindsley Drive to south of Center Street / Route 322.
- Increase the size of the Grove Street / Maple Avenue culvert to prevent backyard flooding, and petition the state to restore a 24-inch or larger culvert to Route 322 nearby. Investigate ways to reduce the occurrence of flooding nearby along Meriden Road.
- Perform an engineering analysis of the culverts in the Longmeadow Drive Extension area to evaluate their conveyance capacities and resize as appropriate to prevent the flooding of nearby yards.

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

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

*Prevention*

- Streamline the permitting process and ensure maximum education of a developer or applicant. Develop a checklist that cross-references the bylaws, regulations, and codes related to flood damage prevention that may be applicable to the proposed project. This list could be provided to an applicant at any Town department.
- Urge or petition FEMA to more critically evaluate Letter of Map Amendment (LOMA) and LOMC applications that are received such that redevelopments do not potentially cause increased flooding to other properties.

- Perform a Town-wide Master Drainage Study and continue to update it at least every five years. Part of this study should include the introduction of a comprehensive catch basin maintenance program.
- Consider joining FEMA's community rating system.
- Continue to require Flood Hazard Area, subdivision, and commercial and industrial zoning permit applications to provide needed flood data.
- Consider requiring buildings constructed in floodprone areas to be protected to the highest recorded flood level, regardless of being within a defined SFHA.
- Encourage residents to move personal property out of the 100-year flood plain, especially in the Woodtick Road area southwest of Garthwait Road along the Mad River.
- New buildings should be designed and graded to shunt drainage away from the building.
- When possible, 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.

*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 objectives 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.

*Structural Projects*

- Investigate incidences of roadway flooding in the vicinity of Cedar Swamp Pond and clear or resize drainage systems as appropriate to maintain access.
- Raise the level of Central Avenue near Todd Lake above the highest recorded flood level to prevent the road from being flooded in the future.
- Repair the bridge spanning Lily Brook at Todd Road.
- Enlarge the culvert passing Lily Brook under Woodtick Road. Elevate the road if necessary.
- Perform a feasibility analysis to determine the best way to address the flooding conditions in the Town Line Road area. Replace the twin culverts underneath Town Line Road and Nutmeg Valley Road with box culverts capable of passing at least the 50-year flood event. Consider extending a road from the existing baseball fields off Nichols Road southwest through the utility easement to Tosun Road Extension or Nutmeg Valley Road to provide emergency or permanent access to the area.
- Repair the eroding hillside at Tosun Road Extension above Old Tannery Brook and install curbing to prevent further erosion and a possible washout.
- Increase the size of the culvert that passes the Mad River under Mad River Road. The road may need to be raised to accommodate the larger culvert.
- Perform a feasibility analysis considering ways to reduce flooding damages along the Lindsley Brook corridor from Lindsley Drive to south of Center Street / Route 322.
- Increase the size of the Grove Street / Maple Avenue culvert to prevent backyard flooding, and petition the state to restore a 24-inch or larger culvert to Route 322 nearby. Investigate ways to reduce the occurrence of flooding nearby along Meriden Road.
- Perform an engineering analysis of the culverts in the Longmeadow Drive Extension area to evaluate their conveyance capacities and resize as appropriate to prevent the flooding of nearby yards.

- ❑ Continue to investigate reports of localized flooding problems to determine the cause and an appropriate solution. Set milestones for eliminating recurring localized flooding areas.

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 Wolcott 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 Wolcott. A hurricane striking Prospect is considered a possible event in any given year that could cause critical damage to the Town and its infrastructure (Appended Table 2).

## 4.2 Hazard Assessment

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

The geographical 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 most vulnerable to inland flooding along roadways, lakes, and streams 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, and 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, and Hurricane Bob was a Category 2 hurricane when it made landfall in southern New England and New York in August of 1991.

- **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 when it struck

Louisiana, and 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 Wolcott, the coastline assumption is not applicable.

According to Connecticut's Natural Hazard Mitigation Plan, 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 heavy winds flattened forests, destroyed nearly 5,000 cottages, farms, and homes, and damaged an estimated 15,000 more throughout New York and southern New England. Overall, the storm left an estimated 700 dead and caused physical damages in excess of 300 million 1938 United States dollars (USD).

The "Great Atlantic Hurricane" hit the Connecticut coast in September 1944. This Category 3 hurricane brought rainfall in excess of six inches to most of the state and rainfall in excess of eight to ten inches in Fairfield County. Most of the wind damage from this storm occurred in southeastern Connecticut.

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 dollars (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 hurricane.

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 flood waters resulted in over 100 deaths, left 86,000 unemployed, and caused an estimated 200 million dollars in damages (1955 USD). For comparison, the total property taxes levied by all Connecticut municipalities in 1954 amounted to 194.1 million dollars.

More recently, flooding and winds associated with hurricanes have caused extensive shoreline erosion and related damage. In September of 1985, hurricane Gloria passed

over the coastline as a Category 2 hurricane. The hurricane struck at low tide, resulting in low to moderate storm surges along the coast. The storm produced up to six inches of rain and heavy winds which damaged structures and uprooted trees. Over 500,000 people suffered significant power outages. Hurricane Bob, a Category 2 hurricane making landfall in 1991, caused storm surge damage along the Connecticut coast, but was more extensively felt in Rhode Island and Massachusetts. Heavy winds were felt across eastern Connecticut with gusts up to 100 mph recorded, and the storm was responsible for six deaths in the state. Total damage in southern New England was approximately 1.5 billion dollars (1991 USD).

The most recent tropical cyclone to hit 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 Wolcott is 90 miles per hour. Wolcott 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 hired a tree warden in 2005 and has increased inspection and maintenance in Town right-of-ways. According to Town personnel, many dangerous trees have been removed. CL&P also performs tree maintenance, but landowners are 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 Wolcott currently has three designated emergency shelters available. In addition, agreements are in place to use additional facilities, such as the VFW Hall, on an as-needed basis. The Town's fire houses are not considered to be shelters, but serve as important emergency supply distribution centers. Tyrell Middle School is the primary shelter, Wakelee Elementary School is the secondary shelter and Frisbie Elementary School is third in order. All three facilities feature cafeterias with substantial food supply available. Both Tyrell Middle and Frisbie Elementary schools have auxiliary generators for emergency power. 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 Public Warning System. 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. According to the State of Connecticut Natural Hazard Mitigation Plan, a moderate Category II storm is expected to strike the state once per decade. The Town of Wolcott 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 Wolcott 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 are 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 which can not be quantitatively estimated.

As the Town of Wolcott 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 Wolcott 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 Wolcott 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 Wolcott includes guidelines and specifications for communication of hurricane warnings and watches, as well as for a call for evacuation. The public needs to be made aware in advance of a hurricane event of evacuation routes and the locations of public shelters. In addition, Wolcott 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*

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

- Increase tree limb maintenance and inspections, especially along Route 322, Route 69, 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 Wolcott.

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 Wolcott. 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 Wolcott 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 Wolcott 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 each year that could cause significant damage to a small area.

## 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. 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**

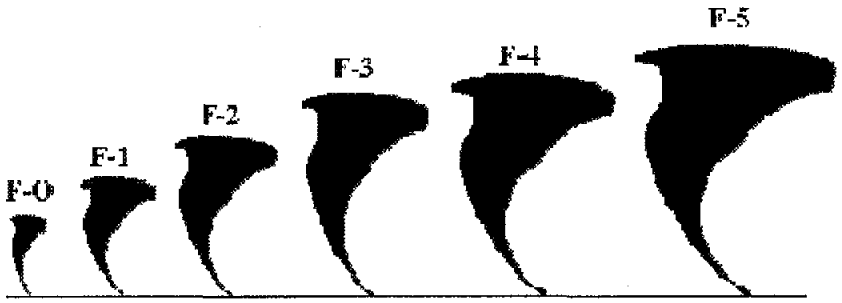



**Table 5-1**
**Fujita Scale**

| 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. |
| 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. |

**Table 5-1 (Continued)**
**Fujita Scale**

| F-Scale Number | Intensity | Wind Speed | Type of Damage Done |
|---|---|---|---|
| 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. |

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 DEP Natural Hazard Mitigation Plan (2004). The highest relative risk for tornadoes in the state will continue to be in the Hartford and New Haven Counties. The Town of Wolcott, located in New Haven County, 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. Only 15 lightning-related fatalities occurred in Connecticut between 1959 and 2005. 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.

Thunderstorms occur 18 to 35 days each year in Connecticut. 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 Wolcott 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. Downbursts may be categorized as microbursts (affecting an area less than 2.5 miles in diameter) or macrobursts (affecting an area at least 2.5 miles in diameter).

It is difficult to find statistical data regarding frequency of downburst activity. However, downburst activity is, on occasion, mistaken for tornado activity in Connecticut, indicating that it is a relatively uncommon yet persistent hazard. The risk to the Town of Wolcott is believed to be low to moderate for any given year. Downburst activity in New Haven County is believed to have occurred most recently on May 16, 2007 and on July 19, 2007. In particular, many people mistook damage near Wolcott for that caused by a suspected tornado during the July 19 storm.

***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 Wolcott is moderate in any given year.

## 5.3 *Historic Record*

The National Climatic Data Center (NCDC) lists 10 tornado events in New Haven County since 1950. This includes one F4 rated tornado, two F3 rated tornadoes, and three F2 rated tornadoes. Property damages from tornados in the county totaled approximately 280 million dollars. Table 5-3 lists the tornado events for New Haven County.

**Table 5-3**
**Tornado Events in New Haven County Since 1950**

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

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

- April 4, 1995 – A roof was reported blown off a building in Wolcott.
- May 29, 1995 – Hail three-quarters of an inch in diameter reported during a storm in Wolcott.
- May 21, 1996 – Clusters of severe thunderstorms raced southeast over the state producing high winds that knocked down trees and power lines. Wind damage was reported in Wolcott.
- May 29, 1998 – Lines of severe thunderstorms produced high winds that downed trees onto power lines in Wolcott.
- June 30, 1998 – Two rounds of thunderstorms passed through New Haven County, bringing high winds and hail three-quarters of an inch in diameter to Wolcott.
- July 17, 1998 – Lightning struck a chimney at 42 Paul Street. The chimney exploded causing bricks to fall into the front yard, and the strike ignited a fire that spread to the wall closest to the chimney.
- August 10, 2001 – Unstable atmospheric conditions produced sudden intense thunderstorms over Connecticut. Strong wind gusts accompanied the thunderstorms, tearing trees and subsequently power lines down and leaving over 60,000 people without power across the state. A two-foot diameter tree was uprooted in Wolcott, and many other trees had their tops sheared off from the high winds.
- August 20, 2004 – An intense severe thunderstorm produced golf ball size (up to 1.75 inches) hail in the vicinity of Wolcott.
- August 21, 2004 – Showers and thunderstorms produced strong winds which downed a tree on a truck three miles northeast of Waterbury.
- August 3, 2006 – A strong thunderstorm cell blew through Wolcott, knocking down several branches onto power lines and closing one road.
- May 16, 2007 – Downburst activity in New Haven County was caused by a severe thunderstorm system moving through Connecticut.

- July 19, 2007 – Downburst activity in New Haven County was caused by a severe thunderstorm system moving through Connecticut. A tornado touched down in nearby Litchfield County.

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

Warning is the primary method of existing mitigation for tornadoes and thunderstorm-related hazards. A ***severe thunderstorm watch*** is issued by the National Weather Service when the weather conditions are such that a severe thunderstorm (damaging winds 58 miles per hour or more, or hail three-fourths of an inch in diameter or greater) is likely to develop. A ***severe thunderstorm warning*** is issued when a severe thunderstorm has been sighted or indicated by weather radar. 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.

**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 Wolcott. 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 Wolcott, the local utilities are responsible for tree branch removal and maintenance above and near their lines. In addition, all new developments in Wolcott must place utilities underground wherever possible. The Department of Public Works (DPW) has a tree warden who has the responsibility of maintaining trees on municipal right of ways, and also approaches residents on a case-by-case basis when trees and branches on their property look hazardous.

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. Wolcott 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 Wolcott 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.

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

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. This information is available at:

*FEMA*
http://www.fema.gov/library/prepandprev.shtm.

*NOAA*
http://www.nssl.noaa.gov/NWSTornado/

Available information from FEMA includes:

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

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

The implementation of an emergency notification system would be beneficial in warning residents of an impending tornado. A community warning system that relies on radios

and television is less effective at warning residents during the night when the majority of the community is asleep. This fact was evidenced most recently by the severe storm which 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*

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

- 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 Wolcott. However, unlike summer storms, winter events and the hazards that result (wind, snow, and ice) have more widespread geographic extent. The entire Town of Wolcott is susceptible to winter storms. In general, winter storms are considered highly likely to occur each year, and the hazards that result (nor'easter winds, snow, and blizzard conditions) are expected to have a significant effect over a large area of the Town.

## 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. Severe winter storms can produce an array of hazardous weather conditions, including heavy snow, blizzards, freezing rain and ice

pellets, and extreme cold. The National Weather Service defines a blizzard as having winds over 35 mph with snow and blowing snow reducing visibility to near zero.

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*

According to the NCDC, there have been 87 snow and ice events in the State of Connecticut between 1993 and 2006, 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 31and 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 occurred in January of 1996. These events were recorded for various counties throughout the state.

With regard to major winter nor'easters, seven 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 over two feet of snow and shut down the State of Connecticut for 24 hours. The nor'easter which occurred on February 12 and 13, 2006 resulted in 18 to 24 inches of snow across Connecticut and was rated on NESIS as a Category 3 "Major" storm across the northeast. This storm ranked 20$^{th}$ out of 33 major winter storms ranked by NESIS for the northeastern United States since 1956.

Catastrophic ice storms are less frequent in Connecticut than the rest of New England due to the close proximity of the warmer waters of the Atlantic Ocean and Long Island Sound. The most severe ice storm in Connecticut on record was Ice Storm Felix on December 18, 1973. This storm resulted in two deaths and widespread power outages throughout the state. An ice storm in November of 2002 that hit Litchfield and western Hartford Counties resulted in 2.5 million dollars in public sector damages. This ice storm caused Route 69 to be closed from the center of Town to the City of Bristol and knocked out electrical service in Wolcott for four to five days.

## *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 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 Wolcott does not subcontract plowing, and instead it uses Town staff. The Town policy is to plow main roads first, and then smaller roads. The Connecticut Department of Transportation plows Route 69 and 322, but the Town usually sands Route 69 because of frequent accidents. During emergencies, a plow vehicle can be dispatched ahead of an emergency vehicle.

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

A few areas in the Town of Wolcott have been identified by Town personnel as having problems with ice during the winter months. Ice is a serious problem throughout Town north of Route 322. The Central Avenue corridor has poor drainage along the uphill side of the road and floods frequently near Todd Lake, resulting in slick conditions and icing during the winter. Drifting snow is not as large a problem in Wolcott as other areas, but it still occurs. This problem is mitigated through municipal plowing efforts.

## 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 Wolcott 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.

Plowing routes should be established that prioritize access to and from critical facilities. Residents should be made aware of the plow routes in order to plan how to best access critical facilities, perhaps by posting the general routes on the Town website. 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. The following recommendations are applicable to other aspects of winter storms such as winds, snow, and ice:

- 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 evacuation plans to ensure timely migration of people seeking shelter in all areas of Wolcott.
- Post a list of Town snow-plowing routes and 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.
- 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 Wolcott is susceptible to earthquakes. However, even though earthquakes have the potential to occur anywhere in the Town, the effects may be felt differently in some areas based on the type of geology. In general, earthquakes are considered a hazard that is unlikely to occur, but that may cause significant effects to a large area of the Town.

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

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

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

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

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

The following is an abbreviated description of the 12 levels of Modified Mercalli intensity from the United States Geological Survey.

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. Rail 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. People 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.

There were 137 recorded earthquakes in Connecticut between 1598 and 1990. 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. In October 1845, an Intensity V earthquake occurred in Bridgeport. An Intensity V earthquake would be a 4.3 on the Richter scale. Another Intensity V earthquake was reported in Stamford in March of 1953. All other seismic activity in Connecticut has ranked less than Intensity V. 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 affect 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 municipality, as adopted by the Building Officials and Code Administrators (BOCA). These include the seismic coefficients for building design in the Town of Wolcott. 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 Wolcott do not address earthquake hazards.

As discussed in Section 2.3, several inactive faults traverse the Town. The inactive faults in the southwestern portion of Town have been designated by the COGCNV as part of a

proposed "action area" of open space near Interstate 84 and Route 70. The fault in the northern section of Town that runs through the Beecher Road area lies along a section of privately-owned open space.

## 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, an earthquake impacting the Town of Wolcott has a 2% chance of exceeding a peak acceleration of 14-16% of the force of gravity in a 50-year period.

According to the State of Connecticut Department of Emergency Management, the chance that a damaging earthquake of magnitude 5.0 or greater will occur within the state in any one year is 5%. The odds of an earthquake of magnitude 6.0 are about one in 300 each year. Therefore, the Town of Wolcott is unlikely to experience a damaging earthquake in any given year. This belief is reinforced by the historical record presented in Section 7.3.

Surficial earth materials behave differently in response to seismic activity. Unconsolidated materials such as sand and artificial fill can amplify the shaking associated with an earthquake. In addition, artificial fill material has the potential for liquefaction. 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. When liquefaction occurs, the strength of the soil decreases and the ability of soil to support building foundations and 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 Wolcott 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.

Several inactive faults traverse the Town, particularly on the side of the town bordering the Town of Southington. These faults are explained in detail in Section 2.3. Even though the faults are inactive, the best mitigation for future development in areas of these faults would be to preserve or convert the fault area into municipal open space.

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. 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 Wolcott, potential mitigation can only include adherence to building codes, education of residents, and adequate planning. The following potential mitigation measures have been identified:

- Preserve or convert areas of inactive faults to municipal open space.
- Consider preventing new residential development in areas prone to collapse.
- Consider restricting residential development on or below steep slopes (slopes exceeding 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, dam failure can cause a chain reaction where the sudden release of floodwaters causes the next dam downstream to fail. With 22 registered dams and potentially several other minor dams in the Town, dam failure can occur almost anywhere in Wolcott. While flooding from a dam failure generally has a limited geographic extent, the effects are potentially catastrophic. Fortunately, a major dam failure is considered only a possible natural hazard event in any given year (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.

There are 22 DEP-registered dams in the Town of Wolcott, of which three are Class A, three are Class BB, one Class B, five are Class C, and ten are undefined. These are listed in Table 8-1.

**Table 8-1**
**Dams Registered with the DEP in the Town of Wolcott**

| Number | Name | Class |
|---|---|---|
| 16601 | Lower Scovill Reservoir (Cornelis) Dam | C |
| 16602 | Scovill (Woodtick) Reservoir Dam | C |
| 16603 | Cedar Swamp Pond Dam | BB |
| 16604 | Southington Reservoir Dam #2 | BB |
| 16605 | Gilbert Pond Dam | - |
| 16606 | Hitchcock Lake Dam | B |
| 16607 | Chestnut Hill Reservoir Dam | C |
| 16608 | Theriault Ice Dam | - |
| 16609 | Wrobel Pond Dam | A |
| 16610 | Masculo Pond Dam | - |
| 16611 | Weltons's Pond Dam | A |
| 16612 | Scamanco Pond Dam | - |
| 16613 | Pellegrini Pond Dam | - |
| 16614 | Pritchard Pond Dam | - |
| 16615 | Evers Pond Dam | A |
| 16616 | Bristol Fish & Game Club Dam | BB |
| 16617 | Herbst Pond Dam | - |
| 16618 | Hocks Pond Dam | - |
| 16619 | Churchelow Pond Dam | - |
| 16620 | New Britain Reservoir Dam (Wolcott Dike) | C |
| 16621 | Beecher Road Pond Dam | - |
| 16622 | Scovill (Woodtick) Reservoir Dike | C |

This section discusses mainly the possible effects of failure of significant and high hazard (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 five Class C dams include the Lower Scovill Reservoir (Cornelis) Dam, Scovill (Woodtick) Reservoir Dam, Chestnut Hill Reservoir Dam, New Britain Reservoir Dam (Wolcott Dike), and Scovill (Woodtick) Reservoir Dike. The Class B dam is Hitchcock Lake Dam. Class B and C dams are spread throughout Wolcott as shown in Figures 8-1, 8-2, and 8-3.

Aside from the Class B and C dams, this plan also includes a discussion of one Class BB dam, the Cedar Swamp Pond dam. Although the dam is considered a moderate hazard potential instead of significant or high, failure of the dam would render an important roadway impassable, cutting off residents in the northern part of town.

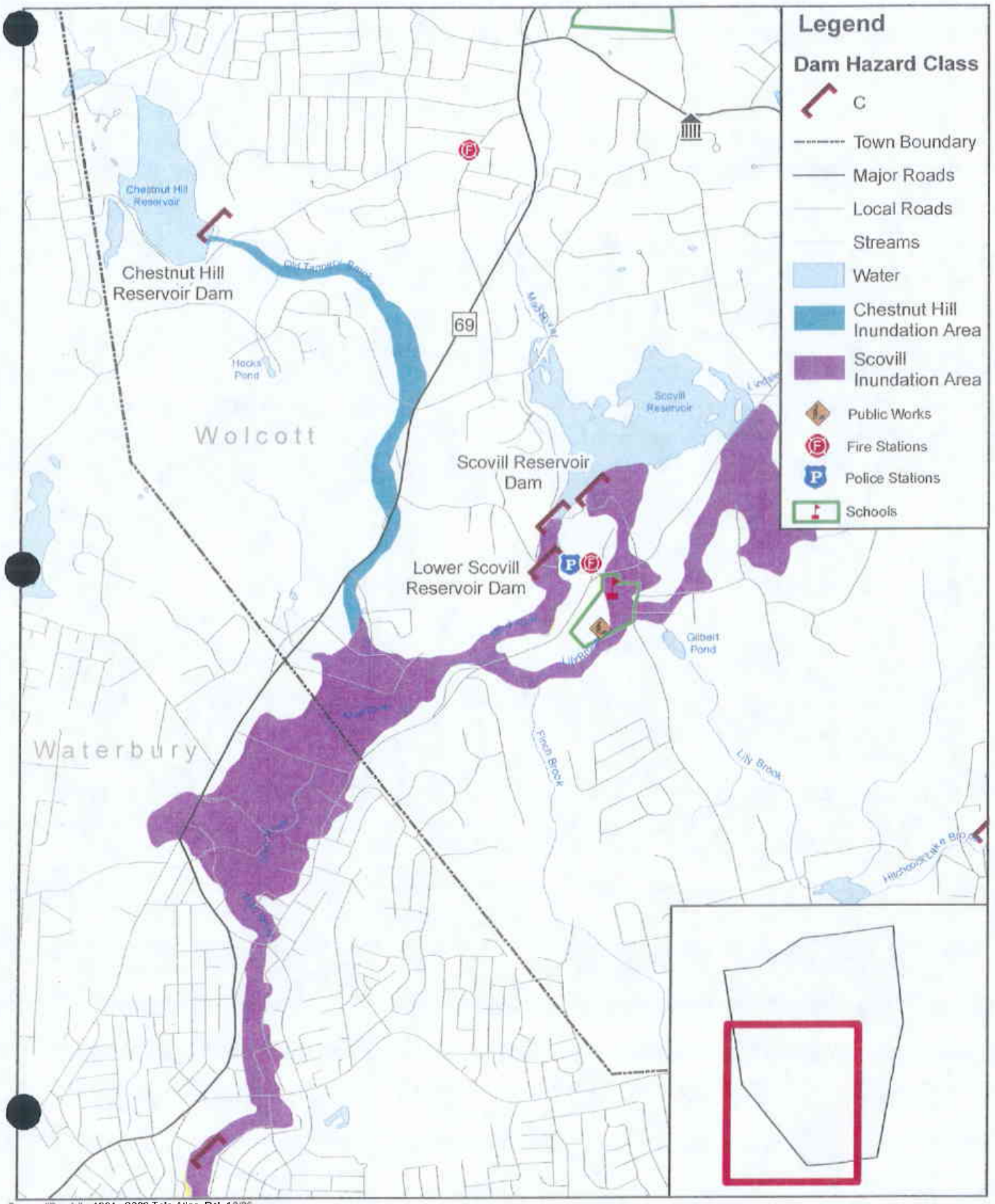
## *8.3 Historic Record*

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

- 1963: Failure of the Spaulding Pond Dam in Norwich caused six deaths and six million dollars in damage.
- 1982: Failure of the Bushy Hill Pond Dam in Deep River caused 50 million dollars in damages.

More recently, the Connecticut DEP reported that the sustained heavy rainfall from October 7 to 15, 2005 caused two dam failures, four partial breaches, and damage to four other dams throughout the State. These are summarized in Table 8-2:

# Figure 8-1: High Hazard Dams in Wolcott

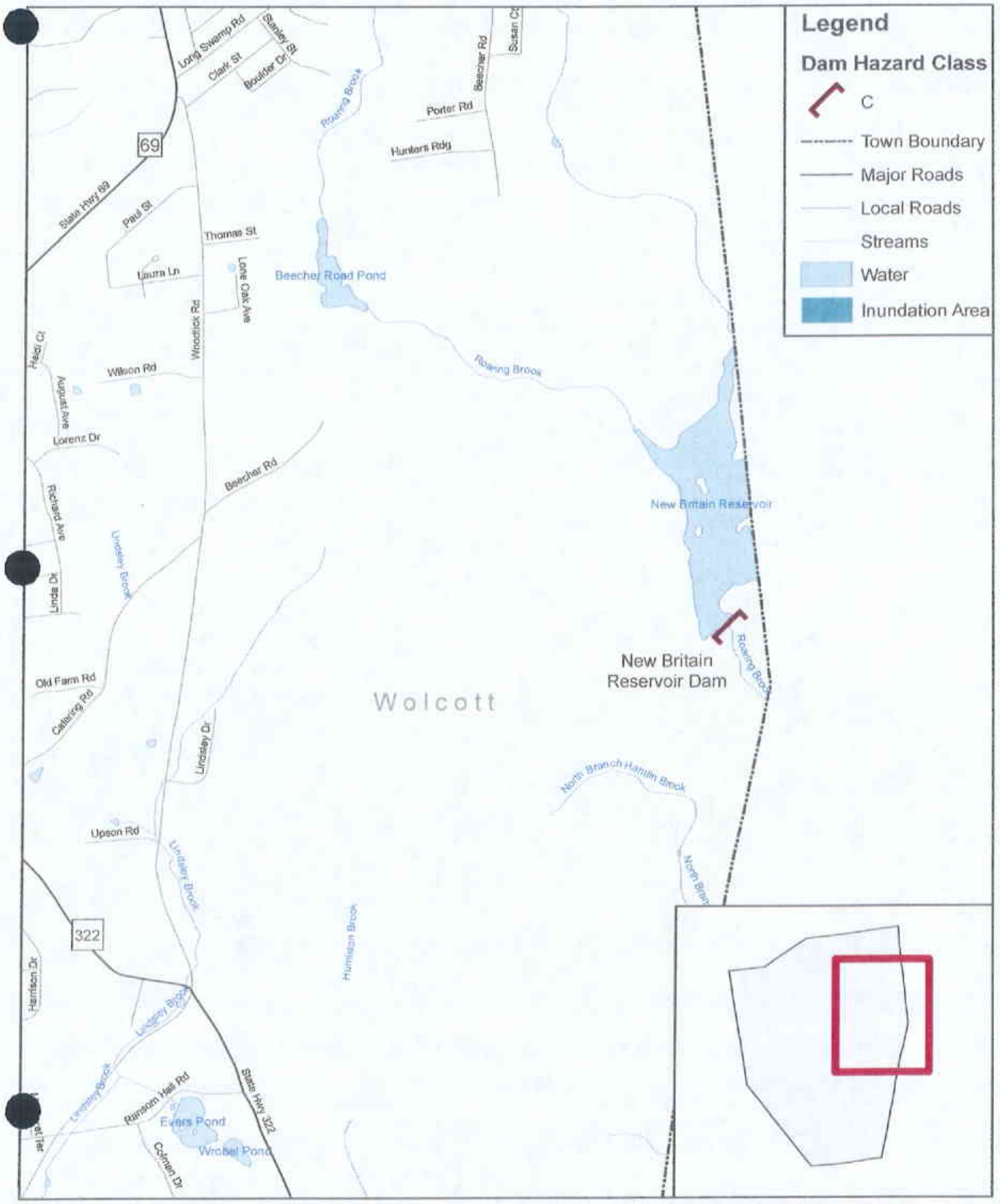



Source: "Roads", c1984 - 2006 Tele Atlas, Rel. 10/06
"Hydrography", "Dams", "Town Boundary", DEP
"Critical Facilities" COGCNV
For general planning purposes only. Delineations may not be exact
February 2008

0 0.25 0.5 Miles

COUNCIL OF GOVERNMENTS
CENTRAL NAUGATUCK VALLEY

# Figure 8-2: High Hazard Dams in Wolcott

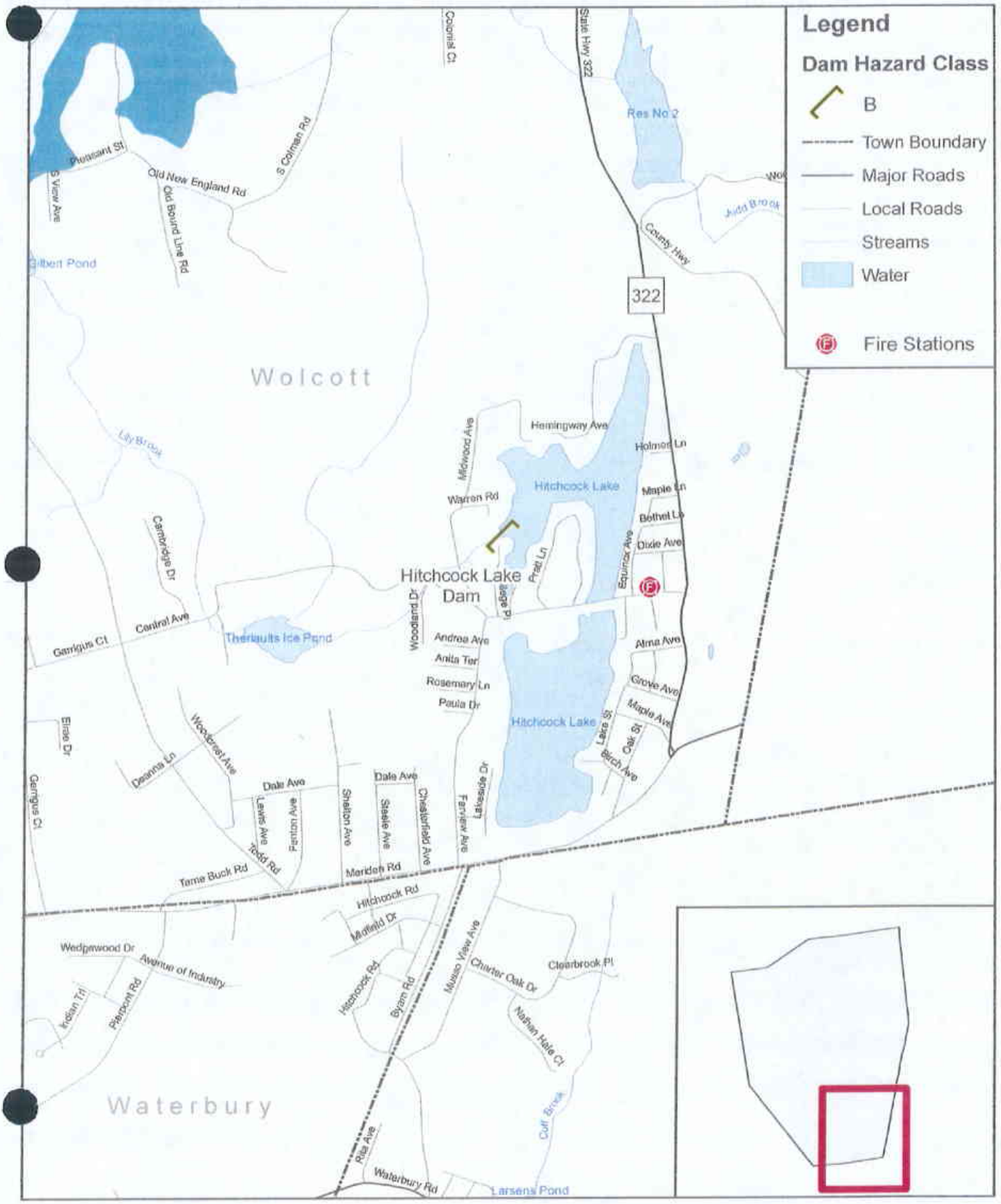



Source "Roads", c1984 - 2006 Tele Atlas, Rel 10/06
"Hydrography", "Dams", "Town Boundary", DEP
For general planning purposes only Delineations may not be exact
February 2008

Miles
0 0.25 0.5

COUNCIL OF GOVERNMENTS
CENTRAL NAUGATUCK VALLEY

# Figure 8-3: High Hazard Dams in Wolcott




Source "Roads", c1984 - 2008 Tele Atlas, Rel 10/06
"Hydrography", "Dams", "Town Boundary" DEP
For general planning purposes only Delineations may not be exact
February 2008

Feet
0 750 1,500

COUNCIL OF GOVERNMENTS
CENTRAL NAUGATUCK VALLEY

**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 Wolcott. According to Town personnel, the dams throughout Town are in varying stages of condition. The following paragraphs highlight the general condition of each Class C & B dam based on information available at the Connecticut DEP:

- Lower Scovill Reservoir Dam – Also known as Cornelis Dam, the Lower Scovill Reservoir Dam is owned by the Town of Wolcott. It consists of an earthen dike with two concrete spillways. According to the DEP files, this dam needed minor maintenance and its Emergency Operations Plan (EOP) updated as of April 2005.

- Scovill Reservoir Dam – Also known as Woodtick Dam, this dam is also owned by the Town of Wolcott. It consists of a concrete dam and spillway. The status of an EOP for this dam is unknown. The dam was repaired as recently as 1996.

- Hitchcock Lake Dam – According to the DEP files, this dam is owned by the Wolcott Land Conservation Trust. It consists of an earthen dike and dam with a concrete spillway. This dam was inspected by the DEP as recently as July 2004 and needed

vegetation removed and general maintenance on the intake gate. This dam lacked an EOP and the DEP requested that one be provided.

- Chestnut Hill Reservoir – According to the DEP files, this earthen dam is owned by the Town of Wolcott. It was repaired as recently as 1990. The status of the EOP for this dam is unknown.

- New Britain Reservoir Dam – This dam is owned by the New Britain Water Department. It consists of an earthen embankment with a concrete spillway and an associated dike with a concrete core-wall and a compacted earthen embankment. The EOP on file with the DEP dates from 1982 but has likely been updated since as the New Britain Water Department currently uses this reservoir for water supply. Major modifications to the dam were completed in 1984.

- Scovill Reservoir Dike – Part of the Scovill Reservoir Dam system, this dike holds back water above the Woodtick section of Wolcott approximately 1,500 feet northeast from the main outflow of the Scovill Reservoir at the Scovill Reservoir Dam. It consists of an earthen embankment. The status of the EOP for this dike is unknown.

- Cedar Swamp Pond Dam – This dam is owned by the Cedar Lake Owners Association, although parts of the site are reportedly owned by the Town of Wolcott. The dam was inspected by an engineer retained by the Association in 2006 and found to be in good condition with only minor repairs needed. The status of the EOP for this dam is unknown.

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

The dam safety statues 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.

Owners of Class C dams are required to maintain emergency operations plans. The Town of Wolcott is responsible for maintaining the plan for the Scovill Reservoir, Lower Scovill Reservoir, and Chestnut Hill Reservoir. The Wolcott Land Conservation Trust is responsible for maintaining an EOP for Hitchcock Lake, and the New Britain Water Department is responsible for maintaining the EOP for the New Britain Reservoir. New Britain Reservoir is the only reservoir currently used as a water supply.

## *8.5 Vulnerabilities and Risk Assessment*

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

*Lower Scovill Reservoir*

Lower Scovill Reservoir is owned by the Town of Wolcott. It covers a surface area of approximately 4.5 acres. The Lower Scovill Reservoir receives its inflow from the Scovill Reservoir and outflows to the Mad River. The Mad River corridor downstream of the Lower Scovill Reservoir Dam is lightly developed in the Town of Wolcott and gently slopes to the southwest towards the City of Waterbury, where the floodplain is more densely developed. A dam failure would impact properties along the Mad River and approximately 1,800 feet up Lily Brook. Damage would also likely occur in the Sharon Road area of Waterbury, and could extend further into Waterbury depending on the extent of the breach.

*Scovill Reservoir*

Scovill Reservoir is owned by the Town of Wolcott. It covers a surface area of approximately 120.5 acres. Scovill Reservoir receives its inflow from the Mad River and Lindsley Brook and outflows directly to the Lower Scovill Reservoir.

A failure of the Scovill Reservoir Dam would cause an immediate rise in the Lower Scovill Reservoir. This sudden rise could cause the Lower Scovill Reservoir Dam to also fail, and damage would be similar to those noted above. Alternatively, if the dike failed it would send a torrent of water downstream through Woodtick, with the potential to affect several homes and Frisbie School, one of Wolcott's emergency shelters. The floodwaters would intersect Lily Brook below Todd Road and would likely overtop Woodtick Road, as well as causing damages along the Mad River corridor downstream.

*Hitchcock Lake Dam*

Hitchcock Lake Dam is owned by the Wolcott Land Conservation Trust. Hitchcock Lake covers a surface area of approximately 100.2 acres. It receives its inflow mainly from small unnamed watercourses and other nearby drainage.

A failure of Hitchcock lake dam would likely impact properties flanking Hitchcock Lake Brook, and would overwhelm the Theriault Ice Dam on Todd Lake near Central Avenue. Central Avenue would be flooded and rendered impassible. Downstream, the extensive wetlands surrounding Lily Brook east of Todd Road would mitigate the damage caused by the floodwaters. The neighborhood southeast of Frisbie School off Todd Road would likely have minor flooding. The bridge over Lily Brook on Todd Road has scoured wingwalls and a dam failure would likely exacerbate this damage. The bridge over Lily Brook on Woodtick Road would also likely be overtopped. Beyond this point, the Mad River would likely receive the floodwaters with minimal further damage.

*Chestnut Hill Reservoir*

Chestnut Hill Reservoir is owned by the Town of Wolcott. It covers a surface area of approximately 71.0 acres. The reservoir receives its inflow from Welton Pond and several other unnamed streams and outflows to Old Tannery Brook. The Old Tannery Brook corridor is predominately undeveloped, but is steep and narrow to Route 69. Beyond Route 69, the corridor is wider, but is more developed with residential, commercial, and industrial land uses, particularly in the Town Line Road area.

The failure of Chestnut Hill Reservoir Dam would overtop Lyman Road and likely cause some floodwaters to flow eastwards down Lyman Road into a developed residential area of Wolcott. The remainder of the floodwaters would race down Old Tannery Brook towards southwestern Wolcott. Herbst Pond Dam would be overwhelmed, and the Town

Line Road area would experience severe flood depths. Properties along the Mad River would also be impacted, particularly in the Sharon Road area of Waterbury.

*New Britain Reservoir*

New Britain Reservoir is owned by the City of New Britain. It covers a surface area of approximately 51.0 acres. The reservoir receives its inflow from several unnamed tributary streams and outflows to Roaring Brook. A dam failure here would have little impact in the Town of Wolcott, but would cause damage downstream in Southington along the Roaring Brook and Eight Mile River corridors.

*Cedar Swamp Pond*

The Cedar Swamp Pond dam is Class BB. The dam is earthen and does not have an emergency spillway. Overtopping would cause erosion of the earthen dam that could subsequently cause failure. Although the dam is considered a moderate hazard potential instead of significant or high, failure of the dam would render an important roadway (North Street) impassable, as it runs along the crest of the dam. If North Street were impassable, residents in the northern part of town would be cut off from Fire Department company #2, located on North Street.

## *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 Town of Wolcott should work with the Connecticut DEP to ensure that the owners of Class C dams and Cedar Swamp Pond dam have up to date Emergency Operations Plans and Dam Failure Analyses. Copies of these documents should be made available at the Town Hall for reference and public viewing.

With regard to the Chestnut Hill Reservoir Dam, the Lower Scovill Reservoir Dam, and the Scovill Reservoir Dam and Dike, the Town of Wolcott should review and update the Emergency Operations Plan for each dam, and prepare a new dam failure analysis if appropriate. The Town of Wolcott should work with the City of New Britain and the Wolcott Land Conservation Trust to ensure that proper maintenance is being performed and that EOPs and dam failure analyses are up to date for the New Britain Reservoir Dam and Hitchcock Lake Dam, respectively. All Class C 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 Town inspections of Class A, AA, B, and BB dams.

The Town of Wolcott should consider implementing an emergency notification system. Such a system would combine database and GIS mapping technologies to deliver outbound emergency notifications to geographic areas or specific groups of people such as emergency responder teams. This technology could be used to warn downstream residents of an impending dam failure.

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 Wolcott, 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.

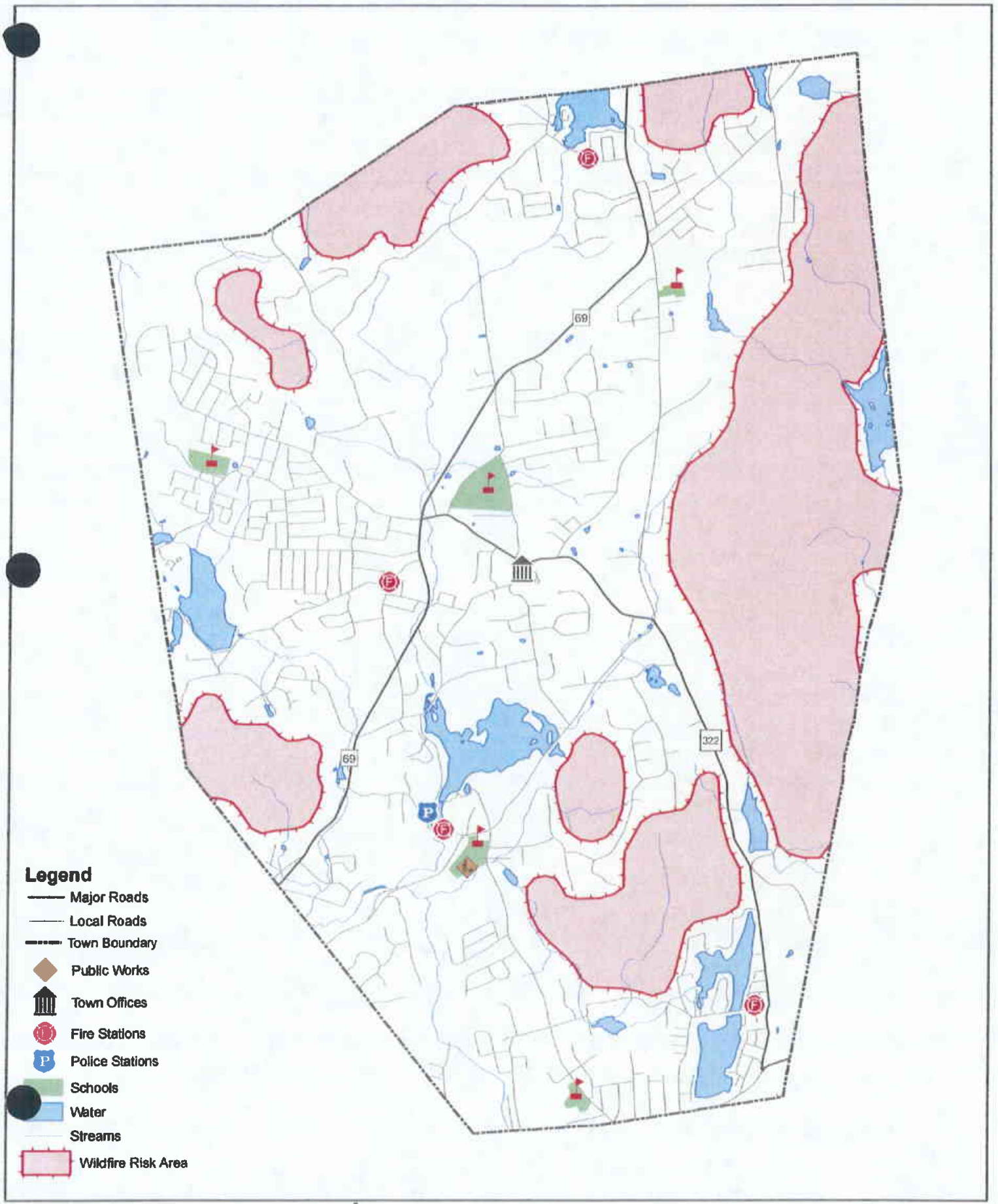
The Town of Wolcott is a low-risk area for wildfires. Wildfires are of particular concern in wooded areas and other areas with poor access for fire-fighting equipment. Figure 9-1 presents the wildfire risk areas for the Town of Wolcott. Hazards associated with wildfires include property damage and loss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

## 9.2 *Hazard Assessment*

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

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

# Figure 9-1: Wolcott Wildfire Risk Areas




Source: "Roads", c1984 - 2006 Tele Atlas, Rel. 10/06.
"Town Boundary", "Hydrography", DEP
"Wildfire Areas", "Critical Facilities", COGCNV
For general planning purposes only. Delineations may not be exact
March 2008

0 0.5 1 Miles

COUNCIL OF GOVERNMENTS
CENTRAL NAUGATUCK VALLEY

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*

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.

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.

According to the USDA Forest Service Annual Wildfire Summary Report for 1994 through 2003, an average of 600 acres per year in the United States 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 in Connecticut since 1994 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.

## *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 Wolcott Zoning Regulation 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. 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 Wolcott 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 Wolcott Water Department's water service to fight fires in the western part of Town along the Route 69 and Beach Road corridors. The Wolcott Water Department purchases water from the City of Waterbury and the Department is limited by its diversion permit in regards to expansion of its service area and fire protection area. In the remainder of Town, the fire department relies heavily on the use of fire ponds to supply fire fighting water.

Education is also an important element of existing mitigation. As discussed in Section 3.4, the Town of Wolcott has several informational pamphlets and web pages dedicated to citizen education and preparedness for natural hazards and other hazard events.

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 Wolcott 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. 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 most extreme wildfire recorded in the past 20 years that burned 300 acres. Given the availability of fire-fighting water in the Town, including the use of dry hydrants and fire ponds, 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. Recall that the public water system in Wolcott is limited to the Route 69 corridor from the southwestern section of Town up to and along Beach Road / Alcott Road area. These areas are generally associated with wooded water company lands, state forests, and land trust property, and each area borders residential sections of the Town. Therefore, residents on the outskirts of these risk areas are the most vulnerable to fire, heat, and smoke effects of wildfires. There is also some concern among Town fire personnel regarding the open areas in the northwestern section of Town that are near new subdivisions.

Despite having a large amount of forest/urban interface, the overall risk of wildfires occurring in the Town of Wolcott is also considered to be low. Such fires fail to spread far due speed of detection and strong fire response. According to Town personnel, the

threat of fire was greater in the 1980's when the Town was more rural. 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 Wolcott. 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 Wolcott Fire Department to be prepared to assist these special populations during a wildfire emergency.

In summary, relatively open lands near new development in the northwestern section of Town 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 infrequent in these areas, they are often difficult to access. Some of this land belongs to other municipal water utilities. The Town has the support of the other municipal water utilities and land trusts to provide access to their extensive watershed lands in case of a wildfire. Finally, the hiking trails off Peterson Park allow access to land that is vulnerable to fires, so it is important to prevent open burning.

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 watershed lands, it is estimated that up to 200 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 Wolcott Water Department should continue to extend the public water supply systems into areas that require water for fire protection. This would not require any changes to the interconnection agreement with the City of Waterbury, but will require amendments or changes to the diversion permit and sale of excess water permit administered by CT DEP and CT DPH, respectively.
- The Wolcott Water Department 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. In particular, two low-pressure zones are known to exist, although these areas are limited in extent.
- The Town of Wolcott should continue the excavation of fire ponds throughout the Town to ensure an adequate supply of firefighting water.

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 should continue to create and disseminate 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.

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 implementation of an emergency notification system would be beneficial in warning residents of an impending hazard. Residents should continue to be encouraged to purchase a NOAA weather radio containing an alarm feature. In addition, the Town Emergency Operations Plan should continue to reviewed and updated regular basis, 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 all recommendations of the Plan without any priority ranking. 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.

### *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.
- Urge or petition FEMA to more critically evaluate LOMA and LOMC applications that are received such that redevelopments do not potentially cause increased flooding to other properties.
- Perform a Town-wide Master Drainage Study and continue to update it at least every five years. Part of this study should include the introduction of a comprehensive catch basin maintenance program.
- Consider joining FEMA's community rating system.
- Continue to require Flood Hazard Area, subdivision, and commercial and industrial zoning permit applications to provide needed flood data.
- Consider requiring buildings constructed in floodprone areas to be protected to the highest recorded flood level, regardless of being within a defined SFHA.

- Encourage residents to move personal property out of the 100-year flood plain, especially in the Woodtick Road area south of Garthwait Road.
- New buildings should be designed and graded to shunt drainage away from the building.
- When possible, 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.

*Property & Natural Resource Protection*

- Pursue the acquisition of additional municipal open space properties inside SFHAs set it aside as greenways, parks, or other non-residential, non-commercial, or non-industrial use.
- Selectively pursue conservation objectives listed in the Plan of Conservation and Development.
- Continue to regulate development in protected and sensitive areas, including steep slopes, wetlands, and floodplains.

*Structural Projects*

- Investigate incidences of roadway flooding in the vicinity of Cedar Swamp Pond and clear or resize drainage systems as appropriate to maintain access.
- Raise the level of Central Avenue near Todd Lake above the highest recorded flood level to prevent the road from being flooded in the future.
- Repair the bridge spanning Lily Brook at Todd Road.

- Enlarge the culvert passing Lily Brook under Woodtick Road. Elevate the road if necessary.
- Perform a feasibility analysis to determine the best way to address the flooding conditions in the Town Line Road area. Replace the twin culverts underneath Town Line Road and Nutmeg Valley Road with box culverts capable of passing at least the 50-year flood event. Consider extending a road from the existing baseball fields off Nichols Road southwest through the utility easement to Tosun Road Extension or Nutmeg Valley Road to provide emergency or permanent access to the area.
- Repair the eroding hillside at Tosun Road Extension above Old Tannery Brook and install curbing to prevent further erosion and a possible washout.
- Increase the size of the culvert that passes the Mad River under Mad River Road. The road may need to be raised to accommodate the larger culvert.
- Perform a feasibility analysis considering ways to reduce flooding damages along the Lindsley Brook corridor from Lindsley Drive to south of Center Street / Route 322.
- Increase the size of the Grove Street / Maple Avenue culvert to prevent backyard flooding, and petition the state to restore a 24-inch or larger culvert to Route 322 nearby. Investigate ways to reduce the occurrence of flooding nearby along Meriden Road.
- Perform an engineering analysis of the culverts in the Longmeadow Drive Extension area to evaluate their conveyance capacities and resize as appropriate to prevent the flooding of nearby yards.
- Continue to investigate reports of localized flooding problems to determine the cause and an appropriate solution. Set milestones for eliminating recurring localized flooding areas.

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

- Increase tree limb maintenance and inspections, especially along Route 322, Route 69, and other evacuation routes. Increase inspections of trees on private property near power lines and Town right-of-ways.

- ❑ 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.

***Winter Storms***

- ❑ Post a list of Town snow-plowing routes and 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.
- ❑ Review evacuation plans to ensure timely migration of people seeking shelter in all areas of Wolcott.
- ❑ Provide additional education and outreach materials to property owners on how to protect property through the use of shutters and storm windows, the importance of removing snow from flat roofs, and the importance of insulating pipes adequately to protect from freezing and bursting.
- ❑ Encourage two modes of egress into every neighborhood by the creation of through streets.

***Earthquakes***

- ❑ Preserve or convert areas of inactive faults to municipal open space.
- ❑ Consider preventing new residential development in areas prone to collapse.
- ❑ Consider restricting residential development on or below steep slopes (slopes exceeding 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***

- Continue to require or conduct regular inspections of all Class C dams, with upkeep and maintenance as required for keeping such dams in safe and functional order.
- Consider implementing Town inspections of Class A, AA, B, and BB dams.
- Work with the Connecticut DEP to ensure that the owners of Class C dams have up to date Emergency Operations Plans and Dam Failure Analyses. Copies of these documents should be made available at the Town Hall for reference and public viewing.

***Wildfires***

- The Wolcott Water Department should continue extend its water system for fire protection and 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 Wolcott should continue the excavation of fire ponds throughout the Town to ensure an adequate supply of firefighting water.
- 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 including tips on how to properly manage burning 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.
- 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. Funding requirements and contact information is given in Section 11.0.

### *Flood Mitigation*

- FEMA Flood Mitigation Assistance Program – *grants for pre-disaster flood hazard mitigation planning and projects.*
- 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***

- FEMA Pre-Disaster Mitigation Grant Program (PDM) – *funding for hazard mitigation projects on a nationally competitive basis.*
- 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.*

***Wildfire Mitigation***

- Assistance to Firefighters Grant Program – *Provides pre-disaster grants to organizations such as fire departments that are recognized for expertise in fire prevention and safety programs.*

***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 Wolcott, and guide it through the FEMA approval process.

As individual recommendations of the hazard mitigation plan are implemented, they must be implemented by the municipal departments that oversee these activities. The Office of the Mayor and the Public Works Department in the Town of Wolcott 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 Mayor 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 Mayor 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 Public Works Department.

## *11.2 Progress Monitoring and Public Participation*

The Office of the Mayor 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 COG regarding certain projects, meetings, site visits, and telephone calls as befits the project being implemented. The Council of Governments of the Central Naugatuck Valley will coordinate an annual meeting for review and evaluation of the plan. Participants in this review may include representatives of the departments listed in Section 11.1.

Matters to be reviewed at this meeting will include a review of the goals and objectives of the original plan, a review of hazards or disasters that occurred during the preceding period, a review of the mitigation activities that have been accomplished to date, a discussion of reasons that implementation may be behind schedule, and recommendations for new projects and revised activities. The meeting will be conducted in October or November, at least two months before the annual application cycle for pre-disaster grants (applications are typically due in January 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 Wolcott.

## *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 Town Council of Wolcott 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 four 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 Cheshire Public Works Department and Planning Department;
- Town of Southington Engineering Department and Planning Department;
- City of Bristol 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
(877) 336-2734
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
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
360 Rainbow Boulevard South, 3rd Floor
Niagara Falls, NY 14303
800-659-2955
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) 424-3706
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.

- *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.

- *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.

- *Flood & Erosion Control Board Program*: Provides assistance to municipalities to solve flooding, beach erosion and dam repair problems. 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.

- *Dam Safety Program*: Charged with the responsibility for administration and enforcement of Connecticut's dam safety laws. 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) 685-8441
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
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.

## 12.0 REFERENCES


Blake, E. S., Jarrell, J. D., Rappaport, E. N., Landsea, C. W. 2006. *The Deadliest, Costliest, and Most Intense United States Tropical Cyclones from 1851 to 2005 (and Other Frequently Requested Hurricane Facts).* Miami, FL: NOAA Technical Memorandum NWS TPC-4. http://www.nhc.noaa.gov/Deadliest_Costliest.shtml

Brumbach, Joseph J. 1965. *The Climate of Connecticut.* State Geological and Natural History Survey of Connecticut, Bulletin No. 99.

Cape Cod Commission. 2004. *Natural Hazards Pre-Disaster Mitigation Plan.* Barnstable County, Cape Cod, Massachusetts.

Connecticut Department of Environmental Protection. 2007. *High Hazard & Significant Hazard Dams in Connecticut, rev. 9/11/07.* http://www.ct.gov/dep/lib/dep/water_inland/dams/high_significant_hazard_dams.pdf

____. 2004. *Natural Hazard Mitigation Plan for 2004-2007.*

____. 2004. *GIS Data for Connecticut - DEP Bulletin Number 40.*

Connecticut Department of Public Health. Connecticut Emergency Medical Service Regions. http://www.dph.state.ct.us/EMS/Documents/EMS%20Regions%20Map%20010108.pdf

Connecticut Flood Recovery Committee. 1955. *Report of the Connecticut Flood Recovery Committee, November 3, 1955.* Connecticut State Library. http://www.cslib.org/floodrecov.pdf

Environmental Defense. 2004. *Bracing for Climate Change in the Constitution State: What Connecticut Could Face.*

Federal Emergency Management Agency. 2007. Multi-Hazard Mitigation Planning Guidance Under the Disaster Mitigation Act of 2000. March 2004, Revised November 2006 and June 2007.

___. 2005. Reducing Damage from Localized Flooding: A Guide for Communities. FEMA document 511.

___. 2000. *Flood Insurance Study, Town of Wallingford, Connecticut, New Haven County.*

___. 1987. *Reducing Losses in High Risk Flood Hazard Areas: A Guidebook for Local Officials.* The Association of State Floodplain Managers.

___. 1982. *Flood Insurance Study, Town of Wolcott, Connecticut, New Haven County.*

___. 1978. *Flood Insurance Study, Town of Beacon Falls, Connecticut, New Haven County.*

___. Hazards. *Backgrounder: Tornadoes.* http://www.fema.gov/hazards/tornadoes/tornado.shtm

___. Library. Federally Declared Disasters by Calendar Year. http://www.fema.gov/library/drcys.shtm

___. Library. *Preparation and Prevention.* http://www.fema.gov/library/prepandprev.shtm

___. *Mitigation Division.* http://www.fema.gov/about/divisions/mitigation/mitigation.shtm

___. *National Hurricane Program.* http://www.fema.gov/hazards/hurricanes/nhp.shtm

___, United States Army Corps of Engineers, National Oceanic and Atmospheric Administration, and Connecticut Department of Public Safety Connecticut Office of Emergency Management. 1993. *Connecticut Hurricane Evacuation Study Technical Data Report.*

Fox News.com Rare Earthquake Strikes Connecticut. http://www.foxnews.com/story/0,2933,336973,00.html. Accessed March 11, 2008.

Gates, R. M., Martin, C. W. 1967. *The Bedrock Geology of the Waterbury Quadrangle.* State Geological and Natural History Survey of Connecticut, Quadrangle Report No. 22.

Glowacki, D. 2005. *Heavy Rains & Flooding of Sub-Regional Drainage Basins.* Reviewed Draft. Connecticut Department of Environmental Protection, Inland Water Resources Division.

Godschalk, D.R., T. Beatley, P. Berke, D.J. Brower, and E.J. Kaiser. 1999. *Natural Hazard Mitigation: Recasting Disaster Policy and Planning*. Island Press: Washington, D.C.

Kafka, Alan L. 2004. *Why Does the Earth Quake in New England? The Science of Unexpected Earthquakes.* Boston College, Weston Observatory, Department of Geology and Geophysics. http://www2.bc.edu/~kafka/Why_Quakes/why_quakes.html

Kocin, P. J., Uccellini, L.W. 2004. A Snowfall Impact Scale Derived From Northeast Storm Snowfall Distributions. *Bull. Amer. Meteor. Soc.*, 85, 177-194. http://www.ncdc.noaa.gov/oa/climate/research/snow-nesis/kocin-uccellini.pdf

Massachusetts Emergency Management Agency and Department of Conservation and Recreation. 2004. *Commonwealth of Massachusetts State Hazard Mitigation Plan.*

Mazzaferro, D. L., Handman, E.H., Thomas, M.P. 1979. *Water Resources Inventory of Connecticut: Part 8 – Quinnipiac River Basin.* United States Geological Survey, Connecticut Water Resources Bulletin No. 27.

Milone & MacBroom, Inc. 2007. *City of Waterbury Natural Hazard Pre-Disaster Mitigation Plan.* Council of Governments of the Central Naugatuck Valley, Waterbury, CT.

___. 2007. *Town of Nantucket Natural Hazard Pre-Disaster Mitigation Plan.*

___. 2006. *Greater Bridgeport Regional Planning Agency Natural Hazard Mitigation Plan.* Greater Bridgeport Regional Planning Agency, Bridgeport, CT.

___. 2005. *City of New Haven Natural Hazard Mitigation Plan.*

Miller, D.R., G.S. Warner, F.L. Ogden, A.T. DeGaetano. 2002. *Precipitation in Connecticut.* University of Connecticut College of Agriculture and Natural Resources. Connecticut Institute of Water Resources, Storrs, CT.

Muckel, G.B. (editor). 2004. Understanding Soil Risks and Hazards: Using Soil Survey to Identify Areas with Risks and Hazards to Human Life and Property. United States Department of Agriculture, Natural Resource Conservation Service, National Soil Survey Center, Lincoln, NE.

National Oceanic and Atmospheric Administration (NOAA), Atlantic Oceanographic and Meteorological Laboratory, Hurricane Research Division. *Hurricane Histograms.* http://www.aoml.noaa.gov/hrd/tcfaq/counties/CT.html

National Oceanic and Atmospheric Administration (NOAA). *Enhanced F-scale for Tornado Damage.* http://www.spc.noaa.gov/efscale/

___. *Weekend Snowstorm in Northeast Corridor Classified as a Category 3 "Major" Storm.* http://www.noaanews.noaa.gov/stories2006/s2580.htm

___. National Climatic Data Center (NCDC). *Extreme Weather and Climate Events.* http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storms

___. National Climatic Data Center (NCDC). 2007. *Monthly and Seasonal Total Snowfall Amount, Wolcott Reservoir, Connecticut.* http://www.ncdc.noaa.gov/ussc/SCopTab1?state=Connecticut&station=WOLCOTT%20RESERVOIR&coopid=069759&short=06

___. National Climatic Data Center (NCDC). 2006. *The Northeast Snowfall Impact Scale (NESIS).* http://www.ncdc.noaa.gov/oa/climate/research/snow-nesis/

___. National Weather Service. National Hurricane Center Tropical Prediction Center. *NHC/TPC Archive of Past Hurricane Seasons.* http://www.nhc.noaa.gov/pastall.shtml

New Hampshire Office of Emergency Management. 2000. *State of New Hampshire Natural Hazards Mitigation Plan.* Concord, New Hampshire.

Roald Haestad, Inc. 1997. *City of New Britain Comprehensive Water Supply Plan.*

Robinson, G. R. Jr., Kapo, K. E. 2003. *Generalized Lithology and Lithogeochemical Character of Near-Surface Bedrock in the New England Region.* U.S. Geological Survey Open-File Report 03-225, U.S. Geological Survey, Reston, VA. http://pubs.usgs.gov/of/2003/of03-225/

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Official Soil Series Descriptions [Online WWW]. Available URL: http://soils.usda.gov/technical/classification/osd/index.html

South Western Regional Planning Agency. 2005. *Pre-Disaster Mitigation Strategy Document, Connecticut's South Western Region.*

Squires, M. F. and J. H. Lawrimore. 2006: Development of an Operational Snowfall Impact Scale. 22nd IIPS, Atlanta, GA. http://www.ncdc.noaa.gov/oa/climate/research/snow-nesis/squires.pdf

Tornado Project Online. http://www.tornadoproject.com/

Town of Wolcott, Connecticut. *Emergency Operations Plan.*

___. *Zoning Regulations.*

___. 2006. *Inland Wetlands and Watercourses Regulations.*

___. 1998. *Subdivision Regulations.*

Town of East Haven, Connecticut. 2001. *Town of East Haven Hazard Mitigation Plan.*

Town of Stratford, Connecticut. 2001. *Natural Hazard Mitigation Plan.*

United States Census Bureau. 2000 Census data. http://www.census.gov/

___. American Factfinder. http://factfinder.census.gov/

United States Department of Transportation. 2002. *The Potential Impacts of Climate Change on Transportation*. The DOT Center for Climate Change and Environmental Forecasting. Workshop, October 1-2, 2002. Summary and Discussion Papers.

United States Geological Survey. Earthquake Hazards Program. *Earthquake Information for Connecticut.* http://neic.usgs.gov/neis/states/connecticut/connecticut_history.html

___. National Seismic Hazard Mapping Project. *Seismic Hazard Map of Connecticut.* http://earthquake.usgs.gov/regional/states/connecticut/hazards.php

___. *USGS Water Data for Connecticut.* http://nwis.waterdata.usgs.gov/ct/nwis/nwis

___. *The Severity of an Earthquake.* http://pubs.usgs.gov/gip/earthq4/severitygip.html

Wolcott Historical Society. Wolcott History. http://www.wolcotthistory.org/

Xhihani, L. "Waterbury: High Waters Raising Havoc." Waterbury Republican-American 17 April 2007.

## 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<br>2 = medium<br>3 = large | 0 = unlikely<br>1 = possible<br>2 = likely<br>3 = highly likely | 1 = limited<br>2 = significant<br>3 = critical<br>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<br>2 = medium<br>3 = large | 0 = unlikely<br>1 = possible<br>2 = likely<br>3 = highly likely | 1 = limited<br>2 = significant<br>3 = critical<br>4 = catastrophic | |
| Nor'Easter Winds | 3 | 3 | 2 | 8 |
| Snow | 3 | 3 | 2 | 8 |
| Blizzard | 3 | 3 | 2 | 8 |
| Hurricane Winds | 3 | 1 | 3 | 7 |
| Ice | 3 | 2 | 2 | 7 |
| Thunderstorm and Tornado Winds | 2 | 2 | 2 | 6 |
| Flooding from Dam Failure | 1 | 1 | 4 | 6 |
| Inland Flooding | 2 | 3 | 1 | 6 |
| Shaking | 3 | 1 | 2 | 6 |
| 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*

# APPENDIX A
# STAPLEE MATRIX

| Strategies Listed by Primary Report Section for Wolcott | Responsible Department[1] | Schedule<br>A. Ongoing<br>B. 2007-2012<br>C. 2012-2017<br>D. 2017-2022 | Associated Report Sections | | | | | | | Category<br>1. Prevention<br>2. Property Protection<br>3. Natural Resource Prot.<br>4. Structural Projects<br>5. Public Information | STAPLEE Criteria<br>*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** |
| Implementation of an emergency notification system | LEPC | B | x | x | x | x | x | x | x | 1,2,5 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | **19** |
| 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 | 3 | **21** |
| | | | | | | | | | | | | | | | | | | |
| **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** |
| Petition FEMA to more critically evaluate Letters of Map Amendment and Letters of Map Change Applications to prevent flooding increases | Mayor | B,C,D | x | x | x | x | | x | | 1 | 3 | 2 | 3 | 3 | 3 | 3 | 1 | **18** |
| 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 | 3 | 1 | **18** |
| Institute a Town-wide comprehensive catch basin cleaning and maintenance program | DPW | B,C,D | x | x | x | x | | | | 1 | 3 | 2 | 2 | 3 | 3 | 3 | 1 | **17** |
| Consider joining FEMA's Community Rating System | Mayor | B | x | x | x | x | | | | 1 | 2 | 3 | 2 | 3 | 3 | 2 | 1 | **16** |
| Continue to require Flood Hazard Area, subdivision, and commercial and industrial permits applications to provide needed flood data | PZC | B | x | x | x | x | | x | | 1 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | **17** |
| Encourage residents to move personal property out of the 100-year flood plain, especially in the Woodtick Road area south of Garthwait Road | ZEO | B,C,D | x | x | x | x | | | | 1 | 2 | 2 | 2 | 3 | 3 | 2 | 1 | **15** |
| 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 | 3 | 3 | 1 | **15** |
| 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 | Mayor, DPW | B | x | x | x | x | | | | 1 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | **18** |
| After the MapMod Program, use the Town two-foot contour maps to develop more exact regulatory flood maps using FEMA flood elevations | DPW | C | x | x | x | x | | | | 1 | 2 | 3 | 2 | 2 | 2 | 3 | 1 | **15** |
| | | | | | | | | | | | | | | | | | | |
| **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 | Mayor | B,C,D | 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 | Mayor | B,C,D | 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 | A | x | x | x | x | x | x | x | 3 | 2 | 3 | 3 | 2 | 3 | 2 | 3 | **18** |
| | | | | | | | | | | | | | | | | | | |
| **Structural Projects** | | | | | | | | | | | | | | | | | | |
| Investigate incidences of roadway flooding near Cedar Swamp Pond and clear or resize drainage systems as appropriate | DPW | C | x | x | x | x | | | | 2,4 | 2 | 3 | 2 | 3 | 3 | 2 | 1 | **16** |
| Raise the level of Central Avenue near Todd Lake above the highest recorded flood level | DPW | B | x | x | x | x | | | | 4 | 3 | 2 | 3 | 3 | 3 | 2 | 2 | **18** |
| Repair the bridge spanning Lily Brook at Todd Road | DPW | C | x | x | x | x | | | | 4 | 3 | 3 | 2 | 3 | 2 | 2 | 1 | **16** |
| Enlarge the culvert passing Lily Brook under Woodtick Road and elevate the road if necessary | DPW | C | x | x | x | x | | | | 4 | 3 | 2 | 2 | 3 | 3 | 2 | 2 | **17** |
| Perform a feasibility analysis to determine the best way to address the flooding conditions in the Town Line Road area | DPW | B | x | x | x | x | | | | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | **19** |
| Replace the twin culverts under Nutmeg Valley Road and Town Line Road on Old Tannery Brook with box culverts sized to at least the 50-year storm | DPW | B | x | x | x | x | | | | 4 | 3 | 3 | 2 | 3 | 3 | 3 | 1 | **18** |
| Consider extending a road from the existing baseball field complex off Nichols Road southwest through the utility easement to Tosun Road Extension | DPW | D | x | x | x | x | x | x | x | 4 | 2 | 3 | 2 | 3 | 1 | 2 | 1 | **14** |
| Repair the eroded hillside at Tosun Road Extension above Old Tannery Brook and install curbing | DPW | B | x | x | x | x | | | | 3,4 | 3 | 3 | 2 | 3 | 3 | 1 | 3 | **18** |
| Enlarge the culvert passing the Mad River under Mad River Road near Route 69 and elevate the road if necessary | DPW | C | x | x | x | x | | | | 4 | 3 | 2 | 2 | 3 | 3 | 3 | 1 | **17** |
| Perform a feasibility analysis to determine the best way to reduce flooding damages along the Lindley Brook corridor from Lindsley Drive to south of Route 322 | DPW | B | x | x | x | x | | | | 2 | 3 | 2 | 2 | 3 | 3 | 1 | 1 | **15** |
| Increase the size of the culverts near Grove Street & Maple Avenue | DPW | C | x | x | x | x | | | | 2,4 | 2 | 3 | 2 | 3 | 3 | 1 | 1 | **15** |
| Petition the state to restore the 24-inch culvert on Route 322 near Grove Street & Maple Avenue | Mayor | B | x | x | x | x | | | | 2,4 | 3 | 3 | 2 | 3 | 3 | 1 | 1 | **16** |
| Investigate ways to reduce poor drainage flooding on Meriden Road near Hitchcock Lake | DPW | B | x | x | x | x | | | | 1 | 2 | 2 | 3 | 3 | 3 | 2 | 1 | **16** |
| Perform an conveyance analysis of the culverts in the Longmeadow Drive Extension area | DPW | B | x | x | x | x | | | | 2 | 2 | 3 | 2 | 3 | 3 | 1 | 1 | **15** |
| Investigate reports of localized flooding problems to determine cause and appropriate solution | DPW | A | x | x | x | x | | | | 4 | 3 | 3 | 2 | 3 | 3 | 3 | 1 | **18** |
| | | | | | | | | | | | | | | | | | | |
| **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 | 2 | 3 | 3 | 3 | 2 | **18** |
| Increase inspections of trees on private property near power lines and Town right-of-ways | DPW | A | | x | x | x | x | | | 1 | 3 | 2 | 2 | 3 | 3 | 3 | 2 | **18** |
| Continue outreach regarding dangerous trees on private property | DPW | A | | x | x | x | x | | | 1 | 3 | 2 | 2 | 3 | 3 | 2 | 2 | **17** |
| Continue to require that utilities be placed underground in new developments and pursue funding to move them underground in existing areas | PZC, Mayor | A | x | x | x | x | | x | x | 2 | 3 | 2 | 2 | 3 | 3 | 3 | 2 | **18** |
| Continue to require compliance with the amended Connecticut Building Code for wind speeds | PZC | A | | x | x | x | | | | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 1 | **18** |
| 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 Wolcott | Responsible Department[1] | Schedule<br>A. Ongoing<br>B. 2007-2012<br>C. 2012-2017<br>D. 2017-2022 | Associated Report Sections | | | | | | | Category<br>1. Prevention<br>2. Property Protection<br>3. Natural Resource Prot.<br>4. Structural Projects<br>5. Public Information | STAPLEE Criteria<br>*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** | | | | | | | | | | | | | | | | | | |
| Compile and post a final list of plowing routes, prioritizing egress to shelters and critical facilities | DPW | B | | | | x | | | | 5 | 3 | 3 | 2 | 3 | 3 | 2 | 1 | **17** |
| Complete and disseminate evacuation plan to ensure timely evacuation of shelterees from all areas of Wolcott | LEPC | B | x | x | x | x | x | x | x | 1,5 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | **19** |
| 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 | B | x | x | x | x | x | x | x | 1 | 3 | 2 | 3 | 3 | 3 | 2 | 1 | **17** |
| | | | | | | | | | | | | | | | | | | |
| **EARTHQUAKES** | | | | | | | | | | | | | | | | | | |
| Preserve or convert areas of inactive faults into municipal open space | PZC | A | | | | | x | | | 1 | 2 | 3 | 3 | 2 | 3 | 1 | 3 | **17** |
| 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** |
| Consider restricting residential development in areas on or below steep slopes (slopes exceeding 30%) | PZC | B | | | | | x | | | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | **20** |
| 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 | Mayor | B | | x | x | x | x | | | 1 | 3 | 2 | 2 | 3 | 2 | 2 | 1 | **15** |
| | | | | | | | | | | | | | | | | | | |
| **DAM FAILURE** | | | | | | | | | | | | | | | | | | |
| Continue to require or conduct regular inspections of all Class C dams and perform or require upkeep and maintenance as needed | DPW | A | x | | | | | x | | 2,4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **21** |
| Consider implementing Town inspections of Class A, AA, B, and BB dams | Mayor | B | x | | | | | x | | 2,4 | 2 | 3 | 2 | 2 | 1 | 3 | 3 | **16** |
| Work with the Connecticut DEP to ensure that the owners of Class C dams have up to date EOPs and Dam Failure Analyses for each dam | Mayor | B | x | | | | | x | | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | **21** |
| Have copies of the Class C dam EOPs and Dam Failure Analyses on file at the Town Hall for public viewing | Mayor | B | | | | | | x | | 5 | 3 | 3 | 3 | 3 | 3 | 1 | 1 | **17** |
| | | | | | | | | | | | | | | | | | | |
| **WILDFIRES** | | | | | | | | | | | | | | | | | | |
| Continue to have the Wolcott Water Department extend/upgrade the public water supply systems into areas requiring water for fire protection | W&SD | A | | | | x | | | x | 4 | 3 | 2 | 3 | 3 | 3 | 3 | 2 | **19** |
| Continue installing fire ponds throughout Town to ensure an adequate supply of firefighting water in areas without water service | W&SD/DPW | A | | | | x | | | x | 1 | 3 | 2 | 2 | 3 | 2 | 3 | 2 | **17** |
| 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 | LEPC | 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 | LEPC | 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 Commission
PZC = Planning & Zoning Commission
ZEO = Zoning Enforcement Officer
DPW = Department of Public Works
W&SD = Wolcott Water & Sewer Department

# 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 Wolcott 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 May 16, 2006.
Notes typed June 5, 2006
Scott Bighinatti

---

Connecticut experienced a period of heavy rains from May 12 to the 16, 2006. On May 16, 2006, Jim MacBroom and David Murphy outlined several sites of interest in the Towns of Cheshire and Wolcott and the City of Waterbury that may have experienced flooding in the past. These sites were visited on May 16, 2006 and photographed. The sequence of photography is listed below:

Camera #1:

1. Ten Mile Brook at Route 70, Cheshire, upstream
2. Ten Mile Brook at Route 70, Cheshire, downstream
3. Willow Brook at Cornwall Ave., Cheshire, upstream
4. Willow Brook at Cornwall Ave., Cheshire, downstream
5. Error shot
6. Mill River at Mansion Road, Cheshire, upstream
7. Mill River at Mansion Road, Cheshire, downstream
8. Mill River at Forest Lane, Cheshire, upstream
9. Mill River at Forest Lane, Cheshire, downstream
10. Mill River at Fawn Drive, Cheshire, upstream
11. Mill River at Fawn Drive, Cheshire, downstream
12. Mill River at Cook Hill Rd, Cheshire, upstream
13. Mill River at Cook Hill Rd, Cheshire, downstream
14. Honeypot Brook at East Gate Drive, Cheshire, upstream
15. Honeypot Brook at East Gate Drive, Cheshire, downstream
16. Honeypot Brook at Country Club Rd, Cheshire, upstream
17. Honeypot Brook at Country Club Rd, Cheshire, upstream weir
18. Honeypot Brook at Country Club Rd, Cheshire, downstream
19. Honeypot Brook at Riverside Drive, Cheshire, upstream
20. Honeypot Brook at Riverside Drive, Cheshire, downstream
21. Quinnipiac River at Blacks Rd, Cheshire, upstream
22. Quinnipiac River at Blacks Rd, Cheshire, upstream floodplain
23. Quinnipiac River at Blacks Rd, Cheshire, downstream
24. Quinnipiac River at Quinnipiac Park, Cheshire
25. Quinnipiac River at Route 322, Southington, upstream
26. Quinnipiac River at Route 322, Southington, downstream
27. Ten Mile River at West Johnson Ave., Cheshire, downstream

Camera #2:

1. Ten Mile River at West Johnson Ave., Cheshire, upstream
2. Unnamed Stream at Schoolhouse Rd, Cheshire, upstream
3. Unnamed Stream at Schoolhouse Rd, Cheshire, downstream
4. Unnamed Stream at end of Grandview Court, Cheshire

5. Judd Brook at Knotter Drive, Cheshire, downstream
6. Judd Brook at Knotter Drive, Cheshire, upstream
7. Hitchcock Lake Brook at College Place, Wolcott, upstream
8. Hitchcock Lake Brook at College Place, Wolcott, downstream
9. Todd Lake at Central Ave., Wolcott
10. Lily Brook at Todd Rd, Wolcott, upstream
11. Lily Brook at Todd Rd, Wolcott, downstream (scoured wingwall)
12. Lily Brook at Todd Rd, Wolcott, downstream
13. Scoville Reservoir Lower Dam, Nichols Rd, Wolcott
14. Lily Brook at Woodtick Rd, Wolcott, downstream
15. Lily Brook at Woodtick Rd, Wolcott, upstream
16. Old Tannery Brook at Nutmeg Valley St., Wolcott, upstream
17. Old Tannery Brook at Nutmeg Valley St., Wolcott, downstream
18. Chestnut Hill Reservoir Spillway, Lyman Road, Wolcott
19. Chestnut Hill Reservoir Outflow (Old Tannery Brook), Lyman Road, Wolcott
20. Old Tannery Brook at Tosun Road, Wolcott, upstream #1
21. Old Tannery Brook at Tosun Road, Wolcott, upstream #2
22. Old Tannery Brook at Tosun Road, Wolcott, sliding barricade
23. Old Tannery Brook at Tosun Road, Wolcott, downstream
24. Old Tannery Brook at Nutmeg Valley St., Wolcott, water over road area
25. Mad River at Sharon Road, Waterbury, downstream #1
26. Mad River at Sharon Road, Waterbury, upstream
27. Mad River at Sharon Road, Waterbury, downstream #2

These notes follow the sequence of photography above.

a) Ten Mile Brook at Route 70, Cheshire – The bridge in this area appears more than sufficient for flood flows. The high water mark can be seen in shot 1 and far below the bottom of the bridge. There is riprap upstream and downstream of the bridge to reinforce the banks. There was some evidence of high water downstream bending plants.

b) Willow Brook at Cornwall Avenue, Cheshire – There are three circular culverts under this bridge. The recent rain event filled 60-70% of the culvert at the high water mark.

c) Mill River at Madison Road, Cheshire – This bridge is fairly recent and provides clearance for flood flows. The bridge consists of two rectangular culverts separated by a concrete support. There is a staff gauge on the downstream end of this bridge (visible in picture). Riprap is evident around the sides of the banks near the bridge on both sides.

d) Mill River at Forest Lane, Cheshire – The river here contains lots of sediment. As the upstream channel appears to be more swale than channel, it is probable that the erosion is caused by high water eroding soils that don't typically have flowing water. The existing culvert, although old, appears sufficient.

e) Mill River at Fawn Drive, Cheshire – The river is still heavily sedimented. There is a significant concrete channel between Forest Lane and Fawn Drive to protect the residential neighborhood. The river widens on the downstream side.

f) Mill River at Cook Hill Road, Cheshire – The river has lost its brown, sediment color at this point downstream. This is another twin rectangular culvert with concrete support bridge that is sufficient for flood purposes. The upstream photo depicts the debris that can get caught on the support.

g) Honeypot Brook at East Gate Drive, Cheshire – Twin culverts divert flow under this bridge. The bridge may act as a constriction; any future review of this bridge should include an analysis of its design conveyance.

*Honeypot Brook at East Gate Drive (note culverts)*

h) Honeypot Brook at Country Club Road, Cheshire – The brook here is flowing slightly overbank. There is a concrete weir on the upstream side of the bridge that is in disrepair but could still possibly be used for stream flow calculations. The bridge appears sufficient to handle moderate flood flows. The property owners downstream have taken great pains to reinforce the channel banks with riprap. Nearby, the wetland at the end of Stony Hill Drive is completely flooded.

*Honeypot Brook at Country Club Road (upstream)*

*Honeypot Brook at Country Club Road (downstream)*

i) Unnamed Stream at Riverside Drive, Cheshire – This sizeable stream is swollen with floodwater pouring out of the impoundment located just south of Riverside Drive. The culvert here has riprap upstream to prevent erosion. A wooden bridge spans the stream on the downstream end. The waters here flow directly into the Quinnipiac River, located just a few hundred feet downstream.

j) Quinnipiac River at Blacks Road, Cheshire – The river is very high. Upstream, there are several instances of trees and brush being underwater. The floodplain to the northwest of the bridge is also inundated in places and has a small stream flowing out of it, entering the river just above the bridge. This stream may be due to overbank flow upstream or just from rainwater flowing out of the floodplain. There is further evidence of trees being underwater downstream. Flow was eroding the bank in front of the northeast upstream wingwall.

k) Quinnipiac River at Quinnipiac Park, Cheshire – A sewer manhole was placed here on the bank at some point, but it now acts as an island a few feet into the river. The river is high, but not overbank here. This spot was accessed by walking behind the red wall on the soccer field and walking down the trail to the river.

l) Quinnipiac River at Route 322, Southington/Cheshire – The river here is very high and overbank. Inundation was occurring on both sides of the bridge. The upstream wingwalls on both sides of the stream are underwater. The sides of the banks may need to be reinforced with riprap, but the upstream side is outside of the study area.

m) Ten Mile River at W. Johnson Ave, Cheshire – The river here is very high, practically overbank. There is evidence of inundation upstream.

n) Unnamed Stream at Schoolhouse Rd, Cheshire – This stream is probably very low most of the time, evidenced by the thick brush growing in the channel. At the moment the stream is flowing slowly due to the wetland plants, compared to the faster velocities upstream (see Grandview Court, below). The plants downstream are also inundated, but the bridge appears adequate for the demand.

o) Unnamed Stream at Grandview Court, Cheshire – The stream is impounded slightly by a railroad bridge above this point, and flows rapidly out of that constriction and down the slope at the end of the road. The water is high, but not overbank.

p) Judd Brook at Knotter Drive, Cheshire – Judd Brook flows out of Southington to this point before going through the Cheshire Industrial Park where it joins the Ten Mile River. The river is overbank here, but the culvert appears adequate.

q) Hitchcock Lake Brook at College Place, Wolcott – The high water in Hitchcock Lake is causing this overflow to flow rapidly from the Lake. The bridge appears to be more than adequate and streambed is rocky such that erosion is not an issue.

r) Todd Lake at Central Ave., Wolcott – The floodwaters in Todd Lake have risen to the point of flowing over the road. The water is only 1"-2" inches deep in most of the picture. Reportedly, flooding happens here quite frequently.


*Todd Lake at Central Avenue*

s) Lily Brook at Todd Rd, Wolcott – The brook is not extremely high. The bridge has a badly scoured wingwall on the downstream side.

t) Scoville Reservoir Lower Dam, Wolcott – The water is flowing over the dam.

u) Lily Brook at Woodtick Road, Wolcott – With the addition of the waters of Finch Brook, Lily Brook has swelled compared to its size at Todd Road. The culvert here is too low to support a flood flow event. The water in the picture is less than one foot from the bottom of the bridge.

v) Old Tannery Brook at Nutmeg Valley St, Wolcott – There was a "road closed" sign up at the site, although the flood waters had receded by the point photos were taken. There is evidence of overbank flow in many areas, and the wetland near the street was still inundated with standing water.

*Old Tannery Brook at Nutmeg Valley Street*

*Old Tannery Brook at Nutmeg Valley Street (note blocked culvert)*

w) Chestnut Hill Reservoir Spillway and Outflow, Wolcott - The water in the reservoir was not above the emergency spillway in the photo, but there was evidence of recent water in the spillway. The outflow from the reservoir was flowing slowly.

x) Old Tannery Brook at Tosun Road, Wolcott – The brook is near bankfull in the pictures, but was higher in the near past. The high water mark on the bridge is over a foot higher than where the water is in the picture. A guard rail on the hill near the stream was damaged by what looks like an auto accident. The bending of the guard rail supports produced an opportunity for runoff to erode the side of the hill rather than continuing down the road. This area is prone to inundation.

y) Mad River at Sharon Road, Waterbury – The river here is slightly overbank and very wide. The bridge appears to be a recent construction and appears suitable for handling a sizeable flood event.

COGCNV field notes
Field inspection on June 7, 2006.
Notes typed June 19, 2006.
David Murphy

---

Connecticut experienced heavy rain on June 7, 2006 due to a spring "nor'easter." This rainfall event occurred only five days after a powerful storm caused flooding and landslides in the City of Waterbury. Thus, sites in Cheshire, Wolcott, and Waterbury were observed on June 7 to check for potential flooding and/or continued landslide activity. Notes from the May 16, 2006 inspections were used to guide the observations in Cheshire and Wolcott. The June 4, 2006 article in the *Waterbury Republican* was used to guide observations in Waterbury.

Photographs:

1. "Water Over Road" signs on Sandbank Road in Cheshire.
2. Marion Road in Southington (on the way to Wolcott); watercourse flowing over road.
3. Todd Lake at Central Avenue in Wolcott.
4. Mad River at Garthwait Road, Wolcott; note riprap at bend in river.
5. Condominiums at northwest corner of Mad River and Sharon Road in Waterbury.
6. River's Edge Apartments at southeast corner of Mad River and Sharon Road in Waterbury.
7. Same as #6
8. Facing south on Charles Street near 4th Street in Waterbury.
9. Damage at 5th Street and Greenmount in Waterbury.
10. Facing east on 5ht Street from the location of damage.
11. Facing down Highview toward Highland in Waterbury.
12. Jersey Road near Pearl Lake Road.
13. Jersey Road near Pearl Lake Road.
14. Jersey Road near Pearl Lake Road.
15. Jersey Road near Pearl Lake Road.
16. Jersey Road near Pearl Lake Road.
17. East Mountain Road.
18. East Mountain Road.
19. East Mountain Road.
20. East Mountain Road.

These notes follow the sequence of photography above.

a) Sandbank Road, Cheshire – Motorists are warned about shallow pools of water on the road by signs that read "Water Over Road" (Photo #1).

*1. Warning sign on Sandbank Road in Cheshire*

b) Todd Lake at Central Avenue, Wolcott – This location was inspected on May 16, but the water level in the lake is slightly lower and flooding of the road is not occurring (Photo #3).

c) Mad River parallel to Garthwait Road, Wolcott – An older neighborhood lies between the road and the river. Some of the homes are in the floodplain, and some backyards appeared to be partly flooded. The most upstream building along the road lies at a bend in the river (Photo #4) where riprap has been used to control erosion.

*4. Mad River near an older residential area in Wolcott*

d) Mad River at Sharon Road, Waterbury – Condominiums and apartments are clustered in the floodplain of the Mad River upstream and downstream of Sharon Road. The condos at the northwest corner of the river and the road lie several feet above the river elevation (Photo #5). The condos at the northeast corner of the river are similar in elevation and layout. The large apartment complex (River's Edge) at the southeast corner of the river and the road has expansive common areas that were partly underwater, and some of the paved areas were close to the water elevation, although some of the building appear to be at least ten feet higher than the water elevation (Photos #6, 7). These residential areas reportedly have a history of flooding.

*7. Minor flooding at apartment complex along Mad River*

e) Areas west of downtown Waterbury that flooded on June 2, 2006 were inspected. Damage to a street near the hospital was viewed. Riverside Street was then followed to Charles Street (at the foot of 4th and 5th Streets) where flooding occurred. This area (Photo #8) is at the base of a very steep hillside and is shaped like a trough due to the location of Route 8. It is easy to see how a rain event that exceeded the storm drainage capacity could cause rapid flooding.

*8. Charles Street at base of 4th Street*

5th Street was followed uphill to view the sinkhole/pothole damage from June 2 (Photos #9, 10) where Bank Street, 5th Street, and Greenmount Terrace intersect. This neighborhood was exceedingly difficult to navigate due to the damage, slopes, narrow streets, one-way streets and location of Route 8, which together cause conditions that are contradictory to hazard mitigation.

*9. Damage to 5th Street & Bank Street*

Eventually Highland Avenue was reached, and the stretch between Highview and Nichols was viewed. Evidence of storm damage was observed. However, it appears that recent construction has been underway in this area, so it was difficult to separate construction impacts from storm impacts (Photo #11, for example).

f) While following Pearl Lake Road back to Interstate 84, two areas of damage were "discovered" that had not been reported in the June 4 newspaper. The first of these involves Jersey Street near Hopeville Pond Brook. An excessive amount of water was viewed flowing down along Jersey Street toward, and into, the brook (Photos #12 through 16). The flow was sufficiently strong that asphalt damage was occurring. The water was originating from a catch basin. A resident remarked that it was a brook that begins in the Town of Naugatuck and is piped underground. It is possible that the brook culvert was clogged and the water was escaping to the next-nearest outlet (the catch basin). The resulting condition was quite hazardous.

*12. Water discharging from stormwater catch basin on Jersey Street*

*14. Water flowing down Jersey Street*

g) The second area of damage involves East Mountain Road. While approaching the end of the road from the west along Pearl Lake Road, an excessive amount of water was observed flowing downhill along the side of Pearl Lake Road. This water was flowing from the north end of East Mountain Road, and the road was closed with a barricade. A brief reconnaissance of the road was undertaken, and a severe condition was observed where a landslide/gully had caused the road to fail (Photos #17 through 20). Potholes and sinkholes were scattered in various nearby locations. While this area is not within a mapped floodplain or floodway, it appears that a small watercourse flowing from the northeast has caused this damage.

*17. Northwest end of East Mountain Road (note flowing water)*

*20. Damaged section of East Mountain Road*

*Meeting Minutes*

# NATURAL HAZARD MITIGATION PLANS FOR CHESHIRE, PROSPECT, WATERBURY, AND WOLCOTT

**Council of Governments Central Naugatuck Valley**
**Project Kick-Off Meeting**
***June 26, 2006***

---

## *I. Welcome & Introductions*

The following individuals attended the project kick-off meeting, and will comprise the steering committee:

- David Murphy, P.E., Milone & MacBroom, Inc. (MMI)
- Ken Livingston, AICP, Fitzgerald & Halliday, Inc. (FHI)
- Virginia Mason, Council of Governments Central Naugatuck Valley
- Jeffrey Cormier, Council of Governments Central Naugatuck Valley
- Chet Sergey, Wolcott Local Emergency Planning Commission
- Bob Chatfield, Mayor, Town of Prospect
- George Noewatne, Cheshire Public Works Department
- Jack Casner, Cheshire Fire Department
- Adam Rinko, Waterbury Fire Department

## *II. Description and Need for Hazard Mitigation Plans / Disaster Mitigation Act of 2000*

David described the Disaster Mitigation Act of 2000 and the desire of FEMA to have hazard mitigation planning occur at the local level. A discussion about the pre-disaster hazard mitigation grant program and eligible types of projects took place at this time, and continued intermittently throughout the meeting. The issue is especially relevant in Waterbury, where FEMA will likely be assisting with response and clean-up after the June 2 events. Although funding for disaster response is allocated differently than funding for hazard mitigation, some of the long-term solutions in Waterbury (and other communities) will require pre-disaster hazard mitigation funding.

## *III. Project Scope*

David described the project scope, organized as follows:

- Task 1 – Project Initiation and Data Collection
- Task 2 – Vulnerability Assessment
- Task 3 – Public Meetings
- Task 4 – Response Planning and Recommendations
- Task 5 – FEMA Review and Plan Adoptions

Unlike most planning projects, this project began before the kick-off meeting because the unusual rainfall events in May and June provided opportunities to observe flooding or near-flooding conditions.

The team had questions about the public meetings and public hearings. One public meeting will be held in each municipality to hear from the public and exchange information. David and Ken will likely lead these meetings. These may be coincident with regularly-scheduled meetings of different commissions, although it is not required. The team discussed the likelihood that members of the public would talk about some issues that are not covered in the plans, such as water in basements, potholes and sinkholes caused by water and sewer main breaks, etc. MMI and FHI will listen to all comments and subsequently determine which will be included in the planning process with the steering committee.

The public hearings to adopt the natural hazard plans will occur at the end of the project. The Board of Selectmen, Board of Alderman, or other executive commission will need to adopt each plan after FEMA's comments are addressed.

## *IV. Hazards*

The COG's grant application included a number of hazards that have been organized as follows:

- Flooding
- Hurricanes
- Winter storms
- Summer storms and tornadoes
- Earthquakes
- Dam failure
- Wildfires

Over the last month, the following additional hazards have been considered for inclusion in the plans:

- Mass movement/Landslides (Waterbury)
- Collapse/Subsidence above Mines (Cheshire)

Virginia raised two points for discussion. First, the mine subsidence issue may not be appropriate for the Cheshire natural hazard plan, depending on other factors. Nevertheless, we are likely to hear about it at the public meeting. Second, significant water main breaks were originally noted in the grant application based on incidents in Waterbury. However, water main breaks and their resulting damage are not really natural hazards, and this will not be included. Although damage resulting from a compromised storm sewer pipe (earth movement, sinkholes, potholes, washed out roads) may be similar, the cause of the damage is natural (heavy rainfall).

## *V. Data Collection Needs, Availability, and Key Contacts*

David explained that the following departments and/or their commissions typically provide an individual to attend the data collection meetings in each municipality:

- ❑ Public Works
- ❑ Engineering
- ❑ Planning & Zoning
- ❑ Emergency Management or Fire Department
- ❑ Optional: Mayor or Selectman's Office

Each local official in the steering committee should begin to identify the other individuals who should attend the data collection meeting. These meetings will need to occur during the summer, despite the difficulty of working around vacations.

Each municipality will need to provide lists of hazard events such as winter storms, flooding, summer storms, and brush fires, along with descriptions of their results and effects on populations. MMI and FHI can rely on other sources of information (such as the Connecticut Natural Hazard Mitigation Plan) to describe notable hurricanes and earthquakes, although each municipality is free to offer information about these as well.

In the case of Waterbury, Adam indicated that the damage caused by the June 2 storm has been well-documented and organized, and this information will be provided to MMI and FHI. Lists of potential projects have been compiled by the City's engineering consultant.

Bob provided a preliminary list of problem areas in Prospect and marked some of these on a map. It is anticipated that these areas will be field-checked, along with any others that are listed during the meeting in Prospect. Meetings in Wolcott and Cheshire will also yield lists of problem areas that will be field-checked.

A related conversation ensued regarding the erosion damage caused by ATV use in Prospect. Although ATVs are not a natural hazard, the erosion is caused by excessive rainfall. There may be a way to address some of the problem areas in the plan.

## *VI. Proposed Schedule*

The following proposed schedule was modified from the schedule presented in the scope of services. It has been updated to the current status of the project.

| *Month and Year* | *Tasks* |
|---|---|
| April – May 2006 | Preliminary data collection and field reconnaissance. |
| June 2006 | ***Project kick-off meeting*** with COGCNV and a representative from each municipality; data collection; field reconnaissance. |
| July 2006 | Meet with municipalities; data collection; field reconnaissance. |
| August 2006 | Meet with municipalities; data collection; field reconnaissance; data review; vulnerability assessments. |
| September 2006 | Data review; vulnerability assessments. |
| October 2006 | Data review; vulnerability assessments; additional data collection and field reconnaissance (if necessary). |
| November 2006 | Additional data collection and field reconnaissance (if necessary); Present findings to the public and collection of comments. |
| December 2006 | Incorporate public comments; develop recommendations. |
| January 2007 | Draft plans to COGCNV. |
| February 2007 | Meet with COGCNV. |
| March 2007 | Edits to plans; final draft plans to municipalities. |
| April 2007 | Meet with municipalities; final edits. |
| May 2007 | Submit final draft plans to FEMA. |
| June 2007 | FEMA review. |
| July 2007 | FEMA review. |
| August 2007 | Incorporate FEMA edits. |
| September 2007 | Adopt plans in municipalities. |
| October 2007 | Submit final plans to FEMA. |
| *November 2007 – March 2008* | *Reserve time for delays associated with DEP and FEMA review, etc.* |

The next step is for David to contact the steering committee members and schedule the data collection meetings in each municipality.

*Meeting Minutes*

**NATURAL HAZARD MITIGATION PLAN FOR WOLCOTT**
**Council of Governments Central Naugatuck Valley**
**Initial Data Collection Meeting**
***August 9, 2006***

---

## *I. Welcome & Introductions*

The following individuals attended the data collection meeting:

- ❑ Thomas Dunn, Mayor
- ❑ Chet Sergey, LEPC Chairman
- ❑ Paul Scirpo, Police Chief
- ❑ Peter Parks, Building Department
- ❑ David Kalinowski, ZEO & Public Works Department
- ❑ Dennis Dean, Assistant Fire Chief
- ❑ Virginia Mason, COGCNV
- ❑ Jeffrey Cormier, COGCNV
- ❑ David Murphy, Milone & MacBroom, Inc.

## *II. Description and Need for Hazard Mitigation Plans / Disaster Mitigation Act of 2000*

David briefly described the Disaster Mitigation Act of 2000 and the desire of FEMA to have hazard mitigation planning occur at the local level.

## *III. Discussion of Problem Areas*

*Flooding and Dams*

The following list of over-road flooding locations was provided by Chet:

A. Central Avenue at Lily Lake (also known as Todd Lake) – High rainfall events can cause the lake level to rise and impact the road. The road likely needs to be elevated. However, residents can use other roads to get in or out of the area. Note that a fire station is located at the east end of Central Avenue.

B. Town Line Road at Janco – This area includes the Mad River corridor and floodplain from Nichols Road to the Waterbury City Line. A very wide area floods during heavy rain events. Although Wolcott DPW has taken care to clear drainageways in the vicinity of Town Line Road, Nutmeg Valley Road, and Tosun Road, backwater conditions caused in Waterbury can still flood the area. A 2-inch storm can cause Town Line Road to be closed. This past spring, the road was closed during storms. Approximately 30 homes on Tosun Road must use Town Line Road and Nutmeg Valley Road to leave the area, causing this population to be vulnerable to flooding. They can get into their

neighborhood via Tosun Road Extension, but that road is one-way. Even if it were used to go the other way, the hairpin turn and steep grade would make it difficult to leave.

C. Woodtick Road at #200 – *Could not locate this area on the map from the meeting*

D. Mad River Road at Route 69 – Mad River Road floods during heavy rains because the Mad River bridge is undersized. It is at least 18 years old. The road flooded two times in June 2006. The road is not necessarily the only access for residents, but it is nevertheless very heavily utilized.

E. Woodtick Road at Lindsley Drive (and)
F. Woodtick Road at Center Street (Route 322) – These locations are part of a general area of flooding that occurs along Lindsley Brook. The brook flows to the south, parallel to and crossing beneath Woodtick Road a few times. Problems occur at Lindsley Drive and Center Street. Although the roads don't generally need to be closed, a culvert was washed out once and the road was undermined. In the course of a year, this area floods a few times. Much of the problem occurs in backyards. The Center Street bridge over Lindsley Brook (near Woodtick Road) is being improved this year in conjunction with a road widening project. CT DOT is the manager. It is not known if the bridge is being resized.

Additional areas of flooding:

G. Fields at Frisbie School – These fields are used every August of a large fair. Almost every other year, it rains during this event and the fields flood due to poor drainage. Two years ago, a big storm (rain, lightning) caused the area to be quickly evacuated.

H. Neighborhood between Route 322 and Hitchcock Lake – Drainage from Route 322 is directed toward and under Grove Avenue and Maple Avenue. The State downsized from a 24-inch pipe to a 12-inch pipe in some locations to slow the movement of water, but this made the problem worse.

- The McCormack Drive area was mentioned as needing bridge improvements if the intersection were eventually improved. However, this area is not a current problem.

- Wolcott has many dams. Conditions vary.

*Fires*

- In the 1980s, when the town was more rural, brushfires were a bigger problem. Today, they are not as big a concern.

- Areas in the northwest section of the town are still open, and near new development, so these are a possible concern.

- In the northeast section of town, fires are less frequent but more difficult to access. Some of this land belongs to water utilities.

- Hiking trails off Peterson Park allow people to access land that is vulnerable to fires, so it is important to prevent people from starting campfires.

*Earthquakes*

- The CT Building Codes are used.

- Several fault lines traverse the town, especially along the Southington side.

## *IV. Other Issues*

*Critical Facilities*

- Shelters include Terrell School (primary), Wakelee School (secondary), and Frisbie School (third in line). Agreements are in place to use other facilities (such as VFW) for secondary shelters.

- Fire houses are not shelters, but are important emergency supply distribution centers.

- Two electric substations are located in Wolcott, near Frisbie School and Route 69 near Mad River Road.

- Senior housing centers include Chestnut Hill and Wolf Hill. The nursing home on Beach Road (Wolcott View Manor) has generators. Check senior housing locations: Coe Road at Wolf Hill Road; Edgemont Lane; and Potuccos Ring Road (new facility).

*Wind*

- Utilities conduct tree maintenance.

- In 2005, Wolcott hired a tree warden and stepped up inspections and maintenance in right-of-ways. Many dangerous trees have been removed.

- During the August 3, 2006 storm, one road was closed for a fallen tree, and two were closed for branches on overhead lines.

- Wolcott attempts to close roads at convenient intersections, rather than the location of the fallen tree or branch.

- In new developments, utilities must be underground unless ledge is shallow.

*Snow & Ice*

- Because of an elevation and temperature gradient, ice is a big problem north of Route 322.
- The ice storm in November 2002 caused Route 69 to be closed from the center of town to Bristol. Power was out for four to five days.
- Wolcott has all town staff for plowing (no contractors). Main roads get plowed first, and smaller roads second. CT DOT plows State roads, but Wolcott often sands Route 69 because of frequent accidents.
- During emergencies, a plow can be dispatched ahead of an emergency vehicle.
- David will provide plowing costs.

## *V. Public Safety and Emergency Planning*

- Dead-end streets can have only 12 homes or less. The cul-de-sac must have a 60-foot diameter to allow fire truck access.
- Wolcott has a strong, active LEPC. The commission meets monthly with PD and FD, and occasionally conducts drills and tabletop exercises.
- Articles about planning for emergencies appear seasonally in the local newspaper.
- The town has an emergency alert system, but people are apathetic. The LEPC would like to retain a trailer with a speaker to be able to alert people near their homes.
- Reverse 911 has been considered. Even if purchased in conjunction with the school system, it is cost prohibitive. A grant for installation would help, and then the Town could possibly pay for annual maintenance.
- The EOP is all-encompassing, while the town ERP contains more information about natural hazards. Virginia will provide a copy of the EOP and Chet will provide a copy of the ERP.
- Drainage complaints are routed to DPW and Zoning and recorded in a book. Since the beginning of 2006, the complaint-tracking system has improved. A list of possible projects is being compiled based on complaint tracking.

COGCNV field notes
Field inspection on October 28, 2006.
Notes typed October 30, 2006.
David Murphy

Connecticut experienced a relatively significant rainstorm from October 27 (late) through October 28, 2006. Rainfall totals through the afternoon of October 28 were on the order of two inches state-wide. Although flood warnings were not issued for the state, the storm provided an opportunity to check additional sites in Cheshire and Wolcott that had been discussed at meetings with municipal officials. Sites were checked for potential flooding during the later part of the storm on October 28.

- Northeast Cheshire Flood Area – Given the recent discussions of this area with Suzanne from the Planning Department, and during the public information meeting, it was important to observe the problems during a storm event. The area was approached from Finch Avenue in Meriden, driving south and west along Allen Avenue. The following roads were also checked: Allen Court, Smith Place, Worden Circle, Cheshire Street, Sindall Road, Marks Place, North Pond Road, and Trout Brook Road. Out-of-bank conditions were not observed at Finch Avenue, North Pond Road, and Trout Brook Road. However, out-of-bank conditions and near-flooding were observed at Allen Avenue (photos 1-5). In particular, high flows of the easterly stream were approaching driveways at Allen Avenue (photos 2-3).


1


2


3


4


5

Flows were high but not overbank at Sindall Road (photos 6-7).


6


7

Drainage systems were not observed anywhere along Cheshire Street, but the area is very flat. Large areas of ponded water were observed in the yards of homes on the east side of Cheshire Street across from Blacks Road (photos 8-9). This appears to be nuisance flooding without any serious effects.


8


9

- Honeypot Brook at Blacks Road – While leaving the northeast Cheshire area, Honeypot Brook was crossed on Blacks Road. Of particular interest in this area is that the culvert elevation causes a wide backwater condition on the south (upstream) side of the road. The

water elevation is just below the street. Any additional flow here could cause flooding of the roadway (photos 10-12).


10


11


12

- Cheshire Industrial Park – On the way to Wolcott, a reconnaissance of the industrial park was undertaken based on reports of water all around the Bloomingdale's facility during significant storms. The industrial park is located where several streams come together in the floodplain of the Tenmile River. Nevertheless, the large amounts of open space appear to be handling the water. Street and parking lot flooding was not observed. A grassy area on the east side of Knotter Drive was flooded and a stream appeared to be overbank (no photos).

- Southeast Wolcott (322 and Meriden Road) – The area of Maple Avenue and Grove Avenue reportedly floods during rainstorms due to poor drainage. No flooding was observed.

- Lindsley Brook, Wolcott – Yards in the stream corridor reportedly flood during storms. The area was observed from Lindsley Drive at Woodtick Road, all the way to Bound Line Road. Few homes are located on the east side of Woodtick Road, north of Center Street/Route 322. The vulnerability of this area is generally very low.

  The potential for driveway flooding was observed just upstream of Lindsley Drive (photo 18) with the culvert completely submerged. Flows were very high but overbank conditions were not occurring anywhere, including at Lindsley Drive (photo 17) and at Center Street (photos 13 and 14).


An impoundment was high and encroaching on a yard downstream of Center Street (photos 15 and 16).


South of Center Street/Route 322, where the brook is on the east side of the road, numerous homeowners must cross the brook on bridges and culverts. Thus, flooding could affect access to individual lots during very severe storms, so the vulnerability is somewhat higher. Still, no flooding was observed during this visit.

- Frisbie School, Wolcott – The fields at the school are indeed in a low area with only one apparent point of drainage (to the south). However, no flooding was observed. It is likely that the problem here is very temporary, occurring during (but not after) downpours.

- Townline Road, Nutmeg Valley Road, and Tosun Road in Southwest Wolcott – This area was previously observed on May 16, 2006. Since that date, meetings with municipal officials have shed additional light on the nature of the problem in the area. Specifically, residents on Tosun Road can become isolated because Tosun Road Extension and Nutmeg Valley Road are industrial park roads located in the floodplain of the Mad River and Old Tannery Brook. At the time of the visit, the flow of Old Tannery Brook was higher than it was on May 16, with the two concrete culverts at Nutmeg Valley Road operating and the water elevation close to the road elevation (photos 19-21). Two similar concrete culverts are also located just downstream at Town Line Road, but the water elevation is lower relative to the road. A drainage ditch along the north side of Town Line Road was full but the gradient is very flat. An area of ponded water at its headwaters (photo 22) is basically at the road elevation.

Photographs:

1. Eastern brook at Allen Avenue, Cheshire
2. Eastern brook at Allen Avenue, Cheshire
3. Eastern brook at Allen Avenue, Cheshire
4. Western brook at Allen Avenue, Cheshire
5. Western brook at Allen Avenue, Cheshire
6. Combined brook at Sindall Road, Cheshire
7. Combined brook at Sindall Road, Cheshire
8. Area of yard flooding east of Cheshire Street across from Blacks Road, Cheshire
9. Area of yard flooding east of Cheshire Street across from Blacks Road, Cheshire
10. Honeypot Brook at Blacks Road, Cheshire
11. Honeypot Brook at Blacks Road, Cheshire
12. Honeypot Brook at Blacks Road, Cheshire
13. Lindsley Brook at Center Street, Wolcott
14. Lindsley Brook at Center Street, Wolcott
15. Lindsley Brook downstream of Center Street, Wolcott
16. Lindsley Brook downstream of Center Street, Wolcott
17. Tributary of Lindsley Brook at Lindsley Drive, Wolcott
18. Tributary of Lindsley Brook slightly upstream of Lindsley Drive, Wolcott
19. Old Tannery Brook at Nutmeg Valley Road, Wolcott
20. Old Tannery Brook at Nutmeg Valley Road, Wolcott
21. Old Tannery Brook at Nutmeg Valley Road, Wolcott
22. Corner of Nutmeg Valley Road and Town Line Road (ponding), Wolcott

*Meeting Minutes*

**NATURAL HAZARD MITIGATION PLAN FOR WOLCOTT**
**Council of Governments Central Naugatuck Valley**

**PUBLIC INFORMATION MEETING – NOVEMBER 28, 2006**

---

## *I. Welcome & Introductions*

The following individuals attended the information meeting:

- David Murphy, P.E., Milone & MacBroom, Inc. (MMI)
- Ken Livingston, AICP, Fitzgerald & Halliday, Inc. (FHI)
- Virginia Mason, Council of Governments Central Naugatuck Valley (COGCNV)
- Chet Sergey, Wolcott LEPC
- John Sharek, Wolcott Land Trust, JohnSharek@hotmail.com
- Lina Marunas, Wolcott resident, 879-3831 or Lmarunas@yahoo.com
- Mandy Panagrosso, Thomaston resident, Mandyp11103@yahoo.com (attending to evaluate a speaker for her Communications class at NVCC)
- Rich Dews, Thomaston resident (attending with Ms. Panagrosso)

Virginia 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, Wolcott, Connecticut"*

David and Ken presented the power point slideshow *(copy to be appended to notes during Plan compilation).*

## *III. Discussion*

After the presentation, the two residents were able to spend some time discussing their thoughts about natural hazards in Wolcott.

Ms. Marunas stated that Meriden Road often has water (on the road) near Hitchcock Lake and Route 322. The problem seems to be poor drainage. She has never really seen a problem for the nearby Grove Avenue and Maple Avenue neighborhood, although the lot at the corner of Maple Avenue and Lake Street floods during every rainstorm. This property was a wetland a number of years ago. The flooding does not affect other residents or roads. Mr. Sharek added that the problem associated with Grove Avenue and Maple Avenue pertains to an undersized culvert. This is consistent with previous reports for this area.

Ms. Marunas emphasized that people need to tend to their trees and tree branches. She works for the insurance industry and saw many claims in 2006 related to downed trees. Three years ago, Wolcott was affected by a severe power outage.

The Central Avenue corridor was discussed by both residents. The area at Todd Lake floods frequently. Another problem is that the road and adjacent lots have very poor drainage. New development is occurring on a lot-by-lot basis and this is making the problem worse. Water from the uphill side of the road runs down across the road and causes slick conditions and icing.

Cedar Lake was briefly discussed. Homes are high relative to the stream and therefore are not affected. However, roads in the area are sometimes flooded and impassable.

# Natural Hazard Pre-Disaster Mitigation Plan Wolcott, Connecticut


**Presented by:**

David Murphy, P.E. – Associate
Milone & MacBroom, Inc.

Ken Livingston, Principal Planner II
Fitzgerald & Halliday, Inc.


November 28, 2006

# 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

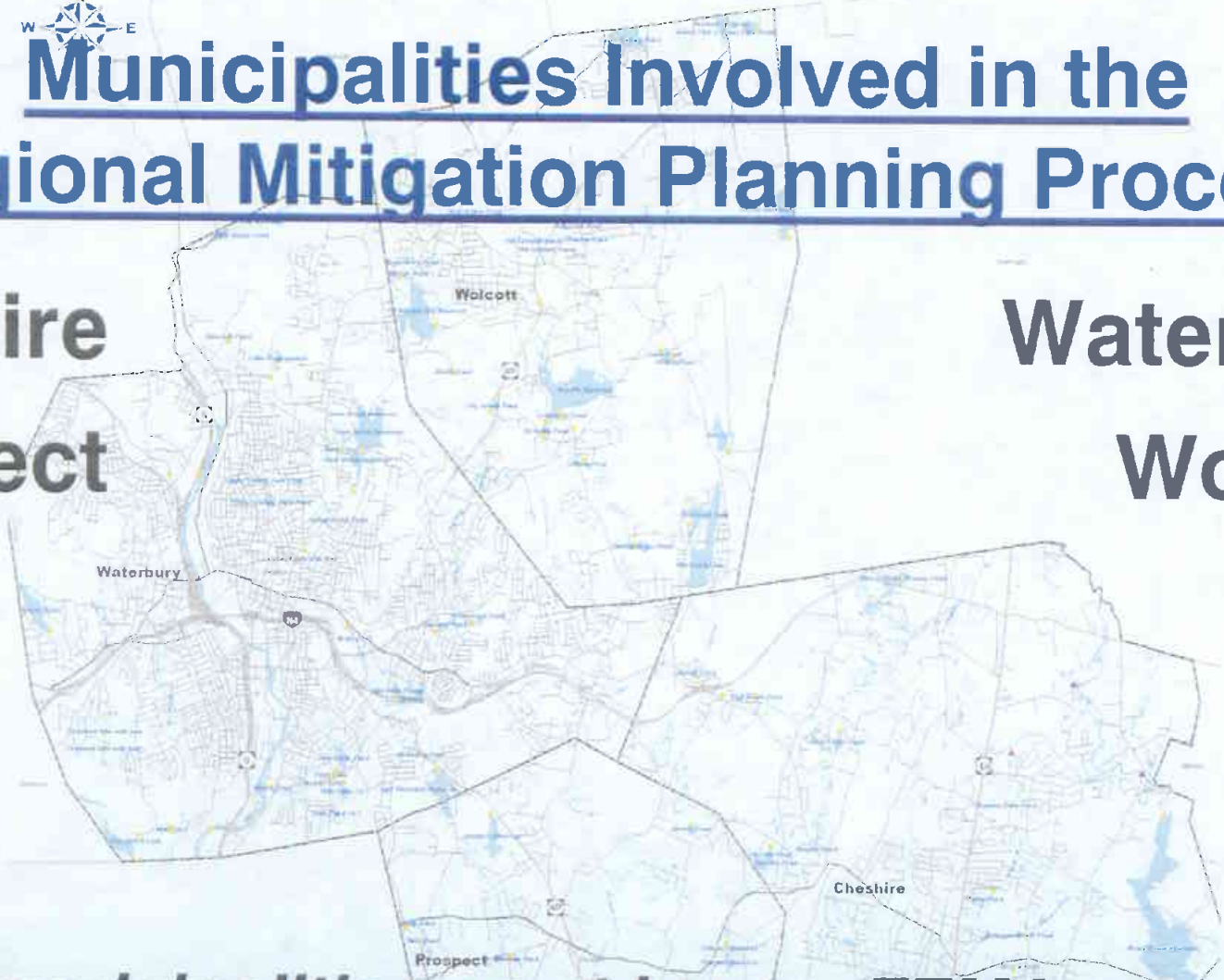
# Municipalities Involved in the Regional Mitigation Planning Process

Cheshire

Prospect

Waterbury

Wolcott




***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


**Warning Signs on Central Avenue – a type of hazard**

# 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 Wolcott
- 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

# Wolcott's Critical Facilities

- Emergency Services – Police, Fire, Ambulance
- Municipal Facilities – Town Hall, Municipal Buildings, Department of Public Works
- Schools – Used as Shelters



Tyrrell Middle School

# Wolcott's Critical Facilities

- Health Care, Assisted Living, and Senior Housing
- Water Utilities – Tanks, Pumping Stations
- Wastewater Utilities – Pumping Stations
- Transportation
- Electrical Substations

# Potential Mitigation Measures

- Develop and implement warning systems
- 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

Scoured Wingwall, Lily Brook at Todd Road

# Primary Natural Hazards Facing Wolcott

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

High Water, Lily Brook at Todd Road

# Hurricanes

- Winds
- Heavy rain / flooding

1955 Flooding

# Summer Storms and Tornadoes

Lightning over Boston

Tornado in KS

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

Flooding in MN

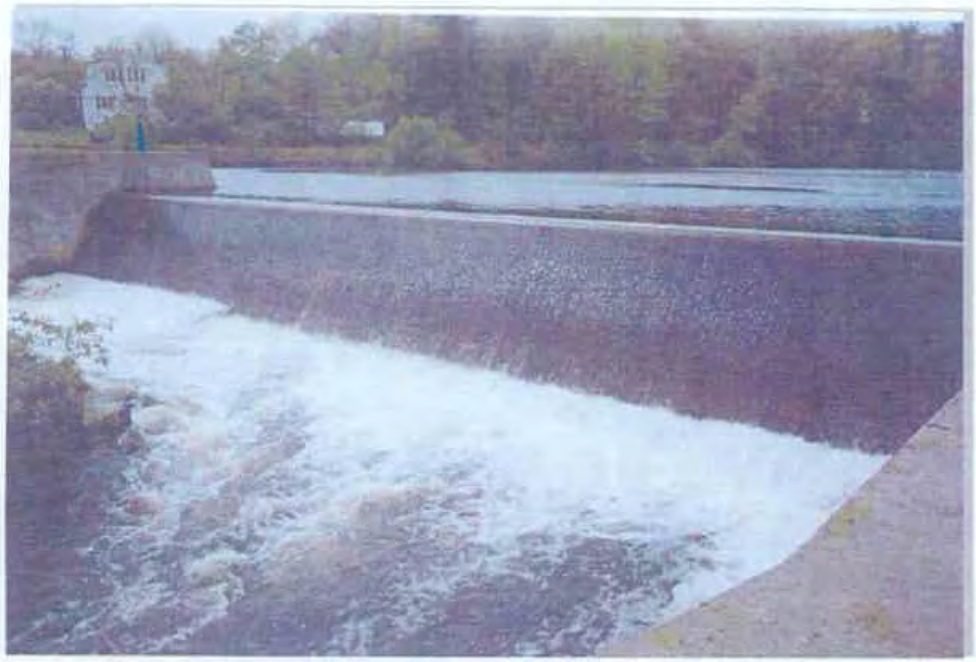
# Winter Storms

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


Blizzard of 1978 - CT

# Dam Failure

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



Scovill Reservoir Lower Dam

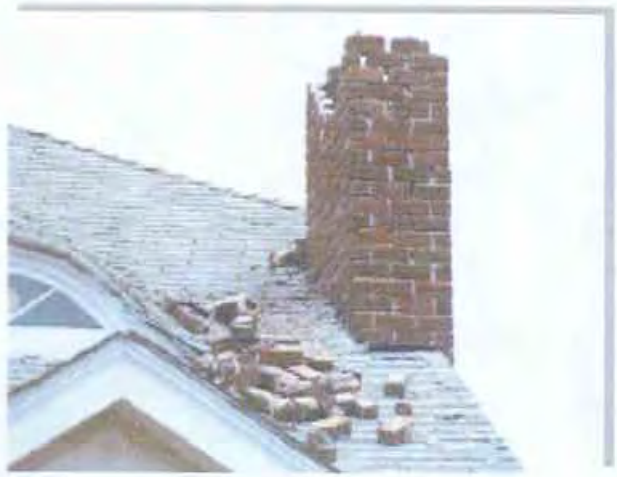
# Wildfires

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

Photo courtesy of FEMA

# Earthquakes

- Wolcott is in an area of minor seismic activity
  - Shaking
  - Slides / Slumps
  - Dam Failure



Photos courtesy of FEMA

# Area-Specific Problems

- Flooding at streams and ponds
- Flooding caused by poor drainage
- Ice
- Brush fires

# Flooding at Streams and Ponds

- Old Tannery Brook at Nutmeg Valley Road, Tosun Road, and Town Line Road in the Mad River Floodplain

Old Tannery Brook at Nutmeg Valley Road, Looking Downstream

Businesses on Nutmeg Valley Road

# Flooding at Streams and Ponds

- Lily Lake (a.k.a. Todd Lake) at Central Avenue


Warning Signs on Central Avenue – a type of hazard

# Flooding at Streams and Ponds

- Lindsley Brook along Woodtick Road and at Center Street and Lindsley Drive

Lindsley Brook

Pond on Lindsley Brook

# Flooding at Streams and Ponds

- Mad River Floodplain
- Mad River at Mad River Road / Route 69
- Mad River at Garthwait Road

Mad River at Garthwait Road

# Flooding Caused by Poor Drainage

- Town Line Road, Nutmeg Valley Road, and Tosun Road – drainage ways must be cleared
- Grove Avenue and Maple Avenue – culvert size problems
- Fields at Frisbie School – drainage during heavy rainfall

Water Near Town Line and Nutmeg Valley Roads

Frisbie School Area

# Ice

- Areas north of Route 322 are especially susceptible

Photos courtesy of FEMA

# Brush Fires

- Northwest section of Town (open areas with new development)
- Northeast section of Town (poor accessibility)

# Next Steps

- Incorporate input from residents
- Rank hazard vulnerability
- Develop mitigation strategies
- Prepare the draft plan with recommendations for review by the Town and the public
- Adopt and implement the plan

# Questions and Additions

# APPENDIX C
# RECORD OF MUNICIPAL ADOPTION