TOWN OF WOLCOTT
HAZARD MITIGATION PLAN UPDATE

Original Adoption and Approval:

May 2008

Updated January 2015

MMI #1014-49

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Originally prepared under a PDM grant from the Federal Emergency Management Agency (FEMA) through the Connecticut Department of Energy and Environmental Protections (DEEP) to the Council of Governments of the Central Naugatuck Valley; Updated under an HMGP grant from FEMA through the Department of Emergency Services and Public Protection (DESPP) Division of Emergency Management and Homeland Security (DEMHS). The contents of this plan reflect the views of the Town of Wolcott and do not necessarily reflect the official views of DEEP or DEMHS. The plan does not constitute a specification or regulation.

ACKNOWLEDGEMENTS & CONTACT INFORMATION

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LIST OF ACRONYMS

AEL	Annualized Earthquake Losses
ARC	American Red Cross
ASFPM	Association of State Floodplain Managers
BCA	Benefit Cost Analysis
BCR	Benefit-Cost Ratio
BFE	Base Flood Elevation
BOCA	Building Officials and Code Administrators
CLEAR	Center for Land Use Education and Research (University of Connecticut)
CM	Centimeter
CRS	Community Rating System
DEEP	Department of Energy & Environmental Protection
DEMHS	Department of Emergency Management and Homeland Security
DFA	Dam Failure Analysis
DMA	Disaster Mitigation Act
DOT	Department of Transportation
DPW	Department of Public Works
EAP	Emergency Action Plan
ECC	Emergency Communications Center
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FMA	Flood Mitigation Assistance
GIS	Geographic Information System
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HURDAT	Hurricane Database (NOAA's)
HURISK	Hurricane Center Risk Analysis Program
ICC	International Code Council
IPCC	Intergovernmental Panel on Climate Change
KM	Kilometer
KT	Knot
LID	Low Impact Development
LOMC	Letter of Map Change
MM	Millimeter
MMI	Milone & MacBroom, Inc.
MPH	Miles per Hour
NAI	No Adverse Impact
NCDC	National Climatic Data Center
NESIS	Northeast Snowfall Impact Scale
NFIA	National Flood Insurance Act
NFIP	National Flood Insurance Program
NFIRA	National Flood Insurance Reform Act

LIST OF ACRONYMS (Continued)

NOAA	The National Oceanic and Atmospheric Administration
OPM	Office of Policy and Management
POCD	Plan of Conservation and Development
PDM	Pre-Disaster Mitigation
RFC	Repetitive Flood Claims
RLP	Repetitive Loss Property
SCCOG	Southeastern Connecticut Council of Governments
SFHA	Special Flood Hazard Area
SLOSH	Sea, Lake and Overland Surges from Hurricanes
SRL	Severe Repetitive Loss
SSURGO	Soil Survey Geographic
STAPLEE	Social, Technical, Administrative, Political, Legal, Economic, and Environmental
TNC	The Nature Conservancy
USD	United States Dollars
USDA	United States Department of Agriculture
USGS	United States Geological Survey

Wolcott Hazard Mitigation Plan Update
Executive Summary

When the initial Hazard Mitigation Plan for the Town of Wolcott was developed in 2007 and adopted and approved in 2008, the town had not been struck by a major disaster in many years. Widespread property damage caused by a natural hazard event had not occurred since Tropical Storm Floyd in 1999. In the years since the first Hazard Mitigation Plan was adopted and approved, a number of severe storms have occurred, resulting in presidential disaster declarations in Connecticut. These include flooding of March 2010, winter storms of January 2011, Tropical Storm Irene of August 2011, Winter Storm Alfred of October 2011, "Superstorm" Sandy of August 2012, and Winter Storm Nemo of February 2013.

These storms have tested the resilience of Wolcott, demonstrating that the town has considerable capacity to recover from storms. However, the town remains at risk from flooding, and the four repetitive loss properties listed in Wolcott are located in areas affected by riverine flooding. One of these properties has recently been acquired and will be converted to a park, demonstrating a commitment to mitigation. The town also remains at risk to localized or widespread power outages caused by wind and snow events that damage utility lines, as well as nonresidential and residential structural damage from heavy snow loads.

Unlike many other communities in the region, Wolcott continues to experience moderate development and growth. The Zoning Regulations were revised and adopted in 2010 to incorporate the new digital flood insurance rate maps (DFIRMs) effective in 2010. The town intends to continue carefully regulating development especially as related to areas of risk to natural hazards. The prohibition of new residential structures in flood zones is considered very restrictive but consistent with the goals of hazard mitigation.

Several high and significant hazard dams are located in Wolcott. The town believes that recent state legislation regarding significant and high hazard dams will help address dam safety. Wind and snow hazards from hurricanes, tropical storms, thunderstorms, nor'easters, and other storms will continue to be addressed by preventive methods (such as tree limb trimming) that have been improved over the last few years based on experience with storms Irene and Alfred as well as other events.

In light of the recent disasters, the primary goal of this hazard mitigation plan is the same as it was in 2008: to reduce the loss of or damage to life, property, infrastructure, and natural resources from natural disasters. This includes the reduction of public and private costs. Going forward, the town intends to focus on a number of strategies carried forward from the first Hazard Mitigation Plan, while also focusing on a handful of new strategies such as acquiring standby power supplies and extending the public water system to areas where fire suppression is not currently available. In general, priorities have not changed since the initial hazard mitigation plan was adopted.

When this plan is next updated in 2018-2019, the town intends to revisit issues related to land development if moderate development occurs over the next few years. The next plan will also report on the status of any mitigation efforts pursued by the town.

1.0 INTRODUCTION

1.1 Background and Purpose

The goal of emergency management activities is to prevent loss of life and property. The four phases of emergency management include Mitigation, Preparedness, Response and Recovery. Mitigation differs from the remaining three phases in that hazard mitigation is performed with the goal to eliminate or reduce the need to respond. The term *hazard* refers to an extreme natural event that poses a risk to people, infrastructure, or resources. In the context of disasters, pre-disaster hazard mitigation is commonly defined as any sustained action that reduces or eliminates long-term risk to people, property, and resources from hazards and their effects.

The primary purpose of a hazard mitigation plan (HMP) is to identify natural hazards and risks, existing capabilities, and activities that can be undertaken by a community to prevent loss of life and reduce property damages associated with the identified hazards. Public safety and property loss reduction are the driving forces behind this plan. However, careful consideration also must be given to the preservation of history, culture and the natural environment of the region.

This HMP update was prepared specifically to identify hazards and potential mitigation measures in Wolcott, Connecticut. The town's previous HMP was adopted by the Town Council and approved by the Federal Emergency Management Agency (FEMA) in May 2008 and is on file at the FEMA Region I office. The HMP expired in May 2013. The HMP is relevant not only in emergency management situations but also should be used within the Town's land use, environmental, and capital improvement frameworks. While an update of the previous HMP, this HMP has been reformatted to be consistent with current FEMA planning requirements.

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 FEMA-approved mitigation plan in order to be eligible to apply for and receive Hazard Mitigation Assistance (HMA) grants.

The HMA "umbrella" contains several competitive grant programs deigned to mitigate the impacts of natural hazards. This HMP update was developed to be consistent with the general requirements of the HMA program as well as the specific requirements of the Hazard Mitigation Grant Program (HMGP) for post-disaster mitigation activities, as well as the Pre-Disaster Mitigation (PDM) and Flood Management Assistance (FMA) programs. These programs are briefly described below.

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. The "5% Initiative" is a subprogram that provides the opportunity to fun mitigation actions that are consistent with the goals and objectives of the State and local mitigation plans and meet all HMGP requirements, but for which it may be difficult to conduct a standard benefit-cost analysis (Section 1.5) to prove cost-effectiveness. The subject plan update was funded through HMGP.

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 HMPs 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. The initial hazard mitigation plan was funded through the PDM program.

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.

The Biggert-Waters Flood Insurance Reform Act of 2012 eliminated the Repetitive Flood Claims (RFC) and Severe Repetitive Loss (SRL) programs and made the following significant changes to the FMA program:

- The definitions of repetitive loss and severe repetitive loss properties have been modified;
- Cost-share requirements have changed to allow more Federal funds for properties with repetitive flood claims and severe repetitive loss properties; and
- There is no longer a limit on in-kind contributions for the non-Federal cost share

The NFIF provides the funding for the FMA program. The PDM and FMA programs are subject to the availability of appropriation funding, as well as any program-specific directive or restriction made with respect to such funds.

One potentially important change to the PDM, HMGP, and FMA programs is that "green open space and riparian area benefits can now be included in the project benefit cost ratio (BCR) once the project BCR reaches 0.75 or greater." The inclusion of environmental benefits in the project BCR is limited to acquisition-related activities.

Effective August 15 2013, acquisitions and elevations will be considered cost-effective if the project costs are less than $276,000 and $175,000, respectively. Structures must be located in Special Flood Hazard Areas (the area of the 1% annual chance flood). The benefit-cost analysis (BCA) will not be required.

Table 1-1 presents potential mitigation project and planning activities allowed under each FEMA grant program described above as outlined in the most recent HMA Unified Guidance document.

Table 1-1
Eligible Mitigation Project Activities by Program

Eligible Activities	HMGP	PDM	FMA
Property Acquisition and Structure Demolition or Relocation	X	X	X
Structure Elevation	X	X	X
Mitigation Reconstruction			X
Dry Floodproofing of Historic Residential Structures	X	X	X
Dry Floodproofing of Non-residential Structures	X	X	X
Minor Localized Flood Reduction Projects	X	X	X
Structural Retrofitting of Existing Buildings	X	X	
Non-structural Retrofitting of Existing Buildings and Facilities	X	X	X
Safe Room Construction	X	X	
Wind Retrofit for One- and Two-Family Residences	X	X	
Infrastructure Retrofit	X	X	X
Soil Stabilization	X	X	X
Wildfire Mitigation	X	X	
Post-Disaster Code Enforcement	X		
Generators	X	X	
5% Initiative Projects	X		
Advance Assistance	X		

Source: Table 3 – HMA Unified Guidance document

Many of the strategies and actions developed in this plan fall within the above list of eligible activities.

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 address the following secondary goals:

- ***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 strategies and actions, 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. 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

These are the same hazards that were addressed in the initial Wolcott Hazard Mitigation Plan. They were reviewed during the development of the 2014 Connecticut Hazard Mitigation Plan Update (adopted January 2014) and Wolcott's plan contributed to the Hazard Identification and Risk Assessment (HIRA) presented in the Connecticut Hazard Mitigation Plan Update. Thus, the plans are consistent. The only hazard given attention in the Connecticut Hazard Mitigation Plan Update but not addressed in the Wolcott Hazard Mitigation Plan Update is drought; however, this is the lowest-ranked hazard of those discussed in the state's plan, with a medium-low composite risk score for New Haven County. In addition, the statewide and countywide annual estimated loss (AEL) in the state plan for this hazard is $0. As such, its inclusion was considered not necessary in the Wolcott Hazard Mitigation Plan Update.

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. Tables 1-2 and 1-3 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 seven different parts. These are *Setting*; *Hazard Assessment*; *Historic Record*; *Existing Capabilities*; *Vulnerabilities and Risk Assessment*; *Potential Mitigation Strategies and Actions,* and *Status of Previous Mitigation Strategies and Actions.* These are described below.

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

Table 1-2
Hazard Event Ranking

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

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

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

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

Magnitude/Severity
1 = limited: injuries and/or illnesses are treatable with first aid; minor "quality of life" loss; shutdown of critical facilities and services for 24 hours or less; property severely damaged < 10%
2 = significant: injuries and/or illnesses do not result in permanent disability; shutdown of several critical facilities for more than one week; property severely damaged <25% and >10%
3 = critical: injuries and/or illnesses result in permanent disability; complete shutdown of critical facilities for at least two weeks; property severely damaged <50% and >25%
4 = catastrophic: multiple deaths; complete shutdown of facilities for 30 days or more; property severely damaged >50%

Table 1-3
Hazard Effect Ranking

Natural Hazard Effects	Location 1 = small 2 = medium 3 = large	Frequency of Occurrence 0 = unlikely 1 = possible 2 = likely 3 = highly likely	Magnitude/ Severity 1 = limited 2 = significant 3 = critical 4 = catastrophic	Rank
Nor'Easter Winds	3	3	2	8
Snow	3	3	2	8
Blizzard	3	3	2	8
Falling Trees/Branches	3	3	2	5
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
Hail	1	2	1	4
Fire/Heat	1	2	1	4
Smoke	1	2	1	4

- ❑ Some effects may have a common cause; for example, a hurricane causes high winds and flooding.
- ❑ Some effects may have similar causes; for example, hurricanes and nor'easters both cause heavy winds.

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

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

Magnitude/Severity
1 = limited: injuries and/or illnesses are treatable with first aid; minor "quality of life" loss; shutdown of critical facilities and services for 24 hours or less; property severely damaged < 10%
2 = significant: injuries and/or illnesses do not result in permanent disability; shutdown of several critical facilities for more than one week; property severely damaged <25% and >10%
3 = critical: injuries and/or illnesses result in permanent disability; complete shutdown of critical facilities for at least two weeks; property severely damaged <50% and >25%
4 = catastrophic: multiple deaths; complete shutdown of facilities for 30 days or more; property severely damaged >50%

- ***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 Capabilities*** 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 Strategies and Actions*** identifies mitigation alternatives, including those that may be the least cost effective or inappropriate for Wolcott.

- ***Status of Mitigation Strategies and Actions*** provides a status report regarding the specific strategies and actions listed in the previous plan.

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 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. All of these communities maintain single-jurisdiction hazard mitigation plans.

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

Table 1-4
Local Plan Development Participants

Name	Department or Commission	Initial Plan?	First Update?
Mr. Thomas Dunn, Mayor	Mayor's Office	Yes	No
Mr. Chester Sergey, Chairman	Wolcott Local Emergency Planning Commission	Yes	Yes
Mr. Paul Scirpo	Police Chief / Emergency Response Plan Coordinator	Yes	No
Mr. Peter Parks	Building Department	Yes	Yes

Name	Department or Commission	Initial Plan?	First Update?
Mr. David Kalinowski, Zoning Enforcement Officer and Public Works Administrator	Departments of Public Works and Zoning	Yes	Yes
Mr. Dennis Dean, Assistant Fire Chief	Fire Department	Yes	No
Mr. Al Voghel,	Emergency Management	Yes	No
Mr. Mark Garrigus	Inland Wetlands Commission	No	Yes

* No longer employed by Town of Wolcott

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 the initial Hazard Mitigation Plan and update the plan in 2013:

Initial Plan

- ***Field inspections were performed on May 16, 2006.*** Observations were made of flooding and hazard-prone areas within the Town.
- ***Field inspections were performed on June 7, 2006.*** Observations were made of flooding and hazard-prone 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 hazard-prone areas within the Town were discussed.
- ***Field inspections were performed on October 28, 2006.*** Observations were made of flooding and hazard-prone 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.

Residents were invited to the public information meetings of October and November 2006 via newspaper, but 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.

It is important to note that COGCNV manages the Central Naugatuck Valley Emergency Planning Committee. This committee was coordinating emergency services in the region during the development of the initial plan. Fire, Police, EMS, Red Cross, emergency management directors, and other departments participated 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 was transferred by the COGCNV to the hazard mitigation planning process.

Additional opportunities for the public to review the initial Plan were implemented in advance of the public hearing to adopt it. The draft that was sent for FEMA review was posted on the Town website and the COGCNV website to provide opportunities for public review and comment. During the public hearing to adopt the plan, any remaining comments from the public were addressed.

First Update

- ***A project meeting with Town officials was held May 14, 2013.*** The update process was described, necessary documentation was collected, and hazard-prone areas within the Town were discussed.
- ***Field inspections were performed on May 14, 2013.*** Repetitive loss properties were viewed.

Public Survey

In lieu of holding a public information meeting for the plan update, the Town of Wolcott elected to host a public survey via www.surveymonkey.com. The survey was open for several months (June 18 through September 3, 2013). Notification of the survey was posted in the Wolcott Community News newspaper,

Five people participated in the survey in 2013, exceeding the participation of the public information meetings held in 2006. The five residents are located on Sky Hill Drive, Todd Road, Potuccos Ring Road, and two on Spindle Hill Road. Three of the participants indicated that they were aware that the town maintained a HMP.

which is mailed free of charge throughout the town; on the town web site; and in the Wolcott Library computer room.

Participants were asked which recent events, if any, have generated awareness of natural hazards. Table 1-5 summarizes the responses.

Table 1-5
Contributors of Awareness of Natural Hazards

Events	Number of Participants Selecting
Winter Storm Nemo in February 2013	3
“Superstorm" Sandy in October 2012	2
"Winter Storm" Alfred in October 2011	3
Hurricane/Tropical Storm Irene in August 2011	2
The Virginia earthquake in August 2011	1
The Springfield, Massachusetts tornado of June 2011	1
The snowstorms of January 2011 that caused buildings to collapse	1

Two residents noted that their awareness has been very high, with one noting that his awareness has been high since the state was closed after the blizzard of 1978.

The next question asked responders to rate hazards on a scale of 1 (low threat) to 3 (high threat) in Wolcott. Responses are presented in Table 1-6.

Table 1-6
Potential Hazard Threat Based on Survey Response

Hazard	Number of Participants Selecting		
	Low Threat	Moderate Threat	High Threat
Flooding	4	1	0
Hurricanes and Tropical Storms	2	2	1
Tornadoes	3	1	1
Severe Thunderstorms (including hail or downbursts)	1	2	2
Winter Storms (including snow or ice) and Blizzards	0	1	4
Earthquakes	4	1	0
Wildfires and Brush Fires	4	1	0
Dam Failure (could be caused by other hazards)	5	0	0

The follow-up question asks which hazards have impacted the participant’s home or business. Table 1-7 summarizes these results.

Table 1-7
Impact to Responder's Home or Business

Hazard	Number of Participants Selecting
Flooding	0
Hurricanes and Tropical Storms	2
Tornadoes	1
Severe Thunderstorms (including hail or downbursts)	2
Winter Storms (including snow or ice) and Blizzards	3
Earthquakes	0
Wildfires and Brush Fires	0
Dam Failure (could be caused by other hazards)	0

When asked if any specific areas of Wolcott were vulnerable to any of the above hazards, participant entered the following:

- Tornadoes-southwest part of town.
- Ice storm-northern part of town.

The next question asked what are the most important things that the community can do to help its residents or organization be prepared for a disaster, and become more resilient over time. Responses are presented in Table 1-8.

Table 1-8
Most Important Community Mitigation Measures Based on Survey Response

Actions	Number of Participants Selecting
Provide outreach and education to residents, businesses, and organizations to help them understand risks and be prepared	1
Provide technical assistance to residents, businesses, and organizations to help them reduce losses from hazards and disasters	2
Conduct projects in the community, such as drainage and flood control projects, to mitigate for hazards and minimize impacts from disasters	4
Make it easier for residents, businesses, and organizations to take their own actions to mitigate for hazards and become more resilient to disasters	2
Improve warning and response systems to improve disaster management	1
Enact and enforce regulations, codes, and ordinances such as zoning regulations and building codes	1

When asked if the responder has taken any actions to reduce the risk or vulnerability to his or her family, home, or organization, responses were as presented in Table 1-9.

Table 1-9
Personal Mitigation Measures Taken Based on Survey Response

Actions	Number of Participants Selecting
Elevated my home or business to reduce flood damage	0
Floodproofed my business to reduce flood damage	0
Installed storm shutters or structural/roof braces to reduce wind damage	0
Taken measures to reduce snow build-up on roofs	1
Cut back or removed vegetation from my overhead utility lines or roof	4
Replaced my overhead utility lines with underground lines	0
Managed vegetation to reduce risk of wildfire reaching my home or business	2
Developed a disaster plan for my family, home, or business	3
Maintain a disaster supply kit for my family, home, or business	2
I have not taken any of these actions	1
Write-in Responses: Stockpile water and food. Store emergency go bags in car trunks.	

When asked "If you could choose one action that could be taken in your town to reduce vulnerability to hazards and the disasters associated with these hazards, what would it be," participant answered with the following:

- Being sure trees near wires are properly trimmed and that large trees that can impact structures are trimmed properly or removed
- Conduct drainage and flood control projects
- Continue phone updates. Appreciate as much info as possible.
- Maintain tree trimming and remove cut vegetation along roads and widen them
- Eliminate the apathy and denial that we are vulnerable to natural disasters and get residents to be better prepared and not dependent on government assistance during disasters. Insist that the Wolcott Community News publish emergency preparedness articles all the time not just "when there is room."

When asked to provide any additional comments or questions to be addressed as the town updates its hazard mitigation plan, one participant noted "Find some way to overcome the mindset that residents expect government to come to their rescue immediately after a disaster rather than be prepared to be self-sufficient for at least three days or preferably seven. Multiple and repeated efforts so far have been for the most part futile in spite of the impact from recent events. The most unprepared are those who are disabled or on AC-powered medical equipment and have no emergency or backup plans whatsoever, nor are they willing to inform us of their situation in advance so we may check on them or assist them in making preparations."

Three participants provided additional contact information for follow-up. Overall, the survey revealed that Wolcott residents see winter storms as having the highest threat and impacting their own homes the most.

Newspaper Articles for Plan Update

In addition to the public outreach described above, the 13 COGCNV municipalities participated in a regional newspaper story about the plan update process and the need to remain eligible for

potential hazard mitigation grants. The story, "Ready for Nature's Nastiness," was printed in the September 28, 2013 edition of the Waterbury Republican American, which maintains readership in all 13 COGCNV communities. A copy is included in Appendix B. The article noted that all of the municipalities were in various stages of the planning process. Potential mitigation projects in several of the towns were described. The article ended with a statement that residents and business owners can send ideas and comments for the plans to the COGCNV at comments@cogcnv.org.

Appendix B contains copies of meeting minutes, field notes and observations, the public information meeting presentation for the initial plan, survey results for the plan update, and other records that document the development and update of the Hazard Mitigation Plan.

Additional opportunities for the public to review this plan update will be implemented in advance of the public hearing to adopt this plan following receiving conditional approval from FEMA. The draft plan update that is sent for FEMA review will be posted on the Town website and the COGCNV website (http://www.cogcnv.org/) to provide opportunities for public review and comment. Comments will be incorporated into the final draft where applicable. The public and interested parties will be notified of the opportunity to review the Plan via the two websites.

Existing Plans, Studies, Reports, and Technical Information

Many existing plans, studies, reports, and sources of technical information were reviewed for development of the initial hazard mitigation plan and the update. These sources are discussed throughout this document in the appropriate sections and include:

- Plan of Conservation and Development – *Used to describe capabilities and demonstrate that the Town of Wolcott already has memorialized policies that are consistent with hazard mitigation*
- Subdivision Regulations – *Used to describe capabilities*
- Zoning Regulations – *Used to describe capabilities*
- Inland Wetland and Watercourse Regulations – *Used to describe capabilities*
- Original Wolcott Flood Insurance Study (1982) – *Used to describe flood extents and risks*
- Flood Insurance Study (2010) and DFIRMs (2010) – *Used to describe flood extents and risks*
- National Climatic Data Center (NCDC) data sets – *Used to describe historical records and risks for several hazards*
- United States Geologic Survey (USGS) reports and mapping – *Used to describe settings, historical records, and risks*
- Connecticut Department of Energy and Environmental Protection (DEEP) Dam Safety files – *Used to gather information related to Class B and C dams and describe dam failure risks*
- Specific studies as referenced in this document.

This list will be augmented as needed in future hazard mitigation plan updates.

1.5 Coordination with Neighboring Communities

Wolcott has coordinated with neighboring municipalities in the past relative to hazard mitigation and emergency preparedness and will continue to do so. The following is a list of the communities that are adjacent to Wolcott.

TABLE 1-10
Municipalities Adjacent to Wolcott

City / Town	Hazard Mitigation Plan Status
Town of Southington	Multi-Jurisdiction Plan (CCRPA)
City of Bristol	Multi-Jurisdiction Plan (CCRPA)
Town of Plymouth	Multi-Jurisdiction Plan (CCRPA)
Town of Cheshire	Single Jurisdiction Plan
City of Waterbury	Single Jurisdiction Plan

Input from neighboring communities was sought during the development of the initial HMP through outreach to the chief elected officials of those communities by way of the COGCNV involvement and the activity of the Central Naugatuck Valley Emergency Planning Committee described above.

Adjacent communities were given ample opportunity to review and comment on this HMP update. Waterbury and Cheshire were invited to comment on potential shared projects and inter-community issues during the data collection meetings for each community's respective plan update, since those towns participated in the coordinated planning effort with Wolcott. Representatives from these communities did not have any specific concerns or input. However, Waterbury representatives noted that for several years, officials in Wolcott have been drawing down impoundments along the Mad River in preparation for large rain events. This helps to reduce flooding along the Mad River in both Wolcott and Waterbury. Waterbury's City Engineer has been in contact with Wolcott about this, and the Mayor of Waterbury recently sent Wolcott officials a letter of thanks for these efforts.

Finally, the surrounding communities that are part of the Central Connecticut Regional Planning Agency (CCRPA) were individually invited via written correspondence to participate in the planning process (refer to Appendix B for copies of the letters). The Town Engineer from Plymouth noted that he received the letter but did not have any specific concerns or input.

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 vulnerable to an array of natural hazards.

2.2 Existing Land Use

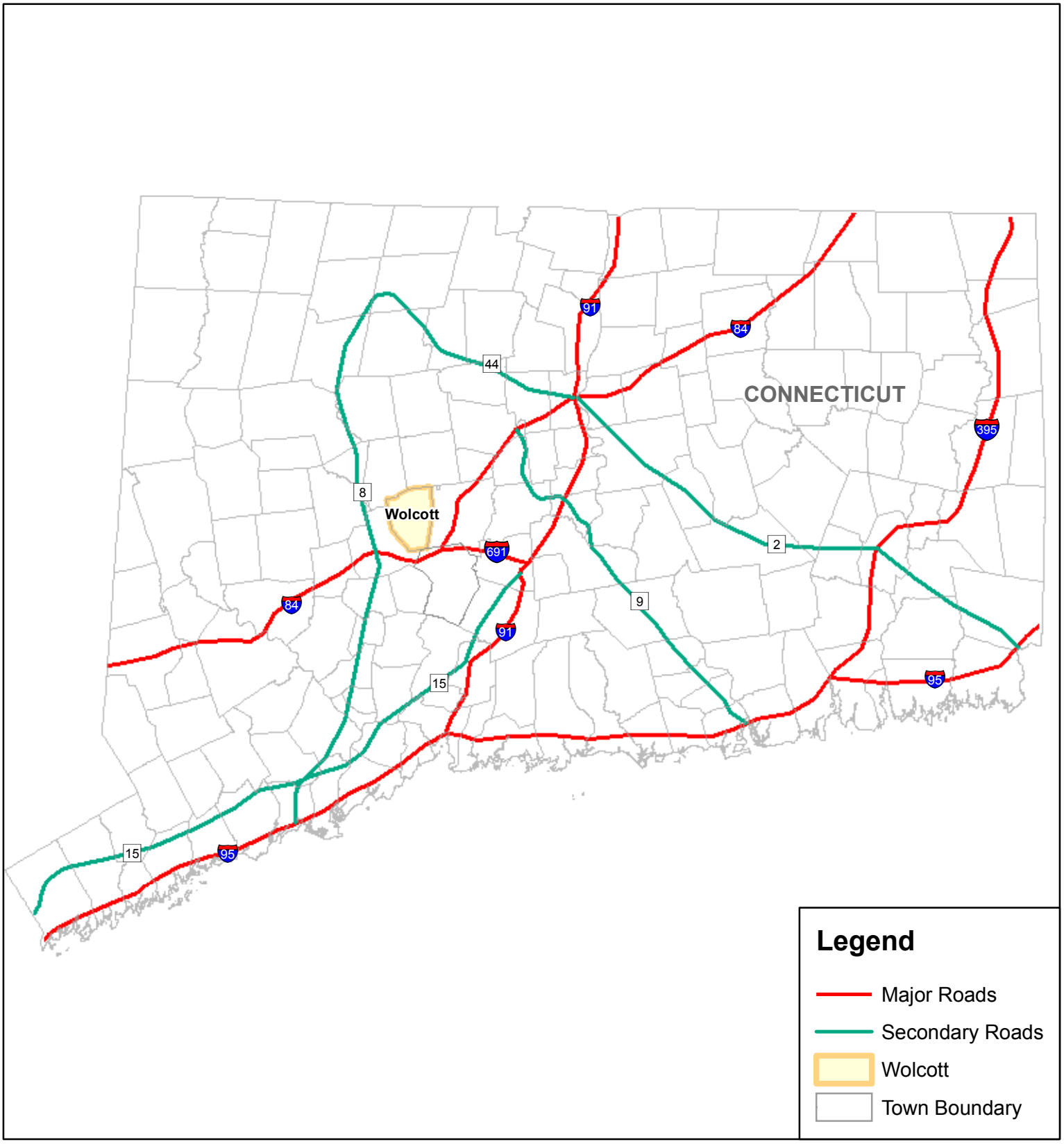
The Town of Wolcott encompasses 20.43 square miles. Wolcott is characterized by its hills and steep slopes which limit development in much of the town. A compact commercial district is located in the center of the town at the intersection of Wolcott Road and Center Street with additional commercial sites along Wolcott Road to the north and south. The commercial areas are surrounded by low-density residential districts interspersed with agricultural operations. 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. Table 2-1 provides a summary of land use in Wolcott by area.

Table 2-2
Land Use by Area

Land Use	Area (acres)	Percent
Undeveloped Land (includes water co. land)	7,667	56.6
High/Low/Medium Density Residential	4,500	33.3
Water	497	3.7
Agricultural	294	2.2
Commercial	161	1.2
Industrial	158	1.2
Recreation	112	0.8
Commercial Facilities/Institutional	95	0.7
Resource Extraction	47	0.3
Transportation/Utilities	11	0.1
Total Town Acreage	13,540	100.0

Source: Council of Governments Central Naugatuck Valley, 2008

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

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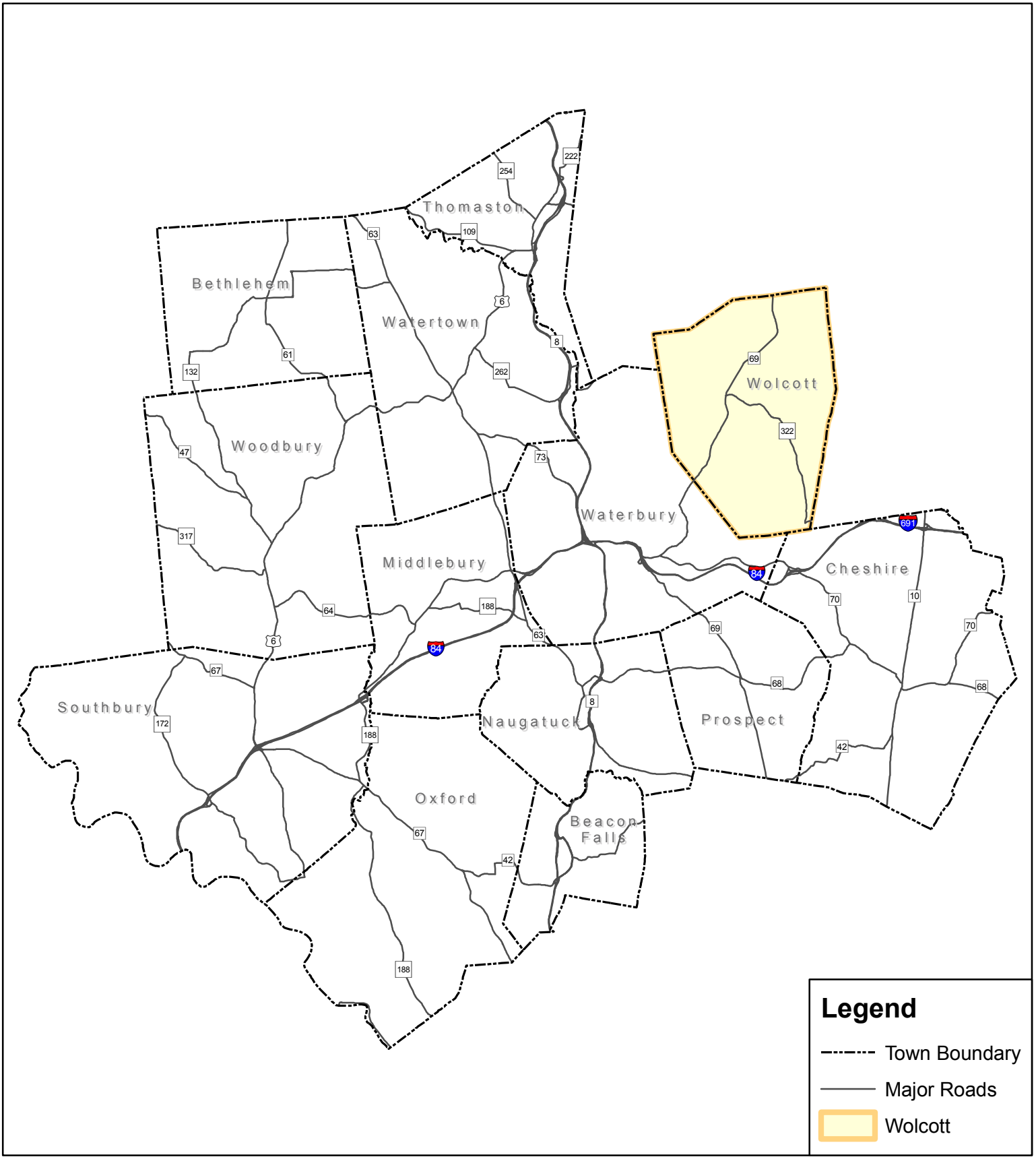
CENTRAL NAUGATUCK VALLEY

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

0 2 4 Miles

COUNCIL OF GOVERNMENTS
CENTRAL NAUGATUCK VALLEY

Refer to Figure 2-3 for a map of generalized land use in the Central Naugatuck Valley Planning Region.

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.

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.

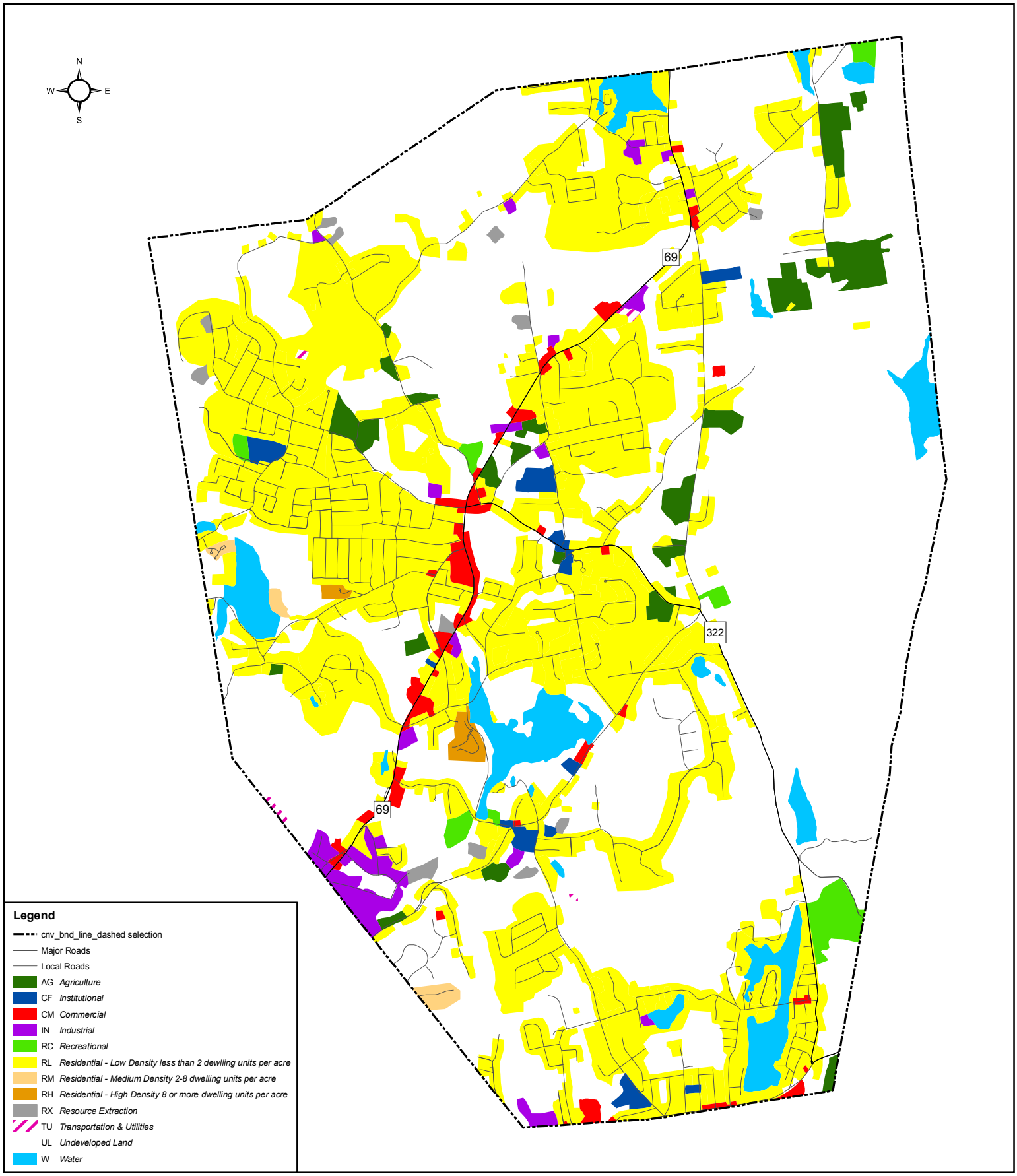
Connecticut bedrock geology is comprised of several "terranes." Terranes are geologic regions that reflect the role of plate tectonics in Connecticut's natural history. The bedrock beneath the Town of Wolcott is part of the Iapetos Terrane, comprised of remnants of the Iapetos Ocean that existed before 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:

- 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.

Figure 2-3: Wolcott Generalized Land Use



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

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

January 2007

0 0.5 1 Miles

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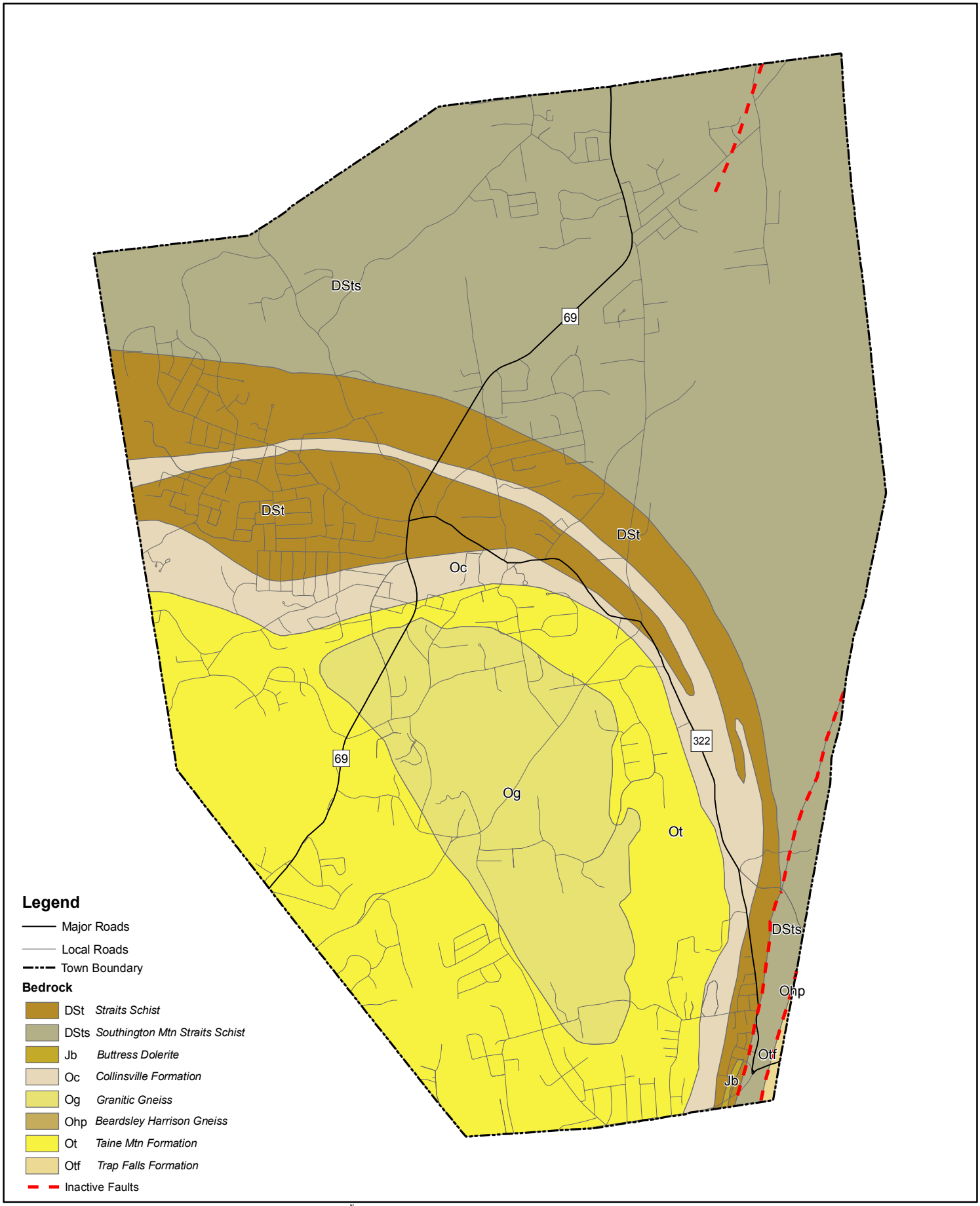
CENTRAL NAUGATUCK VALLEY

Figure 2-4: Wolcott Bedrock Geology



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

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CENTRAL NAUGATUCK VALLEY

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.

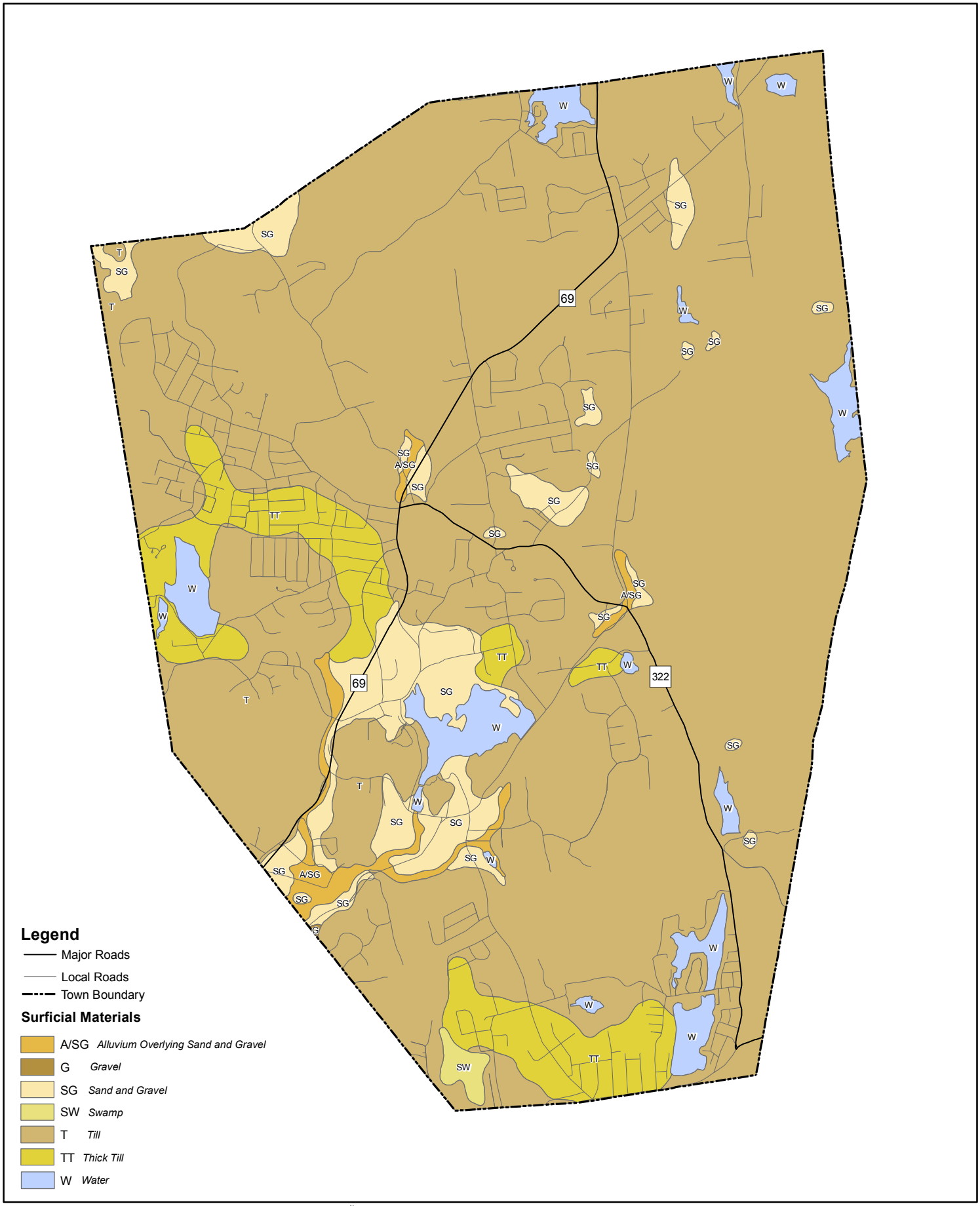
At least twice in the late Pleistocene, continental ice sheets moved across Connecticut. As a result, surficial geology of the Town is characteristic of the depositional environments that occurred during glacial and postglacial periods. Refer to Figure 2-5 for a depiction of surficial geology.

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 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



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

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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 sand and gravel present in the Town is important for several reasons. The stratified deposits could be used in the future to provide drinking water via pumping wells. With regard to flooding, areas of stratified materials are generally coincident with floodplains. This is because these materials were deposited at lower elevations by glacial streams, and these valleys later were inherited by the larger of our present-day streams and rivers. However, smaller glacial till watercourses can also cause flooding, such as those in northern, central, and southern Wolcott. The amount of stratified material 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 Current Climate Conditions and Climate Change

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 19th century (Miller et. al., 2002; NCDC, 2005). Likewise, total annual precipitation in the Town has increased over time. The continued increase in precipitation only heightens the need for hazard mitigation planning, as the occurrence of floods may change in accordance with the greater precipitation.

Like many communities in the United States, Wolcott experienced a population boom following World War II. This population increase led to concurrent increases in impervious surfaces and the amount of drainage infrastructure. Many post-war storm drainage systems and culverts were likely designed using rainfall data published in "Technical Paper No. 40" by the U.S. Weather Bureau (now the National Weather Service) (Hershfield, 1961). The rainfall data in this document dates from the years 1938 through 1958. These values are the standard used in the current Connecticut DOT Drainage Manual (2000) and have been the engineering standard in Connecticut for many years.

This engineering standard was based on the premise that extreme rainfall series do not change through time such that the older analyses reflect current conditions. Recent regional and state-specific analyses have shown that this is not the case as the frequency of two-inch rainfall events has increased and storms once considered a 1% annual chance event are now likely to occur twice as often. As such, the Northeast Regional Climate Center (NRCC) has partnered with the Natural Resources Conservation Service (NRCS) to provide a consistent, current regional analysis of rainfall extremes (http://precip.eas.cornell.edu/) for engineering design. The availability of updated data has numerous implications for natural hazard mitigation as will be discussed in Section 3.

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

Table 2-2 provides population data from the year 2000 and 2010 census counts. The total CNV Region population as indicated in the 2010 Census is 287,768 persons. The total land area is 309 square miles, yielding a regional population density of 931 persons per square mile. Wolcott has a population density of 816 individuals per square mile. By comparison, Waterbury has the highest population density in the region with 3,866 individuals per square mile, and Bethlehem has the lowest population density in the region with 186 individuals per square mile (Table 2-2).

Table 2-2
Population Density by Municipality, Region and State, 2000 and 2010

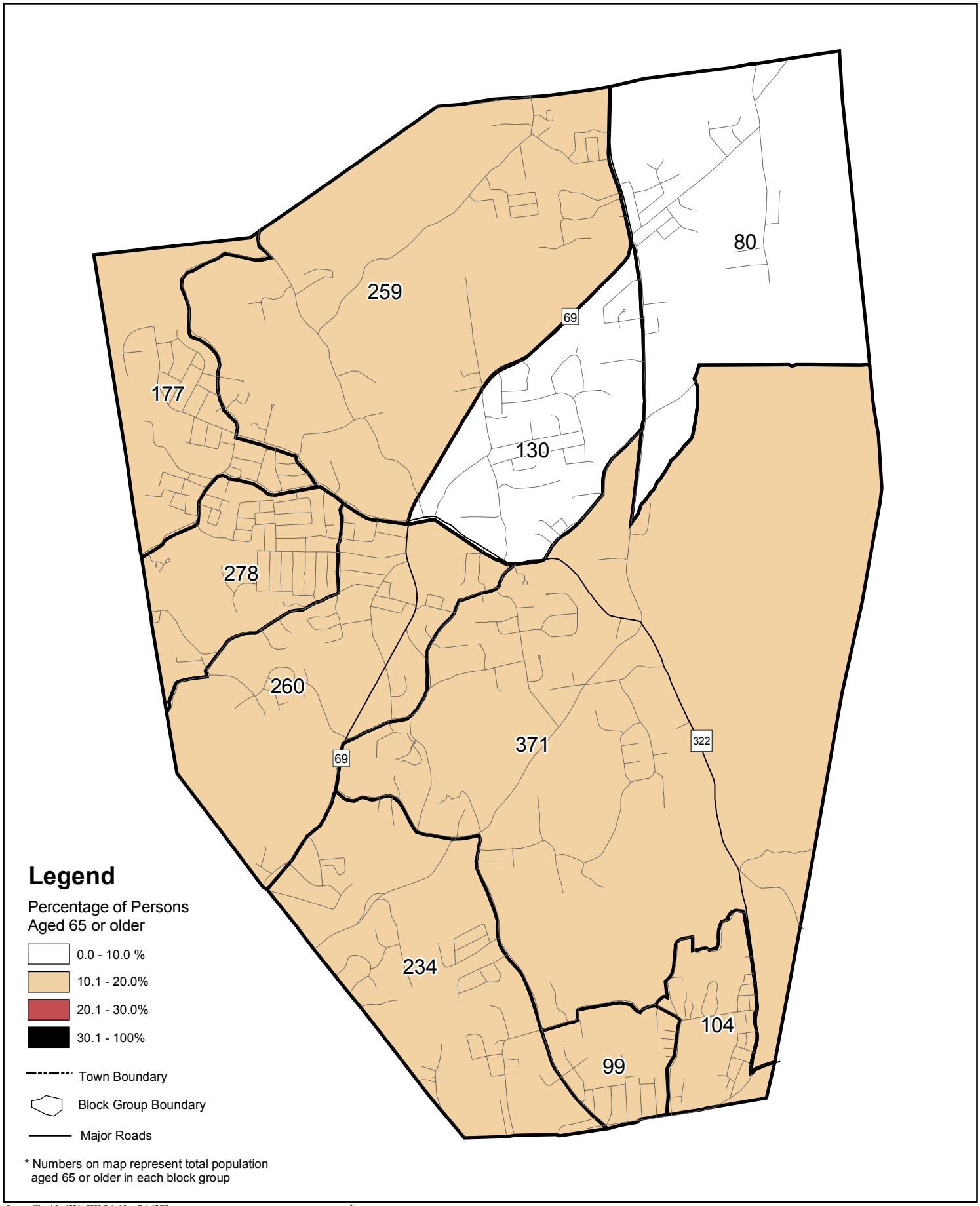
Municipality	Land Area (sq. miles)	Population 2000	Population Density, 2000	Population, 2010	Population Density, 2010
Beacon Falls	9.77	5,246	537	6,049	619
Bethlehem	19.36	3,422	177	3,607	186
Cheshire	32.90	28,543	868	29,261	889
Middlebury	17.75	6,451	363	7,575	427
Naugatuck	16.39	30,989	1,891	31,862	1,944
Oxford	32.88	9,821	299	12,683	386
Prospect	14.32	8,707	608	9,405	657
Southbury	39.05	18,567	475	19,904	510
Thomaston	12.01	7,503	625	7,887	657
Waterbury	28.55	107,271	3,757	110,366	3,866
Watertown	29.15	21,661	743	22,514	772
Wolcott	20.43	15,215	745	16,680	816
Woodbury	36.46	9,198	252	9,975	274
CNV Region	309.02	272,594	882	287,768	931
Connecticut	4844.80	3,405,565	703	3,574,097	738

Source: United States Census Bureau, 2000 Census of Population and Housing, Summary File 1; Census 2010, Profile of General Population and Housing Characteristics

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 and then 10% from 2000 to 2010. 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 may require special assistance or different means of notification before disasters occur. This is an important consideration in the context of hazard mitigation.

Figure 2-6: Wolcott Elderly Population



Source: "Roads", c1984 - 2006 Tele Atlas, Rel. 10/06.
"Town Boundary", DEP
"Age", "Block Groups", 2000 Census
For general planning purposes only. Delineations may not be exact.
January 2008

N
W E
S

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COUNCIL OF GOVERNMENTS
CENTRAL NAUGATUCK VALLEY

Figure 2-7: Wolcott Linguistically Isolated Households

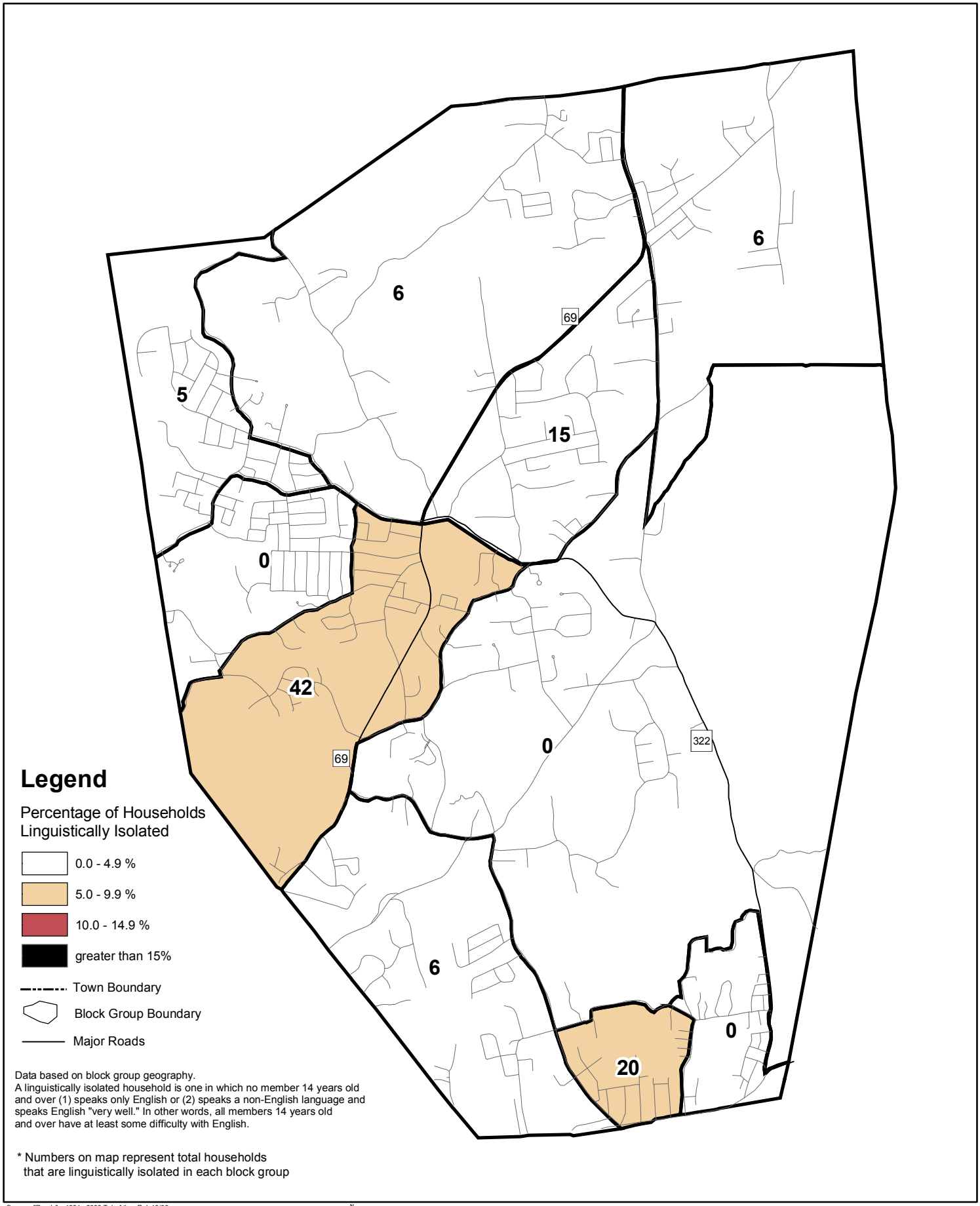
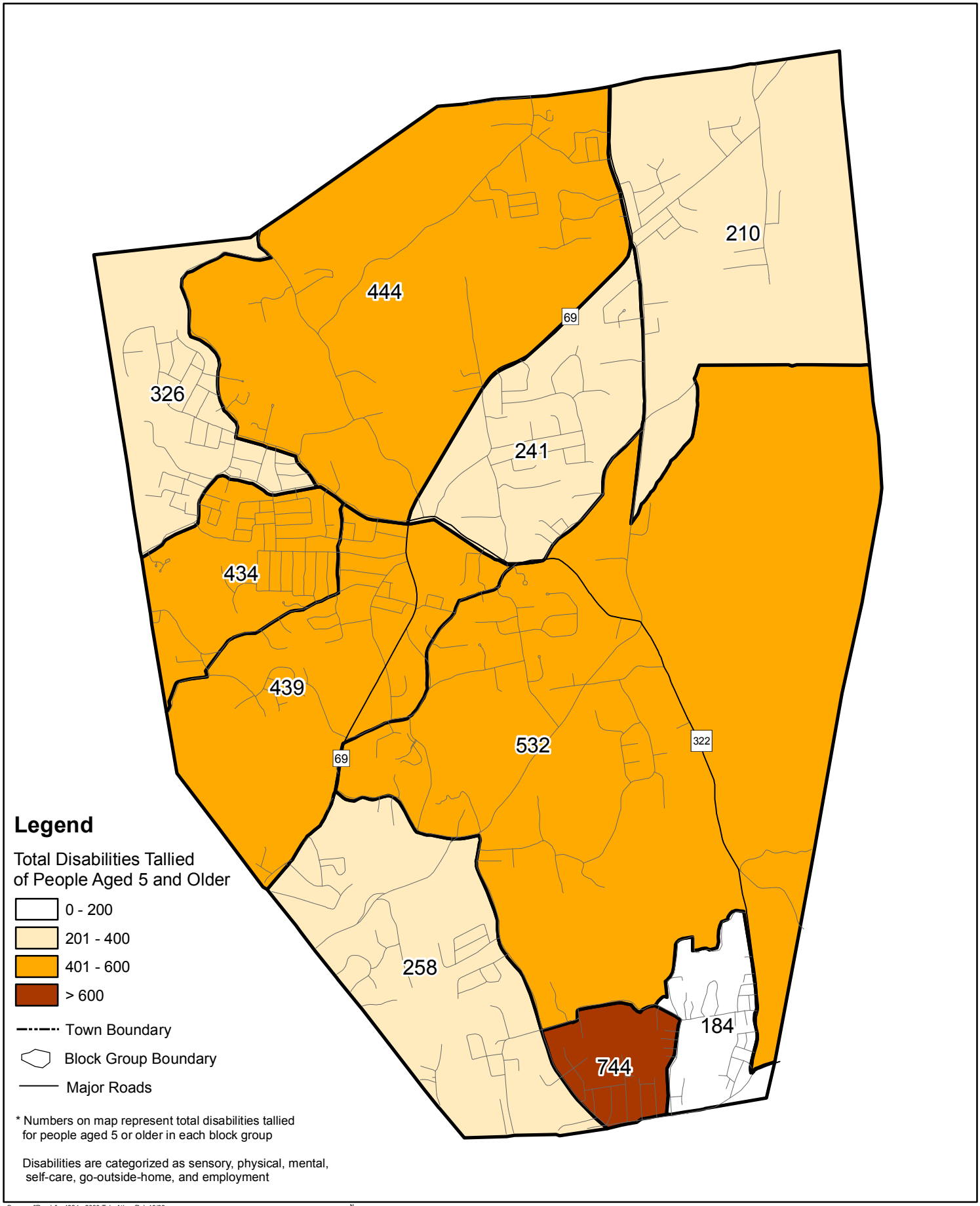


Figure 2-8: Wolcott Disabilities Map



Source: "Roads", c1984 - 2006 Tele Atlas, Rel. 10/06.
"Town Boundary", DEP
"Disability", "Block Groups", 2000 Census
For general planning purposes only. Delineations may not be exact.
January 2008

N W E S

0 0.5 1 Miles

COUNCIL OF GOVERNMENTS
CENTRAL NAUGATUCK VALLEY

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.

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.

Development has continued to be slow to moderate in Wolcott. Limited commercial development has continued along Route 69, and small subdivisions have occurred over the last few years since the initial HMP was adopted.

The Town of Wolcott has continued to ensure that new development is sited and approved with minimal risk from natural hazards. As noted in Section 3.4, a flood hazard area permit must be issued for any development located in special flood hazard areas; and **per Ordinance 94, new residential structures, mobile homes, and recreational vehicles are not permitted in SFHAs.** This is more stringent than the NFIP regulations. Additional capabilities that affect development are described in Sections 4.4, 5.4, 6.4, 7.4, 8.4, and 9.4.

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 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 SFHA?
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

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.

Wolcott High School is not currently considered a shelter, but standby power supply is desired at the high school to protect the facility during prolonger power outages. The high school will soon be connected to the town's municipal water system, which will help make the facility more resilient to extended outages.

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.

When the first HMP was developed, COGCNV was investigating the possibilities of instituting an emergency notification system in the area to further enhance emergency response. Wolcott now subscribes to the state's CT Alert notification system. Effective January 1, 2008, the Town of Wolcott entered the southeast portion of Region 5 of the Connecticut Emergency Medical Service regions. Thus, it was important that Wolcott institute an emergency notification system

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. The town has made significant efforts in the last five years to expand the public water system, and will soon be connecting to the high school as mentioned above. Additional expansion is also planned to the west of Route 69.

3.0 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, 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. 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.

3.2 Hazard Assessment

Flooding is 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 ice jams or dam failure (Section 8.0), and may also cause landslides and slumps in affected areas. According to FEMA, there are several different types of inland flooding:

- **Riverine Flooding**: Also known as overbank flooding, it occurs when channels receive more rain or snowmelt from their watershed than normal, or the channel becomes blocked by an ice jam or debris. Excess water spills out of the channel and into the channel's floodplain area.

- **Flash Flooding:** A rapid rise of water along a water channel or low-lying urban area, usually a result of an unusually large amount of rain and/or high velocity of water flow (particularly in hilly areas) within a very short period of time. Flash floods can occur with limited warning.

- **Shallow Flooding:** Occurs in flat areas where a lack of a water channel results in water being unable to drain away easily. The three types of shallow flooding include:
  - **Sheet Flow:** Water spreads over a large area at uniform depth;
  - **Ponding:** Runoff collects in depressions with no drainage ability; and
  - **Urban Flooding:** Occurs when man-made drainage systems are overloaded by a larger amount of water than the system was designed to accommodate.

Flooding presents several safety hazards to people and property and can cause extensive damage and potential injury or loss of life. Floodwaters cause massive damage to the lower levels of buildings, destroying business records, furniture, and other sentimental papers and artifacts. In addition, floodwaters can prevent emergency and commercial egress by blocking streets, deteriorating municipal drainage systems, and diverting municipal staff and resources.

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

***Floodplains** are lands along watercourses that are subject to periodic flooding; **floodways** are those areas within the floodplains that convey the majority of flood discharge. Floodways are subject to water being conveyed at relatively high velocity and force. 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 at a high velocity.*

In order to provide a national standard without regional discrimination, the 1% annual chance flood (previously known as the "100-year" flood) has been adopted by FEMA as the base flood for purposes of floodplain management and to determine the need for insurance. The risk of having a flood of this magnitude or greater increases when periods longer than one year are considered. For example, FEMA notes that a structure located within the 1% annual chance floodplain has a 26% change of suffering flood damage during the term of a 30-year mortgage. The 0.2% annual chance floodplain (previously known as the "500-year" floodplain) indicates areas of moderate flood hazard.

Wolcott has consistently participated in the NFIP since 1982 and plans to continue participating. SFHAs in Wolcott are delineated on a Flood Insurance Rate Map (FIRM) and supported by a Flood Insurance Study (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.

FEMA commenced the Flood Map Modernization program for New Haven County, Connecticut in August 2007 when the initial HMP was under development. The "Map Mod" program enabled a more accurate representation of SFHAs in Wolcott. The current New Haven County FIS and FIRM panels were effective December 17, 2010. This HMP update is the first to be developed subsequent to the effective date of the current FIS and FIRM panels.

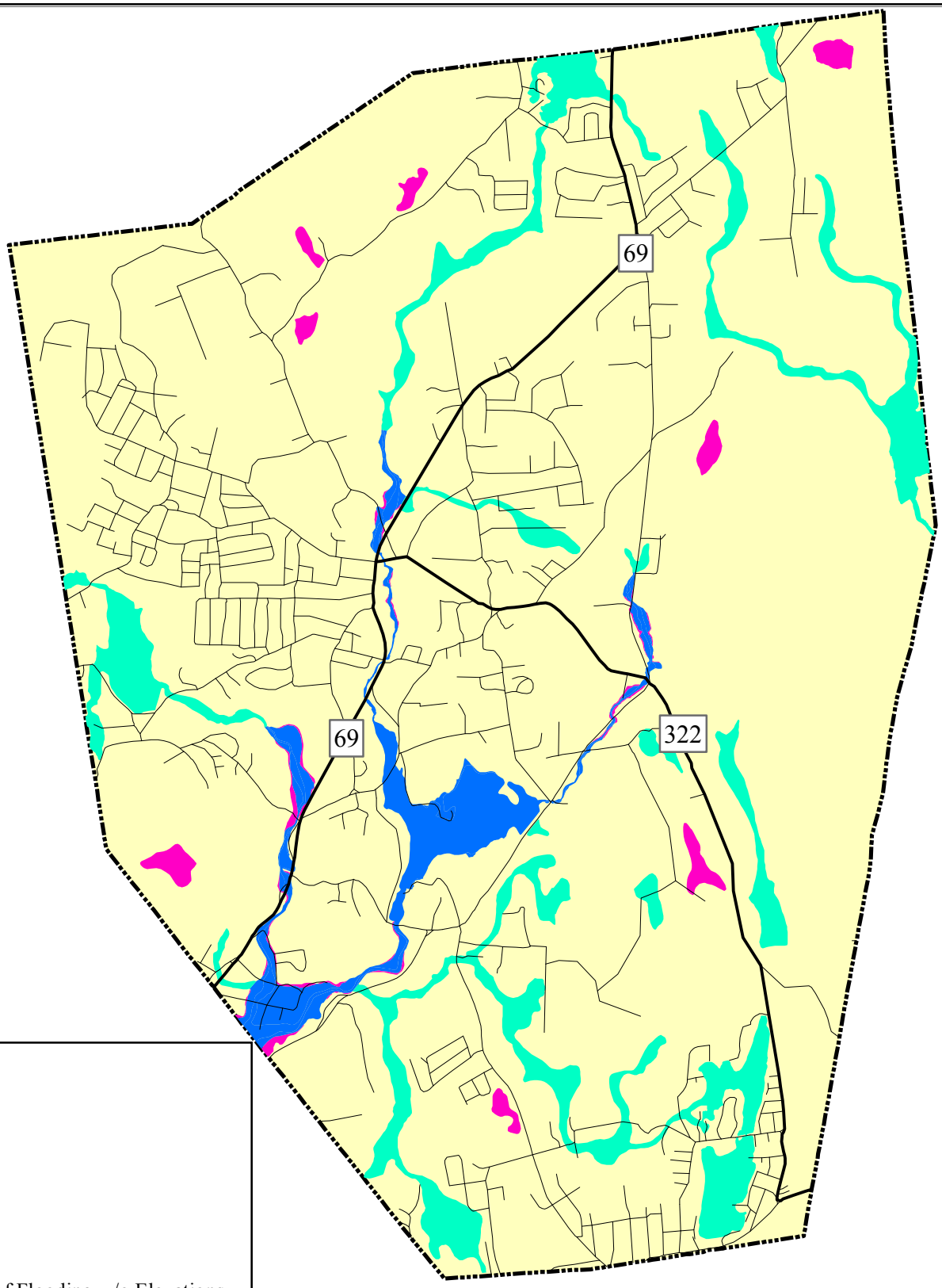
Refer to Figure 3-1 for the areas of Wolcott susceptible to flooding based on FEMA flood zones. Table 3-1 describes the various zones depicted on the FIRM panels for Wolcott.

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.



Legend

- Wolcott Boundary
- State Routes
- Local Roads

Flood Zones

- 1% Annual Chance of Flooding w/o Elevations
- 1% Annual Chance of Flooding with Elevations
- 0.2% Annual Chance of Flooding

SOURCE(S):
"Town Boundary", "State Routes", "Streets" CT DEEP, FEMA Flood Zones DFRIM 2010

Figure 3-1: FEMA Flood Zones in Wolcott

LOCATION:
Wolcott, CT

N

Wolcott Natural Hazard Mitigation Plan Update

MXD: P:\1014-49\Design\GIS\Maps\Wolcott\2013_Figure3-1FEMAFlood.mxd

Map By: JDW
MMI#: 1014-49
Original: 09/2007
Revision: 07/05/2013
Scale: 1 inch = 0.75 mile

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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.

3.3 Historic Record

In every season of the year, 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 about 55 calls throughout Town with some homes having up to four feet of water in the basement.

- July 2, 2009: A warm front lifted north from the Delmarva Peninsula and triggered scattered showers and thunderstorms which resulted in isolated flash flooding in New Haven and New London counties. Roads were flooded in the Wolcott.

- August 29, 2011: Tropical Storm Irene producing heavy rainfall between five and 10 inches within a 12-hour period. The rainfall resulted in widespread flash flooding and river flooding across the northwest part of New Haven County, and a major disaster declaration was declared (FEMA-4023-DR).

3.4 Existing Capabilities

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:

- ***Ordinance 94 (Flood Plain Management Ordinance)*** is essentially the town's local articulation of the NFIP regulations. This ordinance is a comprehensive set of criteria governing development of floodplains in Wolcott. It relies on the FEMA FIS elevations and FIRM mapping to delineate floodplain boundaries, and references the 2010 updates.

- ***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.* 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.

The Town of Wolcott uses the SFHAs 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. **Per Ordinance 94, new residential structures, mobile homes, and recreational vehicles are not permitted in SFHAs. This is more stringent than the NFIP regulations.**

Ordinance 94 requires that all non-residential 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.

Beginning in 2013, town officials have been busy fielding complaints from residents and property owners that are looking for options to avoid paying flood insurance. The Inland Wetlands Commission has been dealing with these residents and property owners by advising them of their options to amend the FIRMs or mitigate their properties to reduce insurance premiums.

Plan of Conservation and Development (POCD)

The POCD was updated and adopted in 2011, subsequent to the initial edition of this HMP. Several policies of this new POCD are consistent with flood hazard mitigation, including:

- Prepare on Open Space Plan that should identify and prioritize undeveloped open space areas.
- Pursue the establishment of a greenway on the Mad River through the Greenways Act.
- Consider use of conservation agreements to provide permanent protection of open space areas.
- Provide and maintain municipal infrastructure facilities including roads, sanitary sewers and storm drainage facilities throughout the Town, to prevent physical deterioration, consistent with the Town's Capital Improvements Program.
- Protect and upgrade the quality of the Town's natural watercourses, ground water and air.
- Protect the quality of potable public surface water and ground water supplies through strict controls on the use, density of land development and other activities which pose a threat to watersheds and ground water resources.
- Carefully regulate development in sensitive ecological and environmental areas to preclude unnecessary damage to the land and the environment.

Structural Projects

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. However, these impoundments were not specifically designed for flood control.

Public Works and Drainage

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 is working through a $9 million capital improvement program to improve roads. Drainage systems are being improved through this program. In the past five years, the following culverts have been repaired or replaced to improve conveyance:

- Intersection of Woodtick and Upson Road
- Nutmeg Valley Road and Townline Road
- Central Ave at Della Bella pond
- Central Ave near Midwood
- Longmeadow Drive
- Old Colony Road
- Lyman Road
- Venus Drive
- Lower Lyman Road
- Todd Hollow Road
- Cedar Point intersection of Spindle Hill
- Saddle Drive
- Manor Lane
- Intersection of Chasse and Brookdale

The Public Works Department has suspended the use of sand for deicing, and catch basins are much cleaner as a result. This helps facilitate drainage.

Natural Resources Protection

The town recently acquired a repetitive loss property and will be converting it to a dog park. This is considered an ideal example of natural resource (floodplain) protection.

Emergency Operations Plan

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.

Warnings and Communications

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 or preventing 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. **Overall, Wolcott's capabilities to mitigate for flooding and prevent loss of life and property damage have improved significantly since the initial hazard mitigation plan was adopted.**

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.

3.5.1 Vulnerability Analysis of Repetitive Loss Properties

Three repetitive loss properties are located in Wolcott. These are listed in Table 3-2. Two are located near the Mad River and one is located near Lindsley Brook. Severe repetitive loss properties are not located in Wolcott.

TABLE 3-2
Repetitive Loss Properties

Street	Associated Watercourse	Flood Zone	Type
Mad River Road	Mad River	C	Non-residential
Town Line Road	Mad River	A	Non-residential
Woodtick Road	Lindsley Brook	A	Multi-Family

The listed repetitive loss property on Mad River Road was recently purchased by the town and the building will be demolished in the near future. The town plans to develop a dog park on this property, which is considered an appropriate use of floodprone property.

The town of Wolcott completed drainage improvements on Town Line Road that will help alleviate more frequent (lower magnitude) flooding events, but significant floods along the Mad River will continue to impact Town Line Road. In general, the repetitive loss properties listed above may remain floodprone for the foreseeable future.

3.5.2 Vulnerability Analysis of Areas Along Watercourses

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 Tosun Road Extension, but that road is one-way. They would need to leave in the opposite direction during a major flood.

- 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.

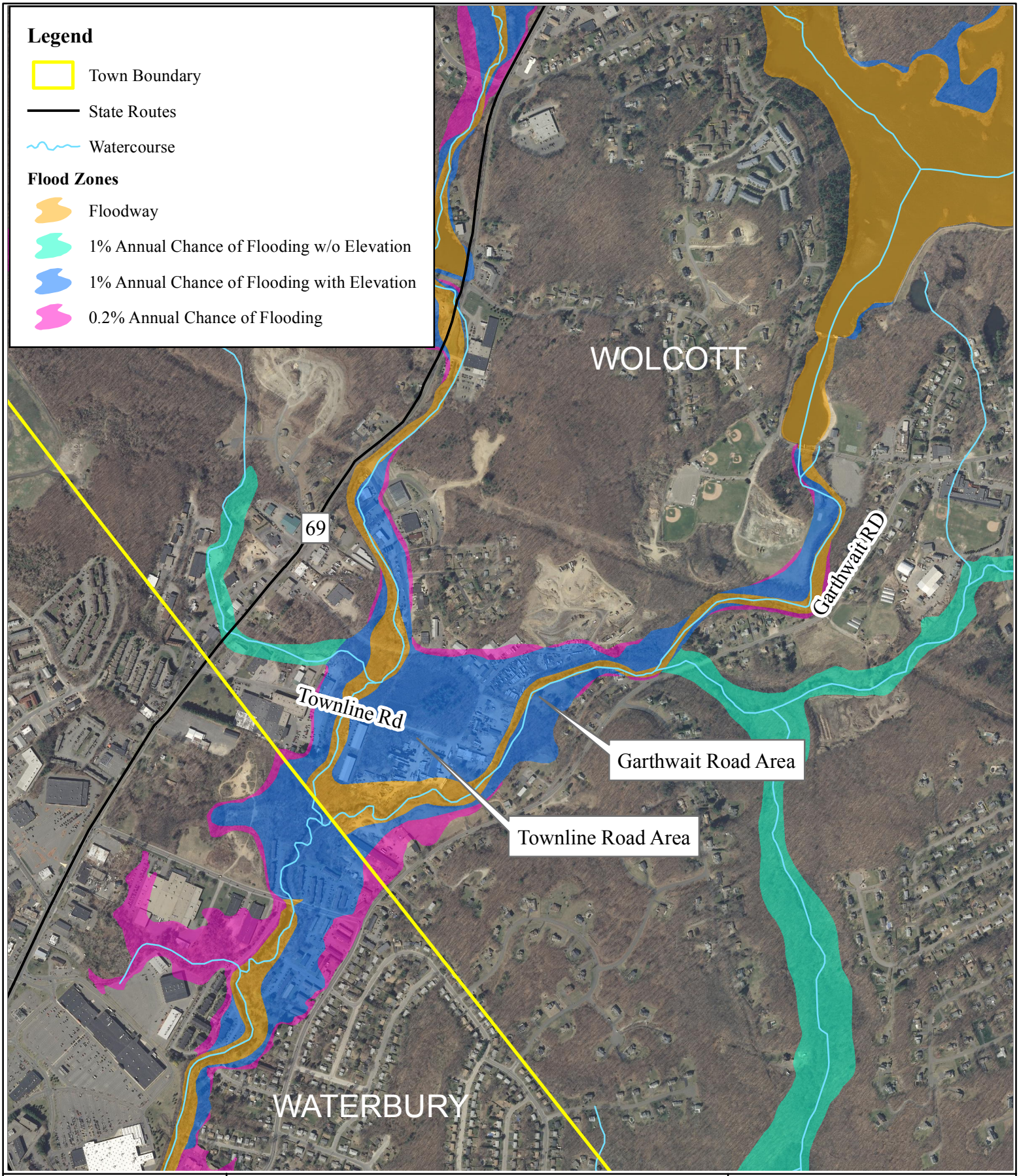
- Woodtick Road south of Garthwait Road – After Lily Brook joins the Mad River, it flows southwest behind several houses. There is a bend in the river near 200 Woodtick Road which causes erosion during flood stage, and the Mad River often floods backyards in this area causing damage to sheds and pools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

- 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.



SOURCE(S):
FEMA Flood Zones DFIRM 2010,
CT Ortho 2012

Figure 3-2: Townline Road Study Area

LOCATION:
Wolcott, CT

N

Wolcott Natural Hazard Mitigation Plan Update

MXD: P:\1014-49\Design\GIS\Maps\Wolcott\2013_Figure3-2Townline.mxd

Map By: JDW
MMI#: 1014-49
Original: 09/2007
Revision: 7/29/2013
Scale: 1 inch = 1,000 feet

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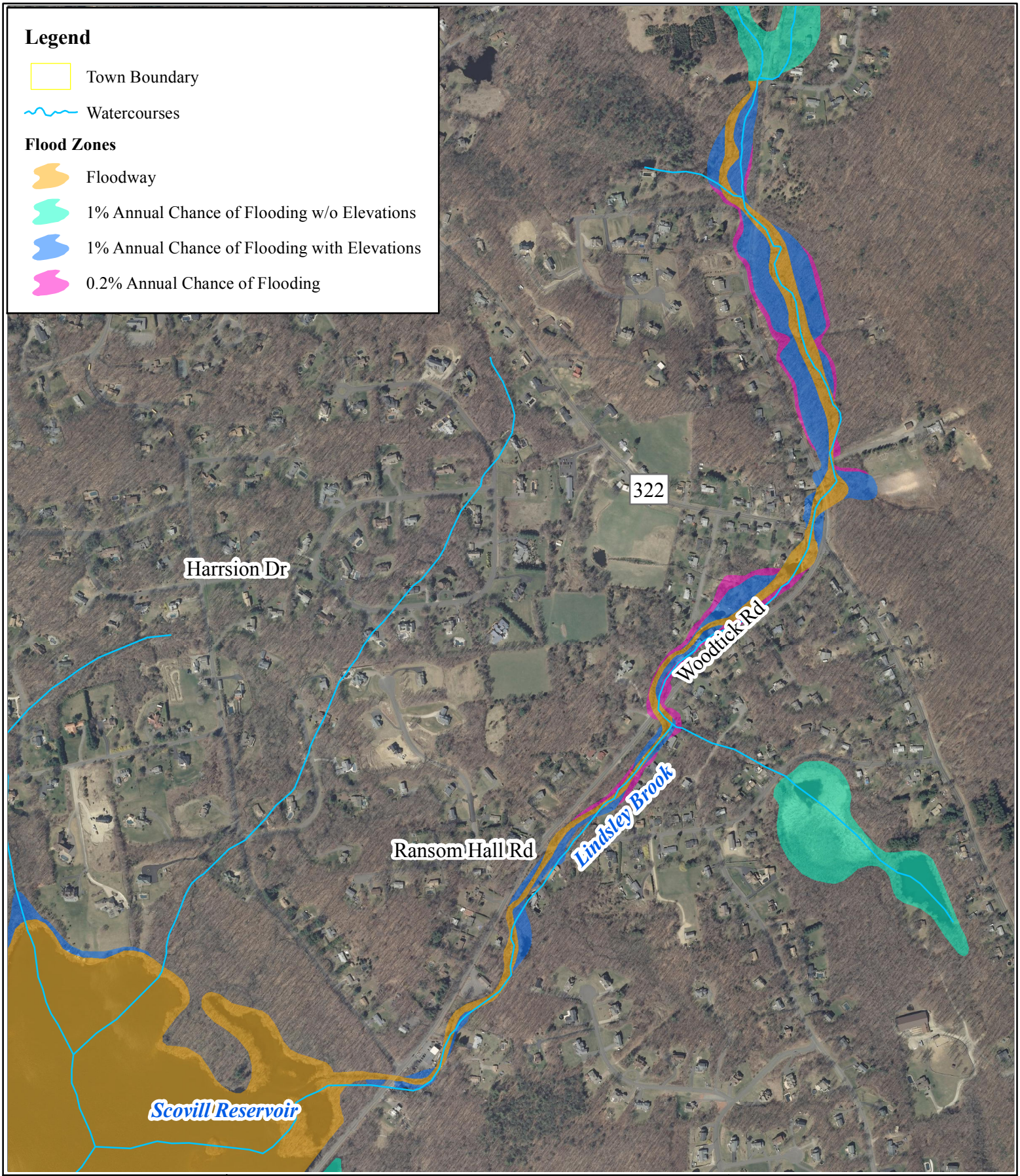

SOURCE(S):
FEMA Flood Zones DFIRM 2010,
CT Ortho 2012, "Hydronet" CT DEEP

Figure 3-3: Lindsley Brook Study Area

LOCATION:
Wolcott, CT

N

Wolcott Natural Hazard Mitigation Plan Update

MXD: P:\1014-49\Design\GIS\Maps\Wolcott\2013_Figure3-3Lindsley.mxd

Map By: JDW
MMI#: 1014-49
Original: 09/2007
Revision: 07/02/2013
Scale: 1 inch = 750 feet

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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.

3.5.3 HAZUS-MH Vulnerability Analysis and Loss Estimates

HAZUS-MH is FEMA's loss estimation methodology software for flood, wind, and earthquake hazards. The current version of the software utilizes year 2000 U.S. Census data and a variety of engineering information to calculate potential damages (valued in year 2006 dollars) to a user-defined region. The software was utilized to perform a basic analysis to generate potential damages to major streams in Wolcott from a 1% annual chance riverine flood event. Hydrology and hydraulics for the streams and rivers were generated utilizing digital elevation models available from the DEEP that were prepared using the 2000 LiDAR study. HAZUS-MH output is included in Appendix C. The following paragraphs discuss the results of the HAZUS-MH analysis.

For HAZUS, major streams in Wolcott were defined as Lindsley Brook, Mad River, and Old Tannery Brook. Unnamed tributaries and named tributaries not modeled as a separate stream are included in the calculations for the nearest downstream tributary.

A summary of the default building counts and values is shown in Table 3-3. Approximately $1.3 billion dollars of building value were estimated to exist within Wolcott.

Table 3-3
HAZUS-MH Flood Scenario – Basic Information

Occupancy	Dollar Exposure
Residential	$973,837,000
Commercial	$180,847,000
Other	$98,841,000
Total	**$1,253,525,000**

The HAZUS-MH simulation estimates that during a 1% annual chance flood event, 16 buildings will be at least moderately damaged in the city from flooding. None of these buildings are expected to be substantially damaged and uninhabitable. Table 3-4 presents the expected damages based on building type.

Table 3-4
HAZUS-MH Flood Scenario – Building Stock Damages

Stream	1-10% Damaged	11-20% Damaged	21-30% Damaged	31-40% Damaged	41-50% Damaged	Substantially Damaged
Lindsley Brook	0	0	0	0	0	0
Mad River	0	0	0	0	0	0
Old Tannery Brook	0	0	0	0	0	0

HAZUS-MH utilizes a subset of critical facilities known as "essential facilities" that are important following natural hazard events. These include fire stations, hospitals, police stations, and schools. The software simulated that under the 1% annual chance flood event, none of Wolcott's essential facilities will be damaged.

The HAZUS-MH simulation estimated the following tons of debris would be generated by flood damage for the 1% annual chance flood scenario along each stream. The simulation also estimates the number of truckloads (at approximately 25 tons per truck) that will be required to remove the debris. The breakdown of debris generation is as follows:

Table 3-5
HAZUS-MH Flood Scenario – Debris Generation (Tons)

Stream	Finishes	Structural	Foundations	Total	Truckloads
Lindsley Brook	4	0	0	4	1
Mad River	65	6	5	76	3
Old Tannery Brook	21	0	0	21	1

HAZUS-MH calculated the potential sheltering requirement for the 1% annual chance flood event along each stream. Displacement includes households evacuated from within or very near to the inundated areas. Of these households, some people will seek temporary shelter in public shelters, while others are predicted to stay with friends, family, or in hotels or motels.

Table 3-6
HAZUS-MH Flood Scenario – Sheltering Requirements

Stream	Displaced Households	Population Using Public Shelters
Lindsley Brook	7	2
Mad River	16	6
Old Tannery Brook	9	4

HAZUS-MH also calculated the predicted economic losses due to the 1% annual chance flood event along each stream. Economic losses are categorized between building-related losses and business interruption losses. Building-related losses (damages to building, content, and inventory) are the estimated costs to repair or replace the damage caused to the building and its contents. This information is presented in Table 3-7. Business interruption losses are those associated with the inability to operate a business because of the damage sustained during the flood, and include lost income, relocation expenses, lost rental income, lost wages, and temporary living expenses for displaced people. This information is presented in Table 3-8.

Table 3-7
HAZUS-MH Flood Scenario – Building Loss Estimates

Stream	Residential	Commercial	Industrial	Others	Total
Lindsley Brook	$50,000	$10,000	$30,000	$0	$90,000
Mad River	$700,000	$2,520,000	$590,000	$630,000	$4,450,000
Old Tannery Brook	$120,000	$810,000	$1,090,000	$340,000	$2,360,000

Table 3-8
HAZUS-MH Flood Scenario – Business Interruption Estimates

Stream	Residential	Commercial	Industrial	Others	Total
Lindsley Brook	$0	$0	$0	$0	$0
Mad River	$0	$20,000	$0	$0	$20,000
Old Tannery Brook	$0	$0	$0	$0	$0

The HAZUS-MH results are generally consistent with observed conditions in Wolcott. Aside from the drainage-related flooding problems that are not addressed by HAZUS, the most damaging floods would occur along the Mad River.

3.6 Potential Mitigation Strategies and Actions

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 that restrict the building of new structures within defined areas. These are usually administered by building, zoning, planning, and/or code enforcement offices through capital improvement programs and through zoning, subdivision, floodplain, and wetland ordinances. It also occurs when land is prevented from being developed through the use of conservation easements or conversion of land into open space.

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 change.

Planning and Zoning: Zoning and Subdivision ordinances regulate development in flood hazard areas. Flood hazard areas should reflect a balance of development and natural areas, although ideally they will be free from development. Site plan and new subdivision regulations typically 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.

- Policies requiring the design and location of utilities to areas outside of flood hazard areas when applicable and the placement of utilities underground when possible.
- A variety of structural-related mitigation strategies, including the use of freeboard, can be applied to new development and substantial redevelopment although these are beyond the minimum requirements of the NFIP.
- Adherence to the State Building Code requires 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.

FEMA encourages local communities to use more accurate topographic maps to expand upon the FIRMs published by FEMA. This is because many FIRMs were originally created using quadrangle maps prepared by the United States Geological Survey with 10-foot contour intervals, but many municipalities today have contour maps of one- or two-foot intervals that show more recently constructed roads, bridges, and other anthropologic features. An alternate approach is to record high water marks and establish those areas inundated by a recent severe flood to be the new regulatory floodplain. While these maps cannot replace the FIRM for insurance purposes, they may be used to regulate development provided that the mapped area is the same size or larger than that mapped on the FIRM.

Adoption of a different floodplain map is allowed under NFIP regulations as long as the new map covers a larger floodplain than the FIRM. It should be noted that the community's map will not affect the current FIRM or alter the SFHA used for setting insurance rates or making map determinations; it can only be used by the community to regulate floodplain areas. The FEMA Region I office has more information on this topic. Contact information can be found in Section 11.

Reductions in floodplain area can only be accomplished through revised FEMA-sponsored engineering studies or Letters of Map Change (LOMC).

Stormwater Management Policies: Development and redevelopment policies to address the prevention of flood damage must include effective stormwater management policies. Developers are typically required to build detention and retention facilities where appropriate. Additional techniques include enhancing infiltration to reduce runoff volume through the use of swales, infiltration trenches, vegetative filter strips, and permeable paving blocks. The goal is that post-development stormwater does not leave a site at a rate higher than under predevelopment conditions.

Standard engineering practice is to avoid the use of detention measures if the project site is located in the lower one-third of the overall watershed. The effects of detention are least effective and even detrimental if used at such locations because of the delaying effect of the peak discharge from the site that typically results when detention measures are used. By detaining stormwater in close proximity of the stream in the lower reaches of the overall watershed, the peak discharge from the site will occur later in the storm event, which will more closely coincide with the peak discharge of the stream, thus adding more flow during the peak discharge during any given storm event. Due to its geography, Waterbury contains a range of upper to lower portions of 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.

3.6.2 Property Protection

A variety of steps can be taken to protect existing public and private properties from flood damage. Performing such measures for repetitive loss properties would provide the greatest benefit to residents and the NFIP. Potential measures for property protection include:

- ***Relocation of structures at risk for flooding to a higher location on the same lot or to a different lot outside of the floodplain***. Moving an at-risk structure to a higher elevation can reduce or eliminate flooding damages to that property.

- ***Elevation of the structure***. Building elevation involves the removal of the building structure from the basement and elevating it on piers to a height such that the first floor is located above the 100-year flood level. The basement area is abandoned and filled to be no higher than the existing grade. All utilities and appliances located within the basement must be relocated to the first floor level. The area below the first floor may only be used for building access and parking.

- ***Construction of localized property improvements such as barriers, floodwalls, and earthen berms***. Such structural projects can be used to prevent shallow flooding and are described in Section 3.3.6.

- ***Performing structural improvements to mitigate flooding damage***. Such improvements can include:

- ⇨ ***Dry floodproofing of the structure to keep floodwaters from entering***. Walls may be coated with compound or plastic sheathing. Openings such as windows and vents would be either permanently closed or covered with removable shields. Flood protection should extend only two to three feet above the top of the concrete foundation because building walls and floors cannot withstand the pressure of deeper water.

Dry floodproofing refers to the act of making areas below the flood level watertight.

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

- ⇨ ***Wet floodproofing of the structure to allow floodwaters to pass through the lower area of the structure unimpeded***. Wet floodproofing should only be used as a last resort above the first floor level. If considered, furniture and electrical appliances should be elevated above the 1% annual chance flood elevation.

- ⇨ ***Performing other potential home improvements to mitigate damage from flooding***. FEMA suggests several measures to protect home utilities and belongings, including:

  - Relocating valuable belongings above the 1% annual chance flood elevation to reduce the amount of damage caused during a flood event;
  - Relocate or elevate water heaters, heating systems, washers, and dryers to a higher floor or to at least 12 inches above the high water mark (if the ceiling permits). A wooden platform of pressure-treated wood can serve as the base.
  - Anchor the fuel tank to the wall or floor with non-corrosive metal strapping and lag bolts.
  - Install a septic backflow valve to prevent sewer backup into the home.
  - Install a floating floor drain plug at the lowest point of the lowest finished floor.
  - Elevate the electrical box or relocate it to a higher floor, and elevate electric outlets to at least 12 inches above the high water mark.

- ❑ ***Encouraging property owners to purchase flood insurance under the NFIP and to make claims when damage occurs***. While having flood insurance will not prevent flood damage, it will help a family or business put things back in order following a flood event. Property owners should be encouraged to submit claims under the NFIP whenever flooding damage occurs in order to increase the eligibility of the property for projects under the various mitigation grant programs.

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 hazard 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 strategies for improved *emergency services* area recommended to prevent damage from 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 strategies for improved *public education* are recommended to prevent damage from flooding. These are common to all hazards in this plan, and are listed in Section 10.1.

3.6.5 Natural Resource Protection

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

Projects that improve the natural condition of areas or restore diminished or destroyed resources can reestablish an environment in which the functions and values of these resources are again optimized. Acquisitions of floodprone property with conversion to open space are the most common of these types of projects. Acquisition of heavily damaged structures (particularly repetitive loss properties) after a flood may be an economical and practical means to accomplish this. In some cases, it may be possible to purchase floodprone properties adjacent to existing recreation areas which will allow for the expansion of such recreational use or the creation of floodplain storage areas. Administrative measures that assist such projects include the development of land reuse policies focused on resource restoration and review of community programs to identify opportunities for floodplain restoration.

Based on the above guidelines, the following typical *natural resource protection* mitigation measures to help prevent damage from flooding include:

- ❑ Pursue additional open space properties in floodplains by purchasing repetitive loss properties and other floodprone structures and converting the parcels to open space;
- ❑ Pursue the acquisition of additional municipal open space properties as discussed in the *Plan of Conservation and Development*;

- ❑ Selectively pursue conservation objectives listed in the Plan of Conservation and Development and/or more recent planning studies and documents; and
- ❑ Continue to regulate development in protected and sensitive areas, including steep slopes, wetlands, and floodplains.

Municipalities should work with local land trusts to identify undeveloped properties (or portions thereof) worth acquiring that are within or adjacent to floodplains.

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**
- ❑ **Review of community programs to identify opportunities for floodplain preservation**

3.6.6 Structural Projects

Structural projects include the construction or modification of structures to lessen the impact of a flood event. Examples of structural projects include:

- ❑ Stormwater controls such as drainage systems, detention dams and reservoirs, and culvert resizing can be employed to modify flood flow rates.
- ❑ 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 modify flood flows.
- ❑ Individuals can protect private property by raising structures and constructing walls and levees around structures.

Care should be taken when using these techniques to ensure that problems are not exacerbated in other areas of the impacted watersheds. Given the many culverts and bridges in a typical community and the increasing rainfall rates in Connecticut described in Section 2.4, reevaluation of the drainage computations on culverts and bridges is often recommended.

3.7 Status of Mitigation Strategies and Actions

The prior mitigation strategies and actions for addressing flooding are listed below with commentary regarding the status of each.

Table 3-9
Status of Previous Strategies and Actions

Strategy or Action	Status
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.	Instead of developing a checklist, key personnel from Building, Public Works, Planning, and the Inland Wetlands Commission (IWC) review development and land use proposals together. This is now a capability and the initiative is deleted.
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.	The IWC chairman addresses these on a case-by-case basis. This is now a capability and the initiative is deleted.
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.	A town-wide effort is not needed because the patterns of development and redevelopment do not lend themselves to a townwide approach. A new strategy below this table will replace this strategy.
Consider joining FEMA's community rating system.	Wolcott will continue to consider joining CRS, although the number of NFIP policies in the town has not yet justified CRS participation and may not justify it.
Continue to require Flood Hazard Area, subdivision, and commercial and industrial zoning permit applications to provide needed flood data.	This is ongoing and is a capability and the initiative is deleted.
Consider requiring buildings constructed in floodprone areas to be protected to the highest recorded flood level, regardless of being within a defined SFHA.	Wolcott does not allow new buildings in SFHAs, which is more restrictive than regulating to the highest flood level. The initiative is deleted.
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.	A new townwide blight ordinance passed subsequent to the initial hazard mitigation plan may assist with this effort, and the strategy is carried forward for additional progress.
New buildings should be designed and graded to shunt drainage away from the building.	This is in the state building code and the strategy may be deleted.
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.	MapMod has been completed and the strategy may be deleted.
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.	This is done case-by-case, but much of the town does not have established BFEs. A new strategy below this table will replace this strategy.

Strategy or Action	Status
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.	The new dog park will be developed on a recently-acquired repetitive loss property, demonstrating that progress has been made. The strategy will be carried forward to evaluate additional potential acquisitions.
Selectively pursue conservation objectives listed in the Plan of Conservation and Development and other studies and documents.	This is ongoing and is a capability and the initiative is deleted.
Continue to regulate development in protected and sensitive areas, including steep slopes, wetlands, and floodplains.	This is ongoing and is a capability and the initiative is deleted.
Investigate incidences of roadway flooding in the vicinity of Cedar Swamp Pond and clear or resize drainage systems as appropriate to maintain access.	Improvements completed.
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.	Improvements completed.
Repair the bridge spanning Lily Brook at Todd Road.	The bridge is no longer believed to contribute to flooding, and the initiative is deleted.
Enlarge the culvert passing Lily Brook under Woodtick Road. Elevate the road if necessary.	Lack of funding prohibited any action subsequent to the initial hazard mitigation plan. Carried forward.
Perform a feasibility analysis to determine the best way to address the flooding conditions in the Town Line Road area.	Drainage improvements have helped with minor flooding but the area will remain in the SFHA.
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.	Improvements completed.
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.	Egress can be provided by reversing the 1-way road direction. This action is no longer needed and the initiative is deleted.
Repair the eroding hillside at Tosun Road Extension above Old Tannery Brook and install curbing to prevent further erosion and a possible washout.	Improvements completed.
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.	Still needed; this flooded during Superstorm Sandy. Lack of funding prohibited any action subsequent to the initial hazard mitigation plan. Carried forward.
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.	Culverts capacities have been increased along this stream corridor.

Strategy or Action	Status
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.	Carried forward. Lack of funding prohibited any action subsequent to the initial hazard mitigation plan.
Investigate ways to reduce the occurrence of flooding nearby along Meriden Road.	Improvements completed.
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.	Improvements completed.
Continue to investigate reports of localized flooding problems to determine the cause and an appropriate solution. Set milestones for eliminating recurring localized flooding areas.	This is ongoing and is a capability and the initiative is deleted.

Portions of the above strategies and actions have been carried forward and are listed in the table of strategies in Appendix A. Three revised or new strategies have been identified through the process of updating this plan:

- Conduct drainage studies in specific areas as needed.
- Use two-foot contour maps or LiDAR topo to develop more precise regulatory flood maps as needed.
- Address flooding in the Town Line Road area by working with building owners as needed.

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 Wolcott is considered a possible event in any given year and could cause critical damage to the Town and its infrastructure.

4.2 Hazard Assessment

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

The 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.

The Saffir-Simpson Scale

The "Saffir-Simpson Hurricane Scale" was used prior to 2009 to categorize hurricanes based upon wind speed, central pressure and storm surge, relating these components to damage potential. In 2009, the scale was revised and is now called the "Saffir-Simpson Hurricane Wind Scale". The modified scale is more scientifically defensible and is predicated only on surface wind speeds. The following descriptions

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.

are from the 2010 *Connecticut Natural Hazard Mitigation Plan Update.*

- **Category One Hurricane:** Sustained winds 74-95 mph (64-82 kt or 119-153 km/hr). *Damaging winds are expected*. Some damage to building structures could occur, primarily to unanchored mobile homes (mainly pre-1994 construction). Some damage is likely to poorly constructed signs. Loose outdoor items will become projectiles, causing additional damage. Persons struck by windborne debris risk injury and possibly death. Numerous large branches of healthy trees will snap. Some trees will be uprooted, especially where the ground is saturated. Many areas will experience power outages with some downed power poles.

- **Category Two Hurricane:** Sustained winds 96-110 mph (83-95 kt or 154-177 km/hr). *Very strong winds will produce widespread damage*. Some roofing material, door, and window damage of buildings will occur. Considerable damage to mobile homes (mainly pre-1994 construction) and poorly constructed signs is likely. A number of glass windows in high-rise buildings will be dislodged and become airborne. Loose outdoor items will become projectiles, causing additional damage. Persons struck by windborne debris risk injury and possibly death. Numerous large branches will break. Many trees will be uprooted or snapped. Extensive damage to power lines and poles will likely result in widespread power outages that could last a few to several days.

- **Category Three Hurricane:** Sustained winds 111-130 mph (96-113 kt or 178-209 km/hr). *Dangerous winds will cause extensive damage.* Some structural damage to houses and buildings will occur with a minor amount of wall failures. Mobile homes (mainly pre-1994 construction) and poorly constructed signs are destroyed. Many windows in high-rise buildings will be dislodged and become airborne. Persons struck by windborne debris risk injury and possibly death. Many trees will be snapped or uprooted and block numerous roads. Near total power loss is expected with outages that could last from several days to weeks.

- **Category Four Hurricane:** Sustained winds 131-155 mph (114-135 kt or 210-249 km/hr). *Extremely dangerous winds causing devastating damage are expected.* Some wall failures with some complete roof structure failures on houses will occur. All signs are blown down. Complete destruction of mobile homes (primarily pre-1994 construction). Extensive damage to doors and windows likely. Numerous windows in high-rise buildings will be dislodged and become airborne. Windborne debris will cause extensive damage and persons struck by the wind-blown debris will be injured or killed. Most trees will be snapped or uprooted. Fallen trees could cut off residential areas for days to weeks. Electricity will be unavailable for weeks after the hurricane passes.

- **Category Five Hurricane:** Sustained winds greater than 155 mph (135 kt or 249 km/hr). *Catastrophic damage is expected*. Complete roof failure on many residences and industrial buildings will occur. Some complete building failures with small buildings blown over or away are likely. All signs blow down. Complete destruction of mobile homes. Severe and extensive window and door damage will occur. Nearly all windows in high-rise buildings will be dislodged and become airborne. Severe injury or death is likely for persons struck by wind-blown debris. Nearly all trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months.

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 recently reanalyzed to current scientific standards as well as the most current hurricane data. During HURDAT's period of record (1851-2012), 2 Category Three Hurricanes, 8 Category Two Hurricanes, 11 Category One Hurricanes, 54 tropical storms, and 8 tropical depressions have tracked within a 150 nautical mile radius of Waterbury, Connecticut. This location was chosen for its prominence in the COGCNV region. The representative storm strengths were measured as the peak intensities for each individual storm passing within the 150-mile radius. The 21 hurricanes noted above occurred in August and September as noted in Table 4-1.

Table 4-1
Tropical Cyclones by Month within 150 Nautical Miles of Waterbury Since 1851

Category	May	June	July	Aug.	Sept.	Oct.	Nov.
Tropical Depression	None	1	1	3	1	1	None
Tropical Storm	2	7	4	11	16	11	2
One	None	None	1	2	7	2	None
Two	None	None	None	3	6	None	None
Three	None	None	None	None	2	None	None
Total	**2**	**8**	**6**	**19**	**32**	**14**	**2**

A description of the more recent tropical cyclones near Wolcott follows:

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.

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 was a Category Two Hurricane when its center made landfall in Rhode Island in August of 1991. The hurricane 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, light to moderate tree damage, and the storm was responsible for six deaths in the state. Total damage in southern New England was approximately $680 million (1991 USD).

Tropical Storm Floyd in September 1999 produced widespread flooding and high winds (sustained at 50 knots) that caused power outages throughout New England and at least one death in Connecticut.

Tropical Storm Irene in August 2011 produced five to 10 inches of rainfall across western Connecticut resulting in widespread flash flooding and river flooding. Local wind gusts exceeded 60 miles per hour. The combination of strong winds and saturated soil led to numerous downed trees and power outages throughout the region. However, the impacts of Irene were reportedly not too bad in Wolcott.

Hurricane Sandy struck the Connecticut shoreline as a Category 1 Hurricane in late October 2012, causing power outages for 600,000 customers and at least $360 million in damages in Connecticut. However, damages were moderate to minor in Wolcott.

4.4 Existing Capabilities

Existing mitigation measures appropriate for 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 2005 Connecticut State Building Code was amended in 2011 and adopted with an effective date of October 6, 2011. The 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 100 miles per hour. Wolcott has adopted the Connecticut Building Code as its building code, and literature is available regarding design standards in the Building Department office.

Connecticut is located in FEMA Zone II regarding maximum expected wind speed. The maximum expected wind speed for a three-second gust is 160 miles per hour. This wind speed could occur as a result of either a hurricane or a tornado in western Connecticut and southeastern New York. The American Society of Civil Engineers recommends that new buildings be designed to withstand this peak three-second gust.

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, and the town accomplishes significant tree clearing on its own. The recently-adopted blight ordinance will help the town remove additional trees, as well as some of the problematic debris in flood zones. Connecticut Light & Power 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.

Connecticut Light & Power was under intense scrutiny after storms Irene and Alfred in 2011. The utility has reportedly done an adequate job trimming trees since 2011. Loss of power is a concern for the town. Trimming has reportedly helped avoid significant outages in a few recent high wind events.

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.

In summary, many of Wolcott's capabilities to mitigate for wind damage and prevent loss of life and property damage have improved since the initial hazard mitigation plan was adopted. Furthermore, CL&P has increased its capabilities relative to tree and tree limb maintenance near utility lines.

4.5 Vulnerabilities and Risk Assessment

The previous HMP noted that "it is generally believed that New England is long overdue for another major hurricane strike." Subsequent to the adoption of the plan, Tropical Storm Irene and Superstorm Sandy struck Connecticut and neighboring states in 2011 and 2012, respectively.

NOAA has utilized the National Hurricane Center Risk Analysis Program (HURISK) to determine return periods for various hurricane categories at locations throughout the United States. As noted on the NOAA website, hurricane return periods are the frequency at which a certain intensity or category of hurricane can be expected with 75 nautical miles of a given location. For example, a return period of 20 years for a particular category storm means that on average during the previous 100 years, a storm of that category passed within 75 nautical miles of that location five times. Thus, it is expected that similar category storms would pass within that radius an additional five times during the next 100 years.

Table 4-2 presents return periods for various category hurricanes to impact Connecticut. The nearest two HURISK analysis points were New York City and Block Island, NY. For this analysis, these data are assumed to represent western Connecticut and eastern Connecticut, respectively.

Table 4-2
Return Period (in Years) for Hurricanes to Strike Connecticut

Category	New York City (Western Connecticut)	Block Island, RI (Eastern Connecticut)
One	17	17
Two	39	39
Three	68	70
Four	150	160
Five	370	430

NOAA issues an annual hurricane outlook to provide a general guide to each upcoming hurricane season based on various climatic factors. However, it is impossible to predict exactly when and where a hurricane will occur. NOAA believes that "hurricane landfalls are largely determined by the weather patterns in places the hurricane approaches, which are only predictable within several days of the storm making landfall."

According to the 2014 *Connecticut Natural Hazard Mitigation Plan Update*, hurricanes have the greatest destructive potential of all natural disasters in Connecticut due to the potential combination of high winds, storm surge and coastal erosion, heavy rain, and flooding which can accompany the hazard. As shown in Table 4-2, NOAA estimates that the return period for a Category Two or Category Three storm to be 39 years and 68 years, respectively.

The 2014 *Connecticut Natural Hazard Mitigation Plan Update* also notes that some researchers have suggested that the intensity of tropical cyclones has increased over the last 35 years, with some believing that there is a connection between this increase in intensity and climate change. While most climate simulations agree that greenhouse warming enhances the frequency and intensity of tropical storms, models of the climate system are still limited by resolution and computational ability. However, given the past history of major storms and the possibility of increased frequency and intensity of tropical storms due to climate change, it is prudent to expect that there will be hurricanes impacting Connecticut in the future that may be of greater frequency and intensity than in the past.

Tropical Cyclone Vulnerability

In general, 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 to several weeks, rendering electronic devices and those that rely on utility towers and lines inoperative.

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.

Factors that influence vulnerability to tropical cyclones in the town include building codes currently in place, and local zoning and development patterns and the age and number of structures located in highly vulnerable areas of the community.

Wolcott's housing stock consists of a handful of historic buildings greater than 50 and sometimes 100 years old, relatively younger buildings built before 1990 when the building code changed to mitigate for wind damage, and relatively recent buildings that utilize the new code changes. Since much of the existing housing stock in the town predates the recent code changes, many structures are highly susceptible to roof and window damage from high winds.

Wolcott is expected to experience moderate population growth in the coming years. Areas of growth and development increase the community's vulnerability to natural hazards such as hurricanes, although new development is expected to mitigate potential damage by meeting the standards of the most recent building codes.

Town-owned critical facilities do not have wind-mitigation measures installed to specifically reduce the effects of wind. Thus, it is believed that nearly all of the critical facilities in the town are as likely to be damaged by hurricane-force winds as any other. However, newer critical facilities are more likely to meet current building code requirements and are therefore considered to be the most resistant to wind damage even if they are not specifically wind-resistant. Older facilities are considered to be more susceptible to wind damage.

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.

HAZUS-MH Simulation and Loss Estimates

In order to quantify potential hurricane damage, HAZUS-MH simulations were run for historical and probabilistic storms that could theoretically affect Wolcott. For the historical simulations, the results estimate the potential maximum damage that would occur in the present day (based on year 2006 dollar values using year 2000 census data) given the same storm track and characteristics of each event. The probabilistic storms estimate the potential maximum damage that would occur based on wind speeds of varying return periods. Note that the simulations calculate damage for wind effects alone and not damages due to flooding or other non-wind effects. Thus, the damage and displacement estimates presented below are likely lower than would occur during a hurricane associated with severe rainfall. Results are presented in Appendix C and summarized below.

Figure 4-1 depicts the spatial relationship between the two historical storm tracks used for the HAZUS simulations (Hurricane Gloria in 1985 and the 1938 hurricane) and the town of Wolcott. These two storm tracks produced the highest winds to affect Wolcott out of all the hurricanes in the HAZUS-MH software.

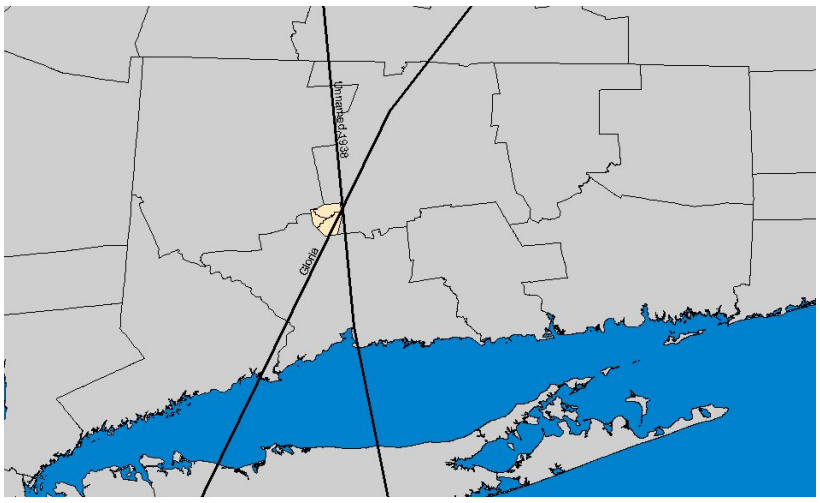


Figure 4-1: Historical Hurricane Storm Tracks

The FEMA default values were used for each census tract in the HAZUS simulations. A summary of the default building counts and values was shown in Table 3-3.

The FEMA *Hurricane Model HAZUS-MH Technical Manual* outlines various damage thresholds to classify buildings damaged during hurricanes. The five classifications are summarized below:

- **No Damage or Very Minor Damage**: Little or no visible damage from the outside. No broken windows or failed roof deck. Minimal loss of roof cover, with no or very limited water penetration.

- **Minor Damage**: Maximum of one broken window, door, or garage door. Moderate roof cover loss that can be covered to prevent additional water entering the building. Marks or dents on walls requiring painting or patching for repair.

- **Moderate Damage**: Major roof cover damage, moderate window breakage. Minor roof sheathing failure. Some resulting damage to interior of building from water.

- **Severe Damage**: Major window damage or roof sheathing loss. Major roof cover loss. Extensive damage to interior from water. Limited, local joist failures. Failure of one wall.

- **Destruction:** Essentially complete roof failure and/or more than 25% of roof sheathing. Significant amount of the wall envelope opened through window failure and/or failure of more than one wall. Extensive damage to interior.

Table 4-3 presents the peak wind speeds during each wind event simulated by HAZUS for Wolcott. The number of expected residential buildings to experience various classifications of damage is presented in Table 4-3, and the total number of buildings expected to experience various classifications of damage is presented in Table 4-4. Minimal damage is expected to buildings for wind speeds less than 58 mph, with overall damages increasing with increasing wind speed.

Table 4-3
HAZUS Hurricane Scenarios – Number of Residential Buildings Damaged

Return Period or Storm	Peak Wind Gust (mph)	Minor Damage	Moderate Damage	Severe Damage	Total Destruction	Total
10-Years	41-42	None	None	None	None	None
20-Years	57-58	2	None	None	None	2
50-Years	75-76	26	1	None	None	27
Gloria (1985)	79	37	1	None	None	38
100-Years	88-89	215	13	None	None	228
200-Years	99-100	676	74	1	1	752
Unnamed (1938)	108	1,213	218	14	10	1,455
500-Years	111-112	1,485	329	30	20	1,864
1000-Years	119-121	1,989	681	118	82	2,870

Table 4-4
HAZUS Hurricane Scenarios – Total Number of Buildings Damaged

Return Period or Storm	Minor Damage	Moderate Damage	Severe Damage	Total Destruction	Total
10-Years	None	None	None	None	None
20-Years	1	None	None	None	1
50-Years	28	None	None	None	28
Gloria (1985)	40	2	None	None	42
100-Years	224	13	None	None	237
200-Years	708	78	4	1	791
Unnamed (1938)	1,280	236	21	10	1,547
500-Years	1,572	358	41	21	1,992
1000-Years	2,116	752	149	81	3,098

The HAZUS simulations consider a subset of critical facilities termed "essential facilities" which are important during emergency situations. Note that the essential facilities in HAZUS-MH may not necessarily be the same today as they were in 2000. Nevertheless, the information is useful from a planning standpoint. As shown in Table 4-5, minimal damage to essential facilities is expected for wind speeds less than 100 mph. Minor damage to schools occurs at wind speeds of approximately 108 mph and greater.

Table 4-5
HAZUS-MH Hurricane Scenarios – Essential Facility Damage

Return Period or Storm	Police Stations (1)	Schools (5)
10-Years	None or Minor	None or Minor
20-Years	None or Minor	None or Minor
50-Years	None or Minor	None or Minor
Gloria (1985)	None or Minor	None or Minor
100-Years	None or Minor	None or Minor
200-Years	None or Minor	None or Minor
Unnamed (1938)	None or Minor	Minor damage with loss of use to all schools
500-Years	None or Minor	Minor damage with loss of use to all schools
1000-Years	None or Minor	Minor damage with loss of use to all schools

Table 4-6 presents the estimated tonnage of debris that would be generated by wind damage during each HAZUS storm scenario. The model breaks the debris into four general categories based on the different types of material handling equipment necessary for cleanup. As shown in Table 4-6, minimal debris are expected for storms less than the 20-year event, and reinforced concrete and steel buildings are not expected to generate debris. Much of the debris that is generated is structure-related.

Table 4-6
HAZUS-MH Hurricane Scenarios – Debris Generation (Tons)

Return Period or Storm	Brick / Wood	Reinforced Concrete / Steel	Eligible Tree Debris	Other Tree Debris	Total
10-Years	None	None	None	None	None
20-Years	None	None	None	None	None
50-Years	95	None	None	None	95
Gloria (1985)	133	None	95	228	456
100-Years	499	None	2,274	4,908	7,681
200-Years	1,473	None	2,860	6,222	10,555
Unnamed (1938)	3,209	None	5,705	12,498	21,412
500-Years	4,439	None	8,244	17,742	30,425
1000-Years	9,625	None	16,391	35,249	61,265

Table 4-7 presents the potential sheltering requirements based on the various wind events simulated by HAZUS. The predicted sheltering requirements for wind damage are relatively minimal for wind events less than 108 mph. Larger wind events are expected to require significant shelter usage. In addition, it is likely that hurricanes will also produce heavy rain and flooding that will increase the overall sheltering need in Wolcott.

Table 4-7
HAZUS Hurricane Scenarios – Shelter Requirements

Return Period or Storm	Number of Displaced Households	Short Term Sheltering Need (Number of People)
10-Years	None	None
20-Years	None	None
50-Years	None	None
Gloria (1985)	None	None
100-Years	None	None
200-Years	5	1
Unnamed (1938)	22	5
500-Years	41	8
1000-Years	144	28

Table 4-8 presents the predicted economic losses due to the various simulated wind events. Property damage loss estimates include the subcategories of building, contents, and inventory damages. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building or its contents. Business interruption loss estimates include the subcategories of lost income, relocation expenses, and lost wages. The business interruption losses are associated with the inability to operate a business due to the damage sustained during a hurricane, and also include temporary living expenses for those people displaced from their home because of the storm.

Table 4-8
HAZUS Hurricane Scenarios – Economic Losses

Return Period or Storm	Residential Property Damage Losses	Total Property Damage Losses	Business Interruption (Income) Losses	Total Losses
10-Years	None	None	None	None
20-Years	$3,940	$3,940	$50	$3,990
50-Years	$1,159,250	$1,198,980	$2,470	$1,201,460
Gloria (1985)	$1,416,010	$1,470,710	$8,980	$1,479,690
100-Years	$4,246,980	$4,533,960	$276,200	$4,810,150
200-Years	$10,636,440	$11,791,430	$1,008,310	$12,799,750
Unnamed (1938)	$24,022,160	$27,358,640	$2,871,290	$30,229,920
500-Years	$35,649,870	$40,869,650	$4,620,940	$45,490,600
1000-Years	$84,243,280	$97,402,500	$11,838,070	$109,240,570

Losses are minimal for storms with return periods of less than 20-years (58 mph) but increase rapidly as larger storms are considered. For example, a reenactment of the 1938 hurricane would cause approximately $30 million in wind damages to Wolcott. As these damage values are based on 2006 dollars, it is likely that these estimated damages will be higher today due to inflation.

In summary, hurricanes are a very real and potentially costly hazard to Wolcott. Based on the historic record and HAZUS-MH simulations of various wind events, the entire community is vulnerable to wind damage from hurricanes. These damages can include direct structural damages, interruptions to business and commerce, emotional impacts, and injury and possibly death.

4.6 Potential Mitigation Strategies and Actions

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

Many people perform basic property protection measures in advance of hurricanes, including cutting dangerous tree limbs, boarding windows, and moving small items inside that could be carried away by heavy winds. Tree wardens may conduct education and outreach regarding dangerous trees on private property, particularly for trees near homes with dead branches overhanging the structure or nearby power lines. These limbs are the most likely to fall during a storm.

4.6.3 Public Education and Awareness

Tracking of hurricanes has advanced to the point where areas often have one week of warning time or more prior to a hurricane strike. The public should be made aware of available shelters and evacuation routes prior to a hurricane event, as well as potential measures to mitigate personal property damage.

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.

The Connecticut Public Utility Regulatory Authority is currently piloting a "micro-grid" program designed to provide backup power supplies to small areas critical to public supply distribution. These infrastructure improvements will allow for small areas of the power grid to be isolated and powered by emergency generators, such as those where supermarkets and gas stations are located. Wolcott is not currently interested in participating in such a program but may be in the future.

4.6.5 Structural Projects

While structural projects to completely eliminate wind damage are not possible, potential structural mitigation measures for buildings include designs for hazard-resistant construction and retrofitting techniques. These generally 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. The four categories of structural projects for wind damage mitigation in private homes and critical facilities include the installation of shutters, load path projects, roof projects, and code plus projects and are defined below.

- Shutter mitigation projects protect all windows and doors of a structure with shutters, lamentations, or other systems that meet debris impact and wind pressure design requirements. All openings of a building are to be protected, including garage doors on

residential buildings, large overhead doors on commercial buildings, and apparatus bay doors at fire stations.

- Load path projects improve and upgrade the structural system of a building to transfer loads from the roof to the foundation. This retrofit provides positive connection from the roof framing to the walls, better connections within the wall framing, and connections from the wall framing to the foundation system.
- Roof projects involve retrofitting a building's roof by improving and upgrading the roof deck and roof coverings to secure the building envelope and integrity during a wind or seismic event.
- Code plus projects are those designed to exceed the local building codes and standards to achieve a greater level of protection.

Given the relative infrequency of hurricane wind damage in Connecticut, it is unlikely that any structural project for mitigating wind damage would be cost effective (and therefore eligible for grant funding) unless it was for a critical facility. Communities should encourage the above measures in new construction, and require it for new critical facilities. Continued 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.

4.7 Status of Mitigation Strategies and Actions

Strategies and actions described in Section 3.7 for the mitigation of flooding are also pertinent to mitigating tropical storm or hurricane related flooding, and are not repeated here. The prior mitigation strategies and actions for mitigation of hurricane and tropical storm winds are listed below with commentary regarding the status of each.

Table 4-9
Status of Previous Strategies and Actions

Strategy or Action	Status
Increase tree limb maintenance and inspections, especially along Route 322, Route 69, and other evacuation routes.	This has increased and will continue as a capability.
Increase inspections of trees on private property near power lines and Town right-of-ways.	This has increased and will continue as a capability.
Continue to require that utilities be placed underground in new developments and pursue funding to place them underground in existing developed areas.	Continuous for new developments and is a capability; not of interest for existing utilities due to expense.

Two new strategies have been identified through the process of updating this plan; both are related to the benefits of having standby power supplies:

- Acquire standby power for Wolcott High School
- Pass an ordinance to require standby power for group homes and assisted living facilities.

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 and could cause significant damage to a small area.

5.2 Hazard Assessment

Heavy wind including tornadoes and downbursts, lightning, heavy rain or 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

NOAA defines a tornado as "a violently rotating column of air extending from a thunderstorm to the ground." The two types of tornadoes include those that develop from supercell thunderstorms and those that do not. While the physics of tornado development are fairly well understood, there are many unknowns still being studied regarding the exact conditions in a storm event required to trigger a tornado, the factors affecting the dissipation of a tornado, and the effect of cloud seeding on tornado development.

Supercell thunderstorms are long-lived (greater than one hour) and highly organized storms feeding off an updraft that is tilted and rotating. This rotation is referred to as a "mesocyclone" when detected by Doppler radar. The figure below is a diagram of the anatomy of a supercell that has spawned a supercell tornado. Tornadoes that form from a supercell thunderstorm are a very small extension of the larger rotation; they are the most common and the most dangerous type of tornado, as most large and violent tornadoes are spawned from supercells.

Non-supercell tornadoes are defined by NOAA as circulations that form without a rotating updraft. Damage from these types of tornadoes tends to be F2 or less (see Fujita Scale, below). The two types of non-supercell tornadoes are gustnadoes and landspouts:

- A gustnado is a whirl of dust or debris at or near the ground with no condensation tunnel that forms along the gust front of a storm.

- A landspout is a narrow, rope-like condensation funnel that forms when the thunderstorm cloud is still growing and there is no rotating updraft. Thus, the spinning motion originates near the ground. Waterspouts are similar to landspouts but occur over water.

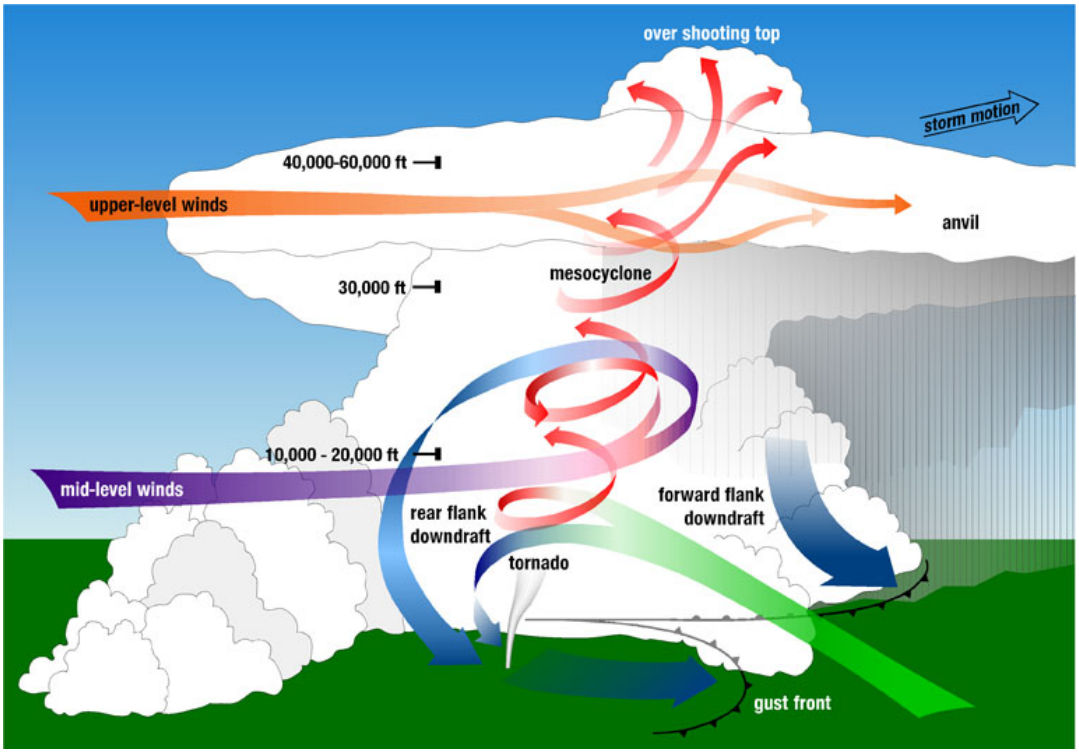
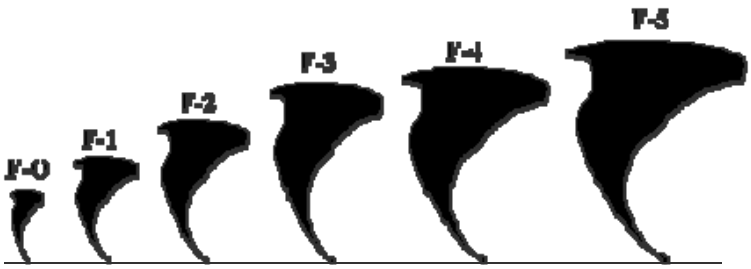


Figure 5-1: Anatomy of a Tornado. Image from NOAA National Severe Storms Laboratory.

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. A description of the scale follows in Table 5-1.



Fujita Tornado Scale. Image courtesy of FEMA.

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; branches broken off trees; shallow-rooted trees knocked over; damage to sign boards.
F1	Moderate tornado	73-112 mph	Peels surface off of 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 for 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 de-barked; steel reinforced concrete structures badly damaged.

According to NOAA, weak tornadoes (F0 and F1) account for approximately 69% of all tornadoes. These tornadoes last an average of five to 10 minutes and account for approximately 3% of tornado-related deaths. Strong tornadoes (F2 and F3) account for approximately 29% of all tornadoes and approximately 27% of all tornado deaths. These storms may last for 20 minutes or more. Violent supercell tornadoes (F4 and above) are extremely destructive but rare and account for only 2% of all tornadoes. These storms sometimes last over an hour and result in approximately 70% of all tornado-related deaths.

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.

Similar to the Fujita Scale, the Enhanced F-scale is also a set of wind estimates based on damage. It 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

Official records of tornado activity date back to 1950. According to NOAA, an average of 1,000 tornadoes is reported each year in the United States. The historic record of tornadoes near Watertown is discussed in Section 5.4. Tornadoes are most likely to occur in Connecticut in June, July, and August of each year

Lightning

Lightning is a discharge of electricity that occurs between the positive and negative charges within the atmosphere or between the atmosphere and the ground. According to NOAA, the creation of lightning during a storm is a complicated process that is not fully understood. 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.

Image courtesy of NOAA.

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, there is an average of 100,000 thunderstorms per year in the United States. An average of 41 people per year died and an average of 262 people were injured from lightning strikes in the United States from 2000 to 2009. 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.

Downbursts

A downburst is a severe localized wind blasting down from a thunderstorm. They are more common than tornadoes in Connecticut. Depending on the size and location of downburst events, the destruction to property may be significant.

Downburst activity is, on occasion, mistaken for tornado activity. Both storms have very damaging winds (downburst wind speeds can exceed 165 miles per hour) and are very loud. These "straight line" winds are distinguishable from tornadic activity by the pattern of destruction and debris such that the best way to determine the damage source is to fly over the area.

Downbursts fall into two categories:

- **Microbursts** affect an area less than 2.5 miles in diameter, last five to 15 minutes, and can cause damaging winds up to 168 mph.
- **Macrobursts** affect an area at least 2.5 miles in diameter, last five to 30 minutes, and can cause damaging winds up to 134 mph).

It is difficult to find statistical data regarding frequency of downburst activity. NOAA reports that there are 10 downburst reports for every tornado report in the United States. This implies that there are approximately 10,000 downbursts reported in the United States each year, and further implies that downbursts occur in approximately 10% of all thunderstorms in the United States annually. This value suggests that downbursts are a relatively uncommon yet persistent hazard.

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 1.5 pounds have been recorded. NOAA has estimates of the velocity of falling hail ranging from nine meters per second (m/s) (20 mph) for a one centimeter (cm) diameter hailstone, to 48 m/s (107 mph) for an eight cm, 0.7 kilogram stone. While crops are the major victims of hail, larger hail is also a hazard to people, vehicles, and property.

According to NOAA's National Weather Service, hail caused four deaths and an average of 47 injuries per year in the United States from 2000 to 2009. Hailstorms typically occur in at least one part of Connecticut each year during a severe thunderstorm.

5.3 Historic Record

According to NOAA, the highest number of occurrences of tornadoes in Connecticut is Litchfield and Hartford counties, followed by New Haven and Fairfield counties, and then Tolland, Middlesex, Windham, and finally New London County. Wolcott is located in northern New Haven County. An extensively researched list of tornado activity in Connecticut is available on Wikipedia. This list extends back to 1648, although it is noted that the historical data prior to 1950 is incomplete due to lack of official records and gaps in populated areas. Table 5-3 summarizes the tornado events near Watertown through July 2013 based on the Wikipedia list.

Table 5-3
Tornado Events Near Wolcott From 1648 to July 2013

Date	Location	Fujita Tornado Scale	Property Damage	Injuries / Deaths
July 22, 1817	Woodbury to Watertown	-	Tree damage	NR
July 26, 1937	Terryville to Bristol	F2	NR	NR
August 21, 1951	Southwestern Litchfield County through northern Watertown and into Hartford County (40 miles)	F2	NR	9 injured
May 24, 1962	Northern New Haven and Southern Hartford Counties (11 miles)	F3	200 buildings destroyed, 600 damaged, $4,000,000 in damages	1 death, 50 injured
June 18, 1962	Eastern Litchfield County	F2	NR	NR
July 29, 1972	Downtown Waterbury	F3 / F2	Factory unroofed, houses damaged	2 injured
July 12, 1973	Southeastern Litchfield County	F2	NR	NR
July 10, 1989	Watertown to northern Waterbury	F2	50 homes unroofed or severely damaged	70 injured
May 29, 1995	South Britain to Southbury (2 miles)	F1	Tree damage, minor damage to homes	NR
July 23, 1995	Prospect	F0	Tractor trailer thrown 200 yards	NR
July 3, 1996	Downtown Waterbury	F1	Damage to high school	NR
July 21, 2010	Litchfield, Thomaston, Bristol	EF1	Tree damage	NR

NR = Not Reported

Thunderstorms occur on 18 to 35 days each year in Connecticut. Only 17 lightning-related fatalities occurred in Connecticut between 1959 and 2009. Hail is often a part of such thunderstorms. 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.
- May 27, 2008 – A strong thunderstorm in advance of a cold front produced isolated flash flooding in New Haven County, including Wolcott, and damaging a fast food restaurant across the city line in Waterbury.
- July 2, 2009 – A warm front lifted north from the Delmarva Peninsula and triggered scattered showers and thunderstorms which resulted in isolated flash flooding in New Haven and New London counties. Roads were flooded in Wolcott.

5.4 Existing Capabilities

Warning is the primary method of existing mitigation for tornadoes and thunderstorm-related hazards. The NOAA National Weather Service issues watches and warnings when severe weather is likely to develop or has developed, respectively. Tables 5-4 and 5-5 list the NOAA Watches and Warnings, respectively, as pertaining to actions to be taken by emergency management personnel in connection with summer storms and tornadoes.

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

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

Table 5-4
NOAA Weather Watches

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

Table 5-5
NOAA Weather Warnings

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

Aside from warnings, several other methods of mitigation for wind damage are employed in 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.
- Utilize CT Alert as needed to warn residents of watches and warnings.

In summary, many of Wolcott's capabilities to mitigate for wind damage and prevent loss of life and property damage have improved since the initial hazard mitigation plan was adopted, such as the use of CT Alert. Furthermore, CL&P has increased its capabilities relative to tree and tree limb maintenance near utility lines.

5.5 Vulnerabilities and Risk Assessment

Description – According to the 2014 *Natural Hazard Mitigation Plan Update,* New Haven County is the fourth most susceptible county in Connecticut to tornado activity. By virtue of its location in New Haven County, Wolcott has moderate potential to experience tornado damage. In addition, NOAA states that climate change has the potential to increase the frequency and intensity of tornadoes, so it is possible that the pattern of occurrence in Connecticut could change in the future.

Although tornadoes pose a threat to all areas of the state, their occurrence is not considered frequent enough to justify the construction of tornado shelters. Instead, the State has provided NOAA weather radios to all public schools as well as many local governments for use in public buildings. The general public continues to rely on mass media for knowledge of weather warnings. Warning time for tornadoes is very short due to the nature of these types of events, so pre-disaster response time can be limited. However, the NOAA weather radios provide immediate notification of all types of weather warnings in addition to tornadoes, making them very popular with communities.

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.

In general, thunderstorms and hailstorms in Connecticut are more frequent in the western and northern parts of the state, and less frequent in the southern and eastern parts. Thunderstorms are expected to impact Cheshire at least 20 days each year. The majority of these events do not cause any measurable damage. Although lightning is usually associated with thunderstorms, it can occur on almost any day. The likelihood of lightning strikes in the Cheshire area is very high during any given thunderstorm although no one area of the town is at higher risk of lightning strikes. The risk of at least one hailstorm occurring in Cheshire is considered moderate in any given year.

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 a downburst from a thunderstorm and have no associated rotation.

Wolcott is particularly vulnerable to damage from high winds due to its heavily treed landscape and residential land uses. Secondary damage from falling branches and trees is more common than direct wind damage to structures. Heavy winds can take down trees near power lines, leading to the start of electrical fires. Such fires can be extremely dangerous during the summer months during 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.

Similar to the discussion for hurricanes in Section 4.6, there are no critical facilities believed to be more susceptible to summer storm damage than any other. Some critical facilities are more susceptible than others to flooding damage due to summer storms. Such facilities susceptible to flooding damage were discussed in Section 3.6.

Loss Estimates – The 2014 Connecticut Natural Hazard Mitigation Plan provides annual estimated losses on a countywide basis for several hazards. Based on the population of Wolcott relative to New Haven County, the annual estimated loss is $1,567 for thunderstorms and $163,541 for tornadoes. The figure for tornadoes is based on their infrequent occurrence coupled with high costs.

Summary – The entire community is at relatively equal risk for experiencing damage from summer storms and tornadoes. Based on the historic record, only a few severe thunderstorms have resulted in costly damages in Wolcott. Most damages are relatively site-specific and occur to private property (and therefore are paid for by private insurance). For municipal property, the budget for tree removal and minor repairs may need to be adjusted from time to time to address storms. Given the limited historic record for damaging tornado events, an estimate of several million dollars in damage may be reasonable for an EF2 tornado striking Wolcott, and with a greater damage amount to be expected should an EF3 or stronger tornado strike.

5.6 Potential Mitigation Strategies and Actions

Strategies and actions described in Section 4.6 for wind are applicable to thunderstorms and tornadoes as well.

Both the FEMA and the NOAA websites contain valuable information regarding preparing for and protecting oneself during a tornado as well as information on a number of other natural hazards. Available information from FEMA includes:

- Design and construction guidance for 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.

More information is available at:

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

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

Warnings are critical to mitigating damage from hail, lightning, and tornadoes. These hazards can appear with minimal warning such that the ability to quickly notify a large area is critical. The community alert system should be utilized to inform the public when severe weather events may occur. Thus, the implementation of an emergency notification system is critical 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.

5.7 Status of Mitigation Strategies and Actions

The prior mitigation strategies and actions for mitigation related to winds, hail, tornadoes, and downbursts are listed below with commentary regarding the status of each.

Table 5-6
Status of Previous Strategies and Actions

Strategy or Action	Status
Increase tree limb maintenance and inspections.	This has increased and will continue as a capability.
Continue outreach regarding dangerous trees on private property.	This is believed complete, with maximum resident awareness attained in Wolcott.
Continue to require that utilities be placed underground in new developments and pursue funding to place them underground in existing developed areas	Continuous for new developments and is a capability; not of interest for existing utilities due to expense.
Continue to require compliance with the amended Connecticut Building Code for wind speeds.	This is part of the state building code and can be deleted as a strategy.
Provide for the Building Department to make literature available during the permitting process regarding appropriate design standards	This is done as needed and is a capability.

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In addition, the two new strategies from Section 4.7 are also applicable to the hazards in this chapter of the plan.

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 weather, including blizzards, freezing rain, ice storms, nor'easters, sleet, snow, and winter storms; and to a secondary extent, extreme cold.

- **Blizzards** include winter storm conditions of sustained winds or frequent gusts of 35 mph or greater that cause major blowing and drifting of snow, reducing visibility to less than one-quarter mile for three or more hours. Extremely cold temperatures and/or wind chills are often associated with dangerous blizzard conditions.

- **Freezing Rain** consists of rain that freezes on objects, such as trees, cars, or roads and forms a coating or glaze of ice. Temperatures in the mid- to upper atmosphere are warm enough for rain to form, but surface temperatures are below the freezing point, causing the rain to freeze on impact.

- **Ice Storms** are forecasted when freezing rain is expected to create ice build-ups of one-quarter inch or more that can cause severe damage.

- **Nor'easters** are the classic winter storm in New England, caused by a warm, moist, low pressure system moving up from the south colliding with a cold, dry high pressure system moving down from the north. The nor'easter derives its name from the northeast winds typically accompanying such storms, and such storms tend to produce a large amount of rain or snow. They usually occur between November 1st and April 1st of any given year, with such storms occurring outside of this period typically bringing rain instead of snow.

- **Sleet** occurs when rain drops freeze into ice pellets before reaching the ground. Sleet usually bounces when hitting a surface and does not stick to objects. It can accumulate like snow and cause a hazard to motorists.

- **Snow** is frozen precipitation composed of ice particles that forms in cold clouds by the direct transfer of water vapor to ice.

- **Winter Storms** are defined as heavy snow events which have a snow accumulation of more than six inches in 12 hours, or more than 12 inches in a 24-hour period.

Impacts from severe winter weather can become dangerous and a threat to people and property. Most winter weather events occur between December and March. Winter weather may include snow, sleet, freezing rain, and cold temperatures. According to NOAA, winter storms were responsible for the death of 33 people per year from 2000 to 2009. 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, and flooding as a result of snowmelt.

> 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.

Until recently, the Northeast Snowfall Impact Scale (NESIS) was used by NOAA to characterize and rank high-impact northeast snowstorms. This ranking system has evolved into the currently used Regional Snowfall Index (RSI). The RSI ranks snowstorms that impact the eastern two thirds of the United States, placing them in one of five categories: Extreme, Crippling, Major, Significant, and Notable. The RSI is based on the spatial extent of the storm, the amount of snowfall, and the juxtaposition of these elements with population. RSI differs from NESIS in that it uses a more refined geographic area to define the population impact. NESIS had used the population of the entire two-thirds of the United States in evaluating impacts for all storms whereas RSI has refined population data into six regions. The result is a more region-specific analysis of a storm's impact. The use of population in evaluating impacts provides a measure of societal impact from the event. Table 6-1 presents the RSI categories, their corresponding RSI values, and a descriptive adjective.

Table 6-1
RSI Categories

Category	RSI Value	Description
1	1-3	Notable
2	3-6	Significant
3	6-10	Major
4	10-18	Crippling
5	18.0+	Extreme

RSI values are calculated within a GIS. The aerial distribution of snowfall and population information are combined in an equation that calculates the RSI score, which varies from around one for smaller storms to over 18 for extreme storms. The raw score is then converted into one of the five RSI categories. The largest RSI values result from storms producing heavy snowfall over

large areas that include major metropolitan centers. Approximately 196 of the most notable historic winter storms to impact the Northeast have been analyzed and categorized by RSI through March 2013.

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.

6.3 Historic Record

A total of 16 extreme, crippling, and major winter storms have occurred in Connecticut during the past 30 years. One is listed for each of the years 1983, 1987, 1993, 1994, 1996, 2003, 2005, 2006, and 2007. More alarmingly, four are listed in the calendar year 2010 and two in 2011.

Considering nor'easters only, 11 major winter nor'easters have occurred in Connecticut during the past 30 years (in 1983, 1988, 1992, 1996, 2003, 2006, 2009, 2010, two in 2011, and 2013).

According to the NCDC, there have been 134 snow and ice events in the state of Connecticut between 1993 and April 2010, causing over $18 million in damages. Notably, heavy snow in December 1996 caused $6 million in property damage. Snow removal and power restoration for a winter storm event spanning March 31 and April 1, 1997 cost $1 million. On March 5, 2001, heavy snow caused $5 million in damages, followed by another heavy snow event four days later that caused an additional $2 million in damages.

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. However, winter storm Alfred from October 29-30, 2011 had an ice precipitation component to it. Although wet snow was the major problem, ice mixed in along and just to the north of the shoreline which slickened roadways and led to additional weight build-up on trees and utility lines and other infrastructure.

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 2002 that hit Litchfield and western Hartford Counties resulted in $2.5 million in public sector damages.

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

- East Coast Winter Storm, March 13-14, 1993 – A powerful storm carrying with it record low barometric pressure readings hit the state with blizzard conditions. Gale force winds accompanied by snow drifts several feet deep closed businesses, hindered travel, and forced residents to lose power. Federal aid was given to the state for snow removal.

- Heavy Snow, January 21, 2001 – Heavy snow and a period of sleet and freezing rain changing to snow impacted the region. In Seymour, a total of eight inches were reported, while nearby Bridgeport received a total of approximately six inches.

- Heavy Snowstorm, March 12, 2005 – Snow fall rates reached in excess of two inches per hour at several locations in the region. Storm snowfall amounts ranged from approximately five to nine inches. In Ansonia, a reported snowfall total of 8.1 inches fell while nearby Derby reported 6.3 inches and Seymour reported 7.8 inches.

- Blizzard, December 26-27, 2010 – An intense low pressure system moved across the region with bands of heavy snow with embedded thunderstorms and significant winds. The powerful blizzard brought the area 10 to 18 inches of snow with sustained winds of 25 to 40 mph with gusts in excess of 60 mph. The storm made all forms of travel extremely difficult to nearly impossible and service on Metro North and Amtrak lines were suspended due to high snow drift.

- Heavy Snow, January 11-12, 2011 – Very heavy snow developed across the region, producing snowfall rates of three to four inches per hour and snow totals ranging from 15 to 30 inches in southern Connecticut. The highest snowfall totals were seen across northern portions of Fairfield and New Haven counties.

- Heavy Snow Storm, January 26-27, 2011 – A period of moderate to heavy snow moved through the region, producing two to five inches before a second round of precipitation, consisting of very heavy snow, moved across the area. This system boasted snowfall rates of three to four inches per hour over a four to six hour period which raised snow totals to 12-20" of snow throughout much of the region.

The winter storms of January and February 2011 are listed as the 18th and 19th storms in the NESIS ranking. These storms produced snow, sleet, freezing rain, strong gusty winds, severely low temperatures, and coastal flooding. Snowfall totals for winter 2010-2011 in Connecticut averaged around 70 inches.

The snowfall, sleet, freezing rain, and rain that affected Connecticut during the 2010-2011 winter season proved to be catastrophic for a number of buildings. With severely low temperatures coupled with the absence of the removal of snow and ice buildup from roofs of buildings in Connecticut, numerous roofs collapsed during the winter season.

Using media reports, a list of roof/building collapses and damage due to buildup of frozen precipitation was compiled. The list (Table 6-2) includes 76 locations that span over a month of time from January 12, 2011 to February 17, 2011.

TABLE 6-2
Reported Roof Collapse Damage, 2011

Address	Municipality	Date	Description
205 Wakelee Avenue	Ansonia	2/2/2011	Catholic Charities
Route 44	Barkhamsted	2/4/2011	Barkhamsted Highway Department Salt Shed
8 Railroad Avenue	Beacon Falls	2/2/2011	Manufacturing Corporation
20 Sargent Drive	Bethany	2/2/2011	Fairfield County Millworks
50 Hunters Trail	Bethany	2/2/2011	Sun Gold Stables
74 Griffin Road South	Bloomfield	2/14/2011	Home Depot Distribution Center

Address	Municipality	Date	Description
25 Blue Hill Road	Bozrah	1/27/2011	Kofkoff Egg Farm
135 Albany Turnpike	Canton	2/3/2011	Ethan Allen Design Center
520 South Main Street	Cheshire	1/12/2011	Cheshire Community Pool (Prior to recent ice storm)
1701 Highland Avenue	Cheshire	1/23/2011	Cox Communications
174 East Johnson Avenue	Cheshire	2/2/2011	First Calvary Life Family Worship Center
166 South Main Street	Cheshire	2/3/2011	George Keeler Stove Shop (Historic Building)
1755 Highland Avenue	Cheshire	2/7/2011	Nutmeg Utility Products
45 Shunpike Road (Route 372)	Cromwell	2/2/2011	K Mart (cracks inside and outside - no official collapse)
Cromwell Hills Drive	Cromwell	2/4/2011	Cromwell Gardens
98 West Street	Danbury	1/28/2011	Garage
142 N. Road (Route 140)	East Windsor	2/3/2011	Dawn Marie's Restaurant - Bassdale Plaza Shopping Center
3 Craftsman Road	East Windsor	2/4/2011	Info Shred
140 Mountain Road	Ellington	1/27/2011	Garage Collapse
100 Phoenix Avenue	Enfield	2/1/2011	Brooks Brothers
South Road	Enfield	2/2/2011	Bosco's Auto Garage
175 Warde Terrace	Fairfield	2/3/2011	Parish Court Senior Housing (Ceiling damage - 10 apartments)
19 Elm Tree Road	Glastonbury	2/6/2011	Residence
Unknown	Hampton	1/28/2011	Wood Hill Farm barn collapse - animals died
Gillette Street	Hartford	1/19/2011	Garage
West Street	Hebron	2/2/2011	Residential
Connecticut Route 101	Killingly	2/8/2011	Historic church converted to an office building
759 Boston Post Road	Madison	2/3/2011	Silver Moon, The Brandon Gallery, Madison Coffee Shop and Madison Cinemas (awning began to collapse)
478 Center Street	Manchester	1/28/2011	Lou's Auto Sales and Upholstery
1388 East Main Street	Meriden	1/28/2011	Jacoby's
260 Sherman Avenue	Meriden	2/6/2011	Engine 4 Fire Station
275 Research Parkway	Meriden	2/17/2011	Four Points by Sheraton Carport
1310 South Main Street	Middletown	1/30/2011	Passport Inn Building & Suites
505 Main Street	Middletown	2/2/2011	Accounting firm, converted, mixed use (3 story)
70 Robin Court	Middletown	2/3/2011	Madison at Northwoods Apartment
80 North Main Street	Middletown	2/7/2011	Abandoned warehouse
Pepe's Farm Road	Milford	1/30/2011	Vacant manufacturing building
282 Woodmont Road	Milford	2/2/2011	Kip's Tractor Barn
150 Main St # 1	Monroe	2/2/2011	Monroe Paint & Hardware (Slumping roof, weld broke loose from structural beam)
Route 63	Naugatuck	1/21/2011	Former Plumbing Supply House
410 Rubber Avenue	Naugatuck	2/2/2011	Thurston Oil Company
1210 New Haven Road	Naugatuck	2/4/2011	Rainbowland Nursery School (structural damage)
1100 New Haven Road	Naugatuck	2/17/2011	Walmart (structural damage)
290 Goffe Street	New Haven	2/7/2011	New Haven Armory

Address	Municipality	Date	Description
201 South Main Street	Newtown	2/9/2011	Bluelinx Corp.
80 Comstock Hill Avenue	Norwalk	1/27/2011	Silvermine Stable
5 Town Line Road	Plainville	1/27/2011	Classic Auto Body
130 West Main Street	Plainville	2/2/2011	Congregational Church of Plainville
Terryville Section	Plymouth	1/12/2011	Public Works Garage (Terryville section) - taking plow trucks out
286 Airline Avenue	Portland	1/27/2011	Midstate Recovery Systems, LLC (waste transfer station)
680 Portland-Cobalt Road (Route 66)	Portland	1/27/2011	Vacant commercial property (next to Prehistoric Mini Golf - former True Value Hardware building)
Tryon Street	Portland	1/27/2011	Residential home (sunroof)
Main Street	Portland	1/28/2011	Middlesex Marina
93 Elm Street	Rocky Hill	2/6/2011	Residential garage
99 Bridgeport Avenue	Shelton	2/3/2011	Shell Gas Station
100 Maple Street	Somers	1/27/2011	Lindy Farms (barn)
68 Green Tree Lane	Somers	2/2/2011	Residential
95 John Fitch Boulevard	South Windsor	2/3/2011	South Windsor 10 Pin Bowling Alley
595 Nutmeg Road North	South Windsor	2/8/2011	Waldo Brothers Company
45 Newell Street	Southington	2/2/2011	Yarde Metals
Furnace Avenue	Stafford Springs	2/2/2011	Abandoned mill building
370 South Main Street	Terryville	2/8/2011	Former American Modular
46 Hartford Turnpike	Tolland	2/3/2011	Colonial Gardens
364 High Street	Tolland	2/9/2011	Horse barn
61 Monroe Turnpike	Trumbull	2/1/2011	Trumbull Tennis Center
5065 Main St # L1207	Trumbull	Unknown	Taco Bell
Route 83	Vernon	1/31/2011	Former Clyde Chevrolet
136 Dudley Avenue	Wallingford	1/27/2011	Tri State Tires
1074 South Colony Road	Wallingford	1/29/2011	Zandri's Stillwood Inn
121 N. Main Street	Waterbury	2/2/2011	Former bowling alley (Sena's Lanes)
456 New Park Avenue	West Hartford	2/8/2011	Shell gas station
Island Lane	West Haven	1/27/2011	Commercial building
Unknown	Wethersfield	2/2/2011	Automotive center roof collapse; 10 cars damaged
50 Sage Park Road	Windsor	2/2/2011	Windsor High School (auditorium roof collapse)
1001 Day Hill Road	Windsor	2/7/2011	Mototown USA
27 Lawnacre Road	Windsor Locks	2/7/2011	Long View RV

The overall storm impacts and damages of the winter 2010-2011 storms resulted in Presidential Disaster Declaration 1958-DR for Connecticut. In Wolcott, the town was called numerous times to inspect potential damage. The Fire Department and school superintendent met frequently to manage snow removal from the schools. Several sheds and a number of sizable buildings collapsed, although none were reported to the sources used to develop the above table. A town highway garage collapsed in Plymouth, which is the community immediately north of Wolcott.

Later that year, Winter Storm Alfred (October 29-30, 2011) dumped up to 32 inches of snow and caused over 600,000 electrical customers in Connecticut to lose power for a significant amount of time. The entire state dealt with wet snow and ice and statewide power outages affecting

Connecticut for a week or longer. The storm was unique in that much of the foliage had yet to fall from trees, which provided more surface area for snow to land and stick, therefore making the trees significantly heavier than if the storm was to occur when trees had lost their foliage. The storm resulted in the death of eight people in Connecticut, four from carbon monoxide poisoning. In all, approximately 90 shelters and 110 warming centers were opened state-wide. The overall storm impacts and damages resulted in another Presidential Disaster Declaration for Connecticut.

Wolcott suffered major damage from Storm Alfred. Power outages ranged from five to eight days. The Fire Department and Public Works Department worked together to clear roads and retained private contractors as needed. According to the NCDC, one person was struck by a tree and injured while walking outside in Wolcott.

A fierce nor'easter (dubbed "Nemo" by the Weather Channel) in February 2013 brought blizzard conditions to most of the Northeast, producing snowfall rates of five to six inches per hour in parts of Connecticut. Many areas of Connecticut experienced more than 40 inches of snowfall, and the storm caused more than 700,000 power outages. All roads in Connecticut were closed for two days. Schools in Wolcott were closed longer than typical for winter storms, and contractors were retained to help clear local roads. This storm was ranked as a "Major" storm by NESIS. The overall storm impacts and damages resulted in yet one more Presidential Disaster Declaration for Connecticut.

In addition to the above statewide events that caused damage in Wolcott, one local event of significance occurred since the previous HMP was adopted. A windstorm in January 2013 was reportedly very severe in the northern section of the town. This demonstrates that local winter events can be significant, just as some thunderstorms can affect only small sections of communities.

6.4 Existing Capabilities

Existing programs applicable to wind are the same as those discussed in Sections 4.0 and 5.0. Programs that are specific to winter storms are generally those related to preparing plows, sand and salt trucks; tree-trimming to protect power lines; and other associated snow removal and response preparations.

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).

When the initial HMP was developed, town policy was to avoid contract of plowing services and instead utilize Town staff. Over the last few years, contractors have been called more often to assist. 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.

In summary, Wolcott's capabilities to mitigate for winter storm damage and prevent loss of life and property have improved since the initial hazard mitigation plan was adopted, such as the increasing attention to removing snow from buildings. This has occurred as a necessity, given the nature of the disasters that occurred in January and October 2011 and then February 2013.

6.5 Vulnerabilities and Risk Assessment

Based on the historic record in Section 6.3, Connecticut experiences at least one major nor'easter approximately every four years, although a variety of minor and moderate snow and ice storms occur nearly every winter. According to the 2010 *Connecticut Natural Hazard Mitigation Plan Update*, Connecticut residents can expect at least two or more severe winter weather events per season, including heavy snow storms, potential blizzards, nor'easters, and potential ice storms. Fortunately, catastrophic ice storms are relatively 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.

According to the 2014 *Connecticut Natural Hazard Mitigation Plan Update*, recent climate change studies predict a shorter winter season for Connecticut (as much as two weeks) and less snow-covered days with a decreased overall snowpack. These models also predict that fewer, more intense precipitation events will occur with more precipitation falling as rain rather than snow. This trend suggests that future snowfalls will consist of heavier (denser) snow and the potential for ice storms will increase. Such changes will have a large impact on how the State and its communities manage future winter storms, and the impact such storms have on the residents, roads, and utilities in the State.

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.

Loss Estimates – The 2014 Connecticut Natural Hazard Mitigation Plan provides annual estimated losses on a countywide basis for several hazards. Based on the population of Wolcott relative to New Haven County, the annual estimated loss is $121 for severe winter storms. The low figure is influenced by the difficulty in separating typical winter storm costs from those associated with extreme events.

Summary – The entire community is at relatively equal risk for experiencing damage from winter storms, although some areas may be more susceptible. Many damages are relatively site-specific and occur to private property (and therefore are paid for by private insurance), while repairs for power outages is often widespread and difficult to quantify to any one municipality. For municipal property, the budget for plowing and minor repairs is generally adequate to handle winter storm damage, although the plowing budget is often depleted in severe winters. In particular, the heavy snowfalls associated with the winter of 2010-2011 drained the local plowing budget and raised a high level of awareness of the danger that heavy snow poses to roofs, as did the snow associated with Winter Storm Alfred in October 2011 and storm Nemo in February 2013.

6.6 Potential Mitigation Strategies and Actions

Winter storm mitigation measures must 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 strategies 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.

> FEMA has produced a Snow Load Safety Guidance Document available at http://www.fema.gov/media-library/assets/documents/29670?id=6652 and in Appendix E.

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. This can occur in both older buildings as well as newer buildings constructed in compliance with the most recent building codes. The town should develop plans to prioritize the removal of snow from critical facilities and other municipal buildings and have funding available for this purpose. Heating coils may also be used to melt or evaporate snow from publicly and privately-owned flat roofs.

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 themselves and their homes for cold and icy weather, including stocking homes, preparing vehicles, and taking care of themselves during winter storms.

Traffic congestion and safe travel of people to and from work can be mitigated by the use of staggered timed releases from work, pre-storm closing of schools, and later start times for companies. Many employers and school districts employ such practices. Communities should consider the use of such staggered openings and closings to mitigate congestion during and after severe weather events if traffic conditions warrant.

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. 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 Status of Mitigation Strategies and Actions

The prior mitigation strategies associated with winds were addressed in earlier sections of this plan. Previous strategies and actions for snow and ice are listed below with commentary regarding the status of each.

Table 6-5
Status of Previous Strategies and Actions

Strategy or Action	Status
Increase tree limb maintenance and inspections	This has increased and will continue as a capability.
Continue to require that utilities be placed underground in new developments and pursue funding to place them underground in existing developed areas	Continuous for new developments and is a capability; not of interest for existing utilities due to expense.
Compile and post a final list of plowing routes, prioritizing egress to shelters and critical facilities.	This was partly completed. The Public Works Department and LEPC have plowing routes, but have determined that posting these in a public location is not in the town's best interest. This part of the action is deleted.
Complete and disseminate evacuation plan to ensure timely evacuation of shelterees from all areas of Wolcott.	The choice of evacuation route in Wolcott depends on the nature of the event occurring. The town LEPC reviews the evacuation plan for each event and responds accordingly. A standardized and static evacuation plan is not favored by the LEPC. This action is deleted.
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.	The LEPC continues to keep materials on display in the library, town hall, and senior center. This is ongoing and therefore is a capability.
Continue to encourage two modes of egress into every neighborhood by the creation of through streets.	Dead-end streets must be less than 1,200 feet in length in Wolcott. This action is a capability.

Portions of the above strategies and actions have become capabilities and they are not listed in the table in Appendix A, as they are ongoing.

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, damaging earthquakes are considered a hazard that is unlikely to occur, but that may cause significant effects to a large area of the Town if one occurred.

7.2 Hazard Assessment

An earthquake is a sudden rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. Earthquakes can cause buildings and bridges to collapse; disrupt gas, electric and telephone lines; and often cause landslides, flash floods, fires, avalanches, and tsunamis. Earthquakes can occur at any time without warning.

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

The Richter scale defines the magnitude of an earthquake. Magnitude is related to the amount of seismic energy released at the hypocenter of the earthquake. It is based on the amplitude of earthquake waves recorded on instruments that have a common calibration. The magnitude of an earthquake is thus represented by a single instrumentally determined value recorded by a seismograph, which records 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. A comparison of Richter magnitude to typical Modified Mercalli intensity is presented in Table 7-1.

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.

Table 7-1
Comparison of Earthquake Magnitude and Intensity

Richter Magnitude	Typical Maximum Modified Mercalli Intensity
1.0 to 3.0	I
3.0 to 3.9	II - III
4.0 to 4.9	IV - V
5.0 to 5.9	VI - VII
6.0 to 6.9	VII - IX
7.0 and above	VIII - XII

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

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

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

7.3 Historic Record

According to the Northeast States Emergency Consortium and the Weston Observatory at Boston College, there were 139 recorded earthquakes in Connecticut between 1668 and 2011. The vast majority of these earthquakes had a magnitude of less than 3.0. The most severe earthquake in Connecticut's history occurred at East Haddam on May 16, 1791. Stone walls and chimneys were toppled during this quake. Additional instances of seismic activity occurring in and around Connecticut is provided below, based on information provided in USGS documents, the Weston Observatory, the 2010 *Connecticut Natural Hazard Mitigation Plan Update*, other municipal hazard mitigation plans, and newspaper articles.

- A devastating earthquake near Three Rivers, Quebec on February 5, 1663 caused moderate damage in parts of Connecticut.
- Strong earthquakes in Massachusetts in November 1727 and November 1755 were felt strongly in Connecticut.
- In April 1837, a moderate tremor occurred at Hartford, causing alarm but little damage.
- In August 1840, another moderate tremor with its epicenter 10 to 20 miles north of New Haven shook Hartford buildings but caused little damage.
- In October 1845, an Intensity V earthquake occurred in Bridgeport. An Intensity V earthquake would be approximately 4.3 on the Richter scale.
- On June 30, 1858, New Haven and Derby were shaken by a moderate tremor.
- On July 28, 1875, an early morning tremor caused Intensity V damage throughout Connecticut and Massachusetts.
- The second strongest earthquake to impact Connecticut occurred near Hebron on November 14, 1925. No significant damage was reported.
- The Timiskarning, Ontario earthquake of November 1935 caused minor damage as far south as Cornwall, Connecticut. This earthquake affected one million square miles of Canada and the United States.
- An earthquake near Massena, New York in September 1944 produced mild effects in Hartford, Marion, New Haven, and Meriden, Connecticut.
- An Intensity V earthquake was reported in Stamford in March of 1953, causing shaking but no damage.
- On November 3, 1968, another Intensity V earthquake in southern Connecticut caused minor damage in Madison and Chester.
- Recent earthquake activity has been recorded near New Haven in 1988, 1989, and 1990 (2.0, 2.8, and 2.8 in magnitude, respectively), in Greenwich in 1991 (3.0 magnitude), and on Long Island in East Hampton, New York in 1992.
- A 2.0 magnitude with its epicenter three miles northwest of the center of Chester occurred on March 11, 2008.
- A magnitude 5.0 earthquake struck at the Ontario-Quebec border region of Canada on June 23, 2010. This earthquake did not cause damage in Connecticut but was felt by residents in Hartford and New Haven Counties.
- A magnitude 3.9 earthquake occurred 117 miles southeast of Bridgeport, Connecticut on the morning of November 30, 2010. The quake did not cause damage in Connecticut but was felt by residents along Long Island Sound.
- An earthquake with a magnitude 2.1 was recorded near southeastern Connecticut on November 29, 2013. The earthquake did not cause damage but was felt by residents from Montville to Mystic.

- The most recent earthquake to strike Connecticut was a magnitude 2.7 beneath the Town of Deep River on August 14, 2014.

A magnitude 5.8 earthquake occurred 38 miles from Richmond, Virginia on August 23, 2011. The quake was felt from Georgia to Maine and reportedly as far west as Chicago. Many residents of Connecticut experienced the swaying and shaking of buildings and furniture during the earthquake although widespread damage was constrained to an area from central Virginia to southern Maryland. According to Cornell University, the August 23 quake was the largest event to occur in the east central United States since instrumental recordings have been available to seismologists.

7.4 Existing Capabilities

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 directly 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.

Wolcott's capabilities to mitigate for earthquake damage and prevent loss of life and property have not necessarily changed since the initial hazard mitigation plan was adopted, although the State's building code has been updated and the town has incorporated those changes.

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.

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.

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

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

According to the 2010 Connecticut Natural Hazard Mitigation Plan Update, Connecticut is at a low to moderate risk for experiencing an earthquake of a magnitude greater than 3.5 and at a moderate risk of an experiencing an earthquake of a magnitude less than 3.0 in the future. No earthquake with a magnitude greater than 3.5 has occurred in Connecticut within the last 30 years, and the USGS currently ranks Connecticut 43rd out of the 50 states for overall earthquake activity.

Nevertheless, it is likely that Connecticut will continue to experience minor earthquakes (magnitude less than 3.0) in the future. While the risk of an earthquake affecting Waterbury is relatively low over the short-term, long-term probabilities suggest that a damaging earthquake (magnitude greater than 5.0) could occur within the vicinity of Waterbury.

Because a damaging earthquake would likely affect a large area beyond Waterbury, it is likely that the community may not be able to receive regional aid for a few days. It is important for municipal facilities and departments to have adequate backup plans and backup supplies to ensure that restoration activities may begin and continue until outside assistance can be provided.

HAZUS-MH Simulations

The 2010 *Connecticut Natural Hazard Mitigation Plan Update* created four "maximum plausible" earthquake scenarios (three historical, one potential) within HAZUS-MH to generate potential earthquake risk to the State of Connecticut. The same four scenarios were simulated within HAZUS-MH to generate potential damages in Wolcott from those events using the default year 2000 building inventories and census data. The four events are as follows:

- Magnitude 5.7, epicenter in Portland, CT, based on historic event
- Magnitude 5.7, epicenter in Haddam, CT, based on historic event
- Magnitude 6.4, epicenter in East Haddam, CT, based on historic event
- Magnitude 5.7, epicenter in Stamford, CT, magnitude based on USGS probability mapping

The results for each HAZUS-MH earthquake simulation are presented in Appendix C and presented below. These results are believed conservative and considered appropriate for planning purposes in Wolcott. Note that potentially greater impacts could also occur.

Table 7-3 presents the number of residential buildings (homes) damaged by the various earthquake scenarios, while Table 7-4 presents the total number of buildings damaged by each earthquake scenario. A significant percentage of building damage is to residential buildings, while other building types include agriculture, commercial, education, government, industrial, and religious buildings. The exact definition of each damage state varies based on building construction. See Chapter 5 of the *HAZUS-MH Earthquake Model Technical Manual*, available on the FEMA website, for the definitions of each building damage state based on building construction.

Table 7-3
HAZUS-MH Earthquake Scenarios – Number of Residential Buildings Damaged

Epicenter Location and Magnitude	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage	Total
Haddam – 5.7	578	136	13	1	728
Portland – 5.7	779	210	23	3	1,015
Stamford – 5.7	151	24	2	0	177
East Haddam – 6.4	946	283	35	3	1,267

Table 7-4
HAZUS-MH Earthquake Scenarios – Total Number of Buildings Damaged

Epicenter Location and Magnitude	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage	Total
Haddam – 5.7	640	169	19	2	830
Portland – 5.7	864	266	35	4	1,169
Stamford – 5.7	168	30	3	0	201
East Haddam – 6.4	1,045	365	58	8	1,476

The HAZUS simulations consider a subset of critical facilities termed "essential facilities" which are important during emergency situations. As shown in Table 7-5, minor damage to essential facilities is expected for each earthquake scenario.

Table 7-5
HAZUS-MH Earthquake Scenarios – Essential Facility Damage

Epicenter Location and Magnitude	Police Stations (1)	Schools (5)
Haddam – 5.7	Minor damage (66% functionality)	Minor damage (67% functionality)
Portland – 5.7	Minor damage (61% functionality)	Minor damage (60% functionality)
Stamford – 5.7	Minor damage (86% functionality)	Minor damage (86% functionality)
East Haddam – 6.4	Minor damage (54% functionality)	No Damage

Table 7-6 presents potential damage to utilities and infrastructure based on the various earthquake scenarios. The HAZUS-MH software assumes that the Wolcott transportation network and utility network includes the following:

- Highway: 4 major roadway bridges and 3 important highway segments;
- A potable water system consisting of 167 total kilometers of pipelines;
- A waste water system consisting of 100 total kilometers of pipelines
- A total of 67 kilometers of natural gas lines

As shown in Table 7-6, highway bridges, the rail facility, and the bus facility are predicted to experience minor damage under the Portland and East Haddam earthquake scenario. Water, sewer, and gas lines are expected to have leaks and breaks, no loss of potable water or electrical service is expected. No displacement of people is expected due to ignitions following the earthquake.

Table 7-6
HAZUS-MH Earthquake Scenarios – Utility, Infrastructure, and Fire Damage

Epicenter Location and Magnitude	Transportation Network	Utilities	Fire Damage
Haddam – 5.7	No Damage	5 leaks and 1 major break in potable water system ($0.02 million), 2 leaks and 1 major break in waste water system ($0.01 million), 1 leak in natural gas system (<$0.01 million). No loss of service expected. Total damage: Approximately $0.04 million.	Fire damage will displace no people.
Portland – 5.7	Minor damage to transportation infrastructure (<$0.01 million to bridges)	8 leaks and 2 major breaks in potable water system ($0.04 million), 4 leaks and 1 major break in waste water system ($0.02 million), 1 leak in natural gas system ($0.01 million). No loss of service expected. Total damage: Approximately $0.07 million.	Fire damage will displace no people.
Stamford – 5.7	No Damage	1 leak in potable water system (<$0.01 million), 1 leak in waste water system (<$0.01 million). No loss of service expected. Total damage: Approximately $0.01 million.	Fire damage will displace no people.
East Haddam – 6.4	Minor damage to transportation infrastructure ($0.02 million to bridges)	16 leaks and 4 major breaks in potable water system ($0.07 million), 8 leaks and 2 major breaks in waste water system ($0.04 million), 3 leaks and 1 major break in natural gas system ($0.01 million). No loss of service expected. Total damage: Approximately $0.12 million.	Fire damage will displace no people.

Table 7-7 presents the estimated tonnage of debris that would be generated by earthquake damage during each HAZUS-MH scenario. As shown in Table 7-7, debris is expected for three of the four earthquake scenarios, with the East Haddam earthquake scenario generating the most debris in the community.

Table 7-7
HAZUS-MH Earthquake Scenarios – Debris Generation (Tons)

Epicenter Location and Magnitude	Brick / Wood	Reinforced Concrete / Steel	Total	Estimated Cleanup Truckloads (25 Tons / Truck)
Haddam – 5.7	1,830	1,170	3,000	120
Portland – 5.7	3,180	2,820	6,000	240
Stamford – 5.7	None	None	None	None
East Haddam – 6.4	4,600	5,400	10,000	400

Table 7-8 presents the potential sheltering requirements based on the various earthquake events simulated by HAZUS-MH. The predicted sheltering requirements for earthquake damage (not including fire damage in Table 7-6) are relatively significant for all but the Stamford scenario. However, it is possible that an earthquake could also produce a dam failure (flooding) or be a contingent factor in another hazard event that could increase the overall sheltering need in the community.

Table 7-8
HAZUS-MH Earthquake Scenarios – Shelter Requirements

Epicenter Location and Magnitude	Number of Displaced Households	Short Term Sheltering Need (Number of People)
Haddam – 5.7	4	2
Portland – 5.7	7	4
Stamford – 5.7	None	None
East Haddam – 6.4	11	6

Table 7-9 presents the casualty estimates generated by HAZUS-MH for the various earthquake scenarios. Casualties are broken down into four severity levels that describe the extent of injuries. The levels are as follows:

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed;
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening;
- Severity Level 3: Injuries will require hospitalization and can become life-threatening if not promptly treated; and
- Severity Level 4: Victims are killed by the earthquake.

Table 7-9
HAZUS-MH Earthquake Scenarios – Casualty Estimates

Epicenter Location - Magnitude	2 AM Earthquake	2 PM Earthquake	5 PM Earthquake
Haddam – 5.7	3 (Level 1)	2 (Level 1)	2 (Level 1)
Portland – 5.7	4 (Level 1); 1 (Level 2)	5 (Level 1); 1 (Level 2)	4 (Level 1); 1 (Level 2)
Stamford – 5.7	1 (Level 1)	0 (Level 1)	0 (Level 1)
East Haddam – 6.4	6 (Level 1); 1 (Level 2)	8 (Level 1); 2 (Level 2)	7 (Level 1); 1 (Level 2)

No casualties are expected due to earthquake damage in Wolcott for the four earthquake scenarios. Some injuries (mostly level 1) are expected for each of the earthquake scenarios..

Table 7-10 presents the total estimated losses and direct economic impact that may result from the four earthquake scenarios created for Wolcott as estimated by the HAZUS-MH software. Capital damage loss estimates include the subcategories of building, contents, and inventory damages. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building or its contents. Business interruption loss estimates include the subcategories of lost income, relocation expenses, and lost wages. The business interruption losses are associated with the inability to operate a business due to the damage sustained during a hurricane, and also include temporary living expenses for those people displaced from their home because of the storm. Note that these damages do not include transportation, utility, or fire damage in Table 7-6.

Table 7-10
HAZUS-MH Estimated Direct Losses from Earthquake Scenarios

Epicenter Location and Magnitude	Estimated Total Capital Losses	Estimated Total Income Losses	Estimated Total Losses
Haddam – 5.7	$14,520,000	$3,750,000	$18,270,000
Portland – 5.7	$24,270,000	$6,910,000	$31,180,000
Stamford – 5.7	$2,060,000	$580,000	$2,640,000
East Haddam – 6.4	$33,700,000	$10,980,000	$44,680,000

The maximum simulated damage considering direct losses and infrastructure losses is approximately $44.7 million for the East Haddam scenario. Note that the losses are presented in 2006 dollars, which implies that they will be greater in the future due to inflation. It is also believed that the next plan update will be able to utilize 2010 census data within HAZUS-MH, providing a more recent dataset for analysis.

Despite the low probability of occurrence of damaging earthquakes, this analysis demonstrates that earthquake damage presents a potential hazard to Wolcott. Additional infrastructure not modeled by HAZUS-MH, such as water treatment plants, sewer pumping stations, and water storage tanks, could be affected by an earthquake.

7.6 Potential Mitigation Strategies and Actions

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.

Requiring adherence to current State building codes for new development and redevelopment is necessary to minimize the potential risk of earthquake damage. Communities may consider preventing new residential development in areas that are most at risk to collapse or liquefaction. Many Connecticut communities already have regulations restricting development on steep slopes. Additional regulations could be enacted to buffer development a certain distance from the bottom of steep slopes, or to prohibit development on fill materials and areas of fine sand and clay. The State Geologist indicates that such deposits have the highest risk for seismic wave amplification. Other regulations could specify a minimum level of compaction for filled areas before it is approvable for development.

Departments providing emergency services should have backup plans and adequate backup facilities such as portable generators in place in case earthquake damage occurs to critical facilities, particularly public water and the waste water treatment facilities. The Public Works Department should also have adequate backup plans and facilities to ensure that roads can be opened as soon as possible after a major earthquake.

The fact that damaging earthquakes are rare occurrences in Connecticut heightens the need to educate the public about this potential hazard. An annual pamphlet outlining steps each family can take to be prepared for disaster is recommended. Also, because earthquakes generally provide little or no warning time, municipal personal and students should be instructed on what to do during an earthquake in a manner similar to fire drills.

Critical facilities may be retrofitted to reduce potential damage from seismic events. Potential mitigation activities may include bracing of critical equipment such as generators, identifying and hardening critical lifeline systems (such as water and sewer lines), utilizing flexible piping where possible, and installing shutoff valves and emergency connector hoses where water mains cross fault lines. Potential seismic mitigation measures for all buildings include strengthening and retrofitting non-reinforced masonry buildings and non-ductile concrete facilities that are particularly vulnerable to ground shaking, retrofitting building veneers to prevent failure, installing window films to prevent injuries from shattered glass, anchoring rooftop-mounted equipment, and reinforcing masonry chimneys with steel bracing.

7.7 Status of Mitigation Strategies and Actions

The prior mitigation strategies associated with earthquakes are listed below with commentary regarding the status of each.

Table 7-11
Status of Previous Strategies and Actions

Strategy or Action	Status
Preserve or convert areas of inactive faults to municipal open space.	This is already complete in the northeastern part of Wolcott, but there may be interest in the western part of the town. The action is carried forward.
Consider preventing new residential development in areas prone to collapse.	This is reviewed and addressed on a case-by-case basis in Wolcott, given the slow pace of development in the town. As such, it is a capability.
Consider restricting residential development on or below steep slopes (slopes exceeding 30%).	This is reviewed and addressed on a case-by-case basis in Wolcott, given the slow pace of development in the town. As such, it is a capability.
Continue to require adherence to the state building codes.	This is part of the State building code and can be deleted as a strategy.
Ensure that municipal departments have adequate backup facilities in case earthquake damage occurs.	This is largely complete but the strategy is modified to address the high school. Specifically, public water system will be extended to the high school, and the town will pursue standby power supply for the high school.

One new strategy has been identified through the process of updating this plan. The town may consider bracing systems and assets inside critical facilities. This could help protect IT systems, important records and files, libraries, and department-specific assets such as mechanical equipment.

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 moderately possible natural hazard event in any given year.

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	-

Number	Name	Class
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.

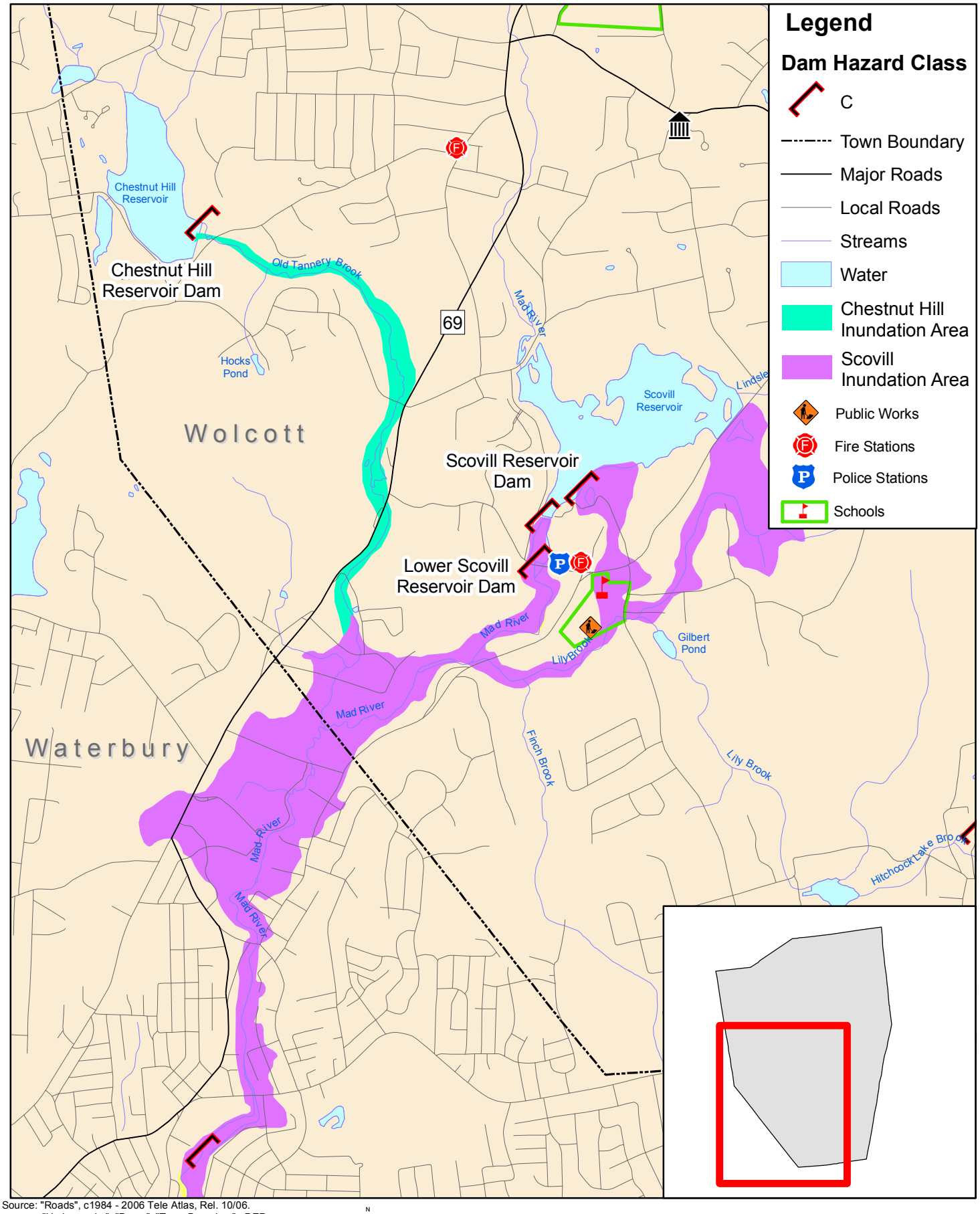
Aside from the Class B and C dams, this plan also includes a discussion of one Class BB dam, the Cedar Swamp Pond dam. Although the dam is considered a moderate hazard potential instead of significant or high, failure of the dam would render an important roadway impassable, cutting off residents in the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

8.3 Historic Record

Approximately 200 notable dam and reservoir failures occurred worldwide in the 20th century. More than 8,000 people died in these disasters. The following is a listing of some of the more catastrophic dam failures in Connecticut's recent history:

- 1938 and 1955: Exact numbers of dam failures caused by these floods are unavailable, but the Connecticut DEEP believes that more dams were damaged in these events than in the 1982 event listed below or the 2005 dam failure events listed on the next page.
- 1961: Crystal Lake dam in Middletown failed, injuring three and severely damaging 11 homes.

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

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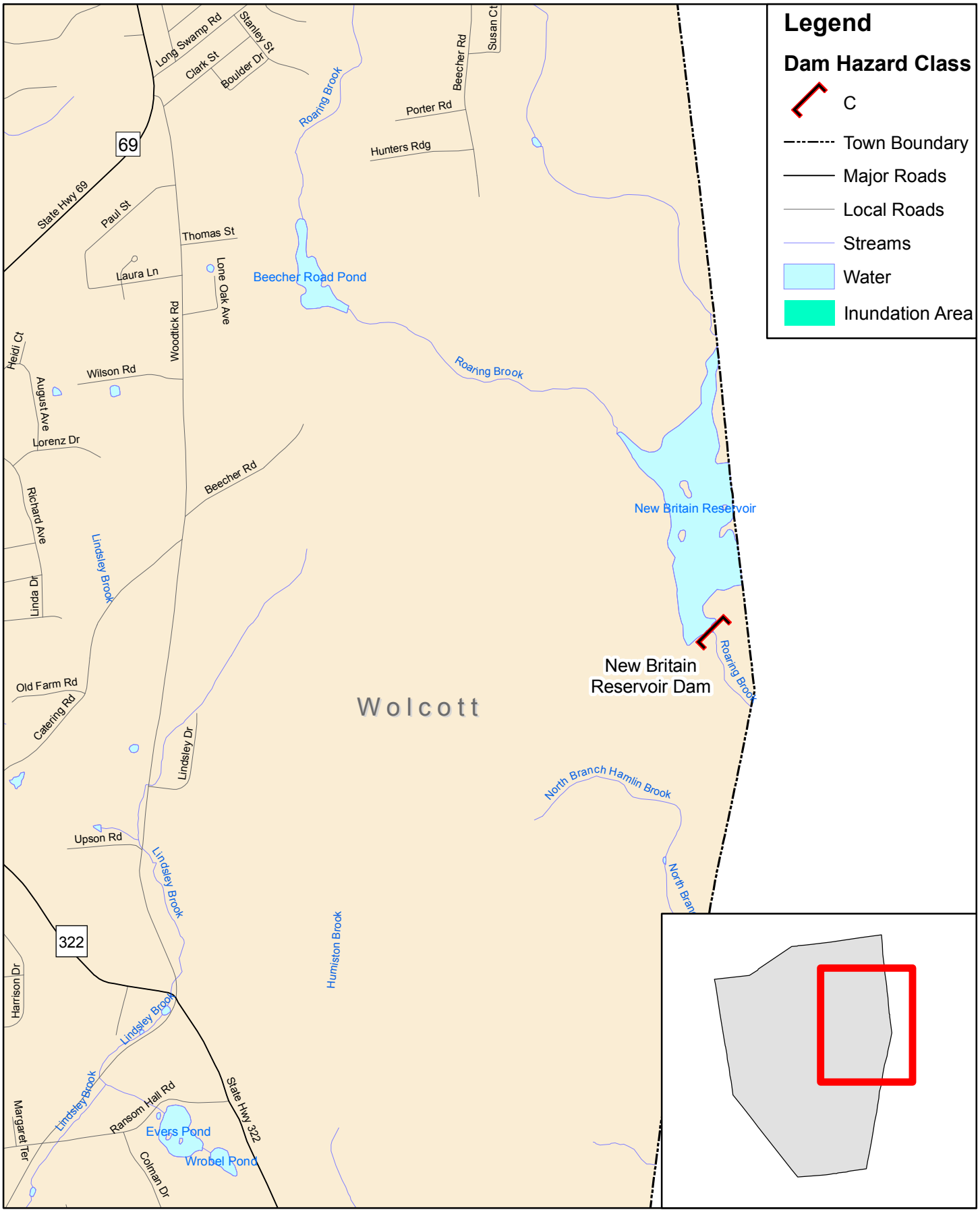
CENTRAL NAUGATUCK VALLEY

Figure 8-2: High Hazard Dams in Wolcott

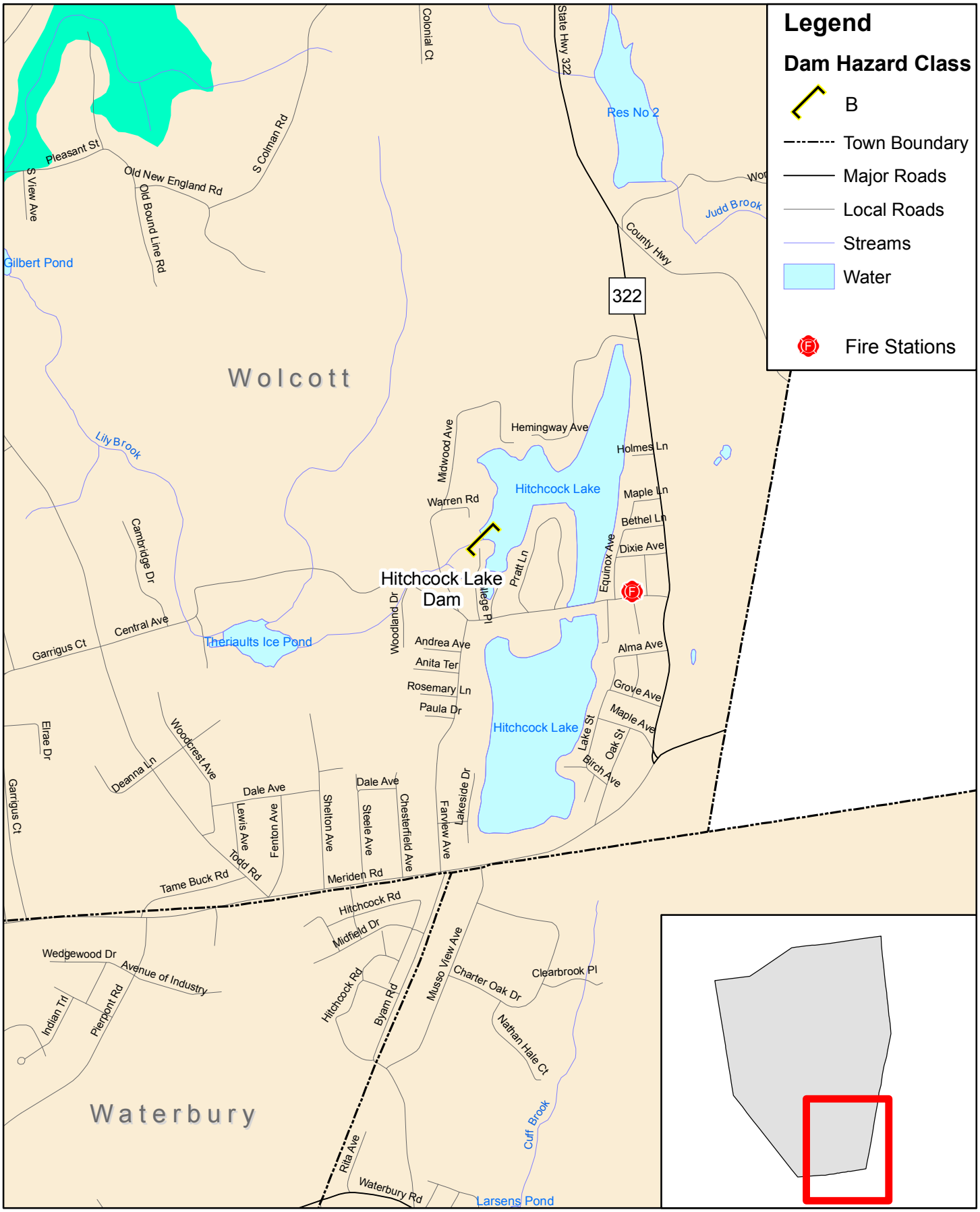


Source: "Roads", c1984 - 2006 Tele Atlas, Rel. 10/06.
"Hydrography", "Dams", "Town Boundary", DEP
For general planning purposes only. Delineations may not be exact.
February 2008

Miles
0 0.25 0.5

COUNCIL OF GOVERNMENTS
CENTRAL NAUGATUCK VALLEY

Figure 8-3: High Hazard Dams in Wolcott



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

0 750 1,500 Feet

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- 1963: Failure of the Spaulding Pond Dam in Norwich caused six deaths and $6 million in damage.
- June 5-6, 1982: Connecticut experienced a severe flood that caused 17 dams to fail and seriously damaged 31 others. Failure of the Bushy Hill Pond Dam in Deep River caused $50 million in damages, and the remaining dam failures caused nearly $20 million in damages.

More recently, the NCDC reports that flash flooding on April 16, 1996 caused three small dams in Middletown and one in Wallingford to breach. The Connecticut DEEP reported that the sustained heavy rainfall from October 7 to 15, 2005 caused 14 complete or partial dam failures and damage to 30 other dams throughout the state. A sample of damaged dams is summarized in Table 8-2.

Table 8-2
Dams Damaged Due to Flooding from October 2005 Storms

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

The Association of State Dam Safety Officials states that no one knows precisely how many dam failures have occurred, but they have been documented in every state. From January 1, 2005 through January 1, 2009, state dam safety programs reported 132 dam failures and 434 incidents requiring intervention to prevent failure.

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 and B dam based on information available at the Connecticut DEP:

- Scovill Reservoir Dam – Also known as Woodtick Dam, this dam is 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.

- 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 DEEP files, this dam needed minor maintenance and its Emergency Operations Plan (EOP) updated as of April 2005.

- 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.

- Hitchcock Lake Dam – According to the DEEP 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 DEEP as recently as July 2004 and needed vegetation removed and general maintenance on the intake gate. This dam lacked an EOP and the DEEP requested that one be provided. An EOP was prepared and filed subsequent to the adoption of the initial hazard mitigation plan.

- Chestnut Hill Reservoir – According to the DEEP 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 DEEP 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.

- 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. This dam does not have an EOP, according to the Wolcott LEPC.

8.4 Existing Capabilities

The Dam Safety Section of the DEEP 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 inventoried and periodically inspected to assure that their continued operation does not constitute a hazard to life, health, or property.

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

Dam Inspection Regulations require that nearly 700 dams in Connecticut be inspected annually. The DEEP currently performs inspections of those dams which pose

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

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

the greatest potential threat to downstream persons and properties, and also performs inspections as complaints are registered.

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 DEEP 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 DEEP Commissioner is empowered by statute to remove or correct, at the expense of the owner, any unsafe structures that present a clear and present danger to public safety.

Owners of Class C dams have traditionally been required to maintain Emergency Operation Plans (EOPs). Guidelines for dam EOPs were published by DEEP in 2012, creating a uniform approach for development of EOPs. As dam owners develop EOPs using the new guidance, DEEP anticipates that the quality of EOPs will improve, which will ultimately help reduce vulnerabilities to dam failures.

Important dam safety program changes are underway in Connecticut. Public Act 13-197, *An Act Concerning the Dam Safety Program and Mosquito Control*, passed in June 2013 and describes new requirements for dams related to registration, maintenance, and EOPs, which will be called emergency action plans (EAPs) moving forward. This Act requires owners of certain unregistered dams or similar structures to register them by October 1, 2015. The Act generally shifts regularly scheduled inspection and reporting requirements from the DEEP to the owners of dams. The Act also makes owners generally responsible for supervising and inspecting construction work and establishes new reporting requirements for owners when the work is completed.

Effective October 1, 2013, the owner of any high or significant hazard dam (Class B and C) must develop and implement an EAP after the Commissioner of DEEP adopts regulations. The EAP shall be updated every two years, and copies shall be filed with DEEP and the chief executive officer of any municipality that would potentially be affected in the event of an emergency. New regulations shall establish the requirements for such EAPs, including but not limited to (1) criteria and standards for inundation studies and inundation zone mapping; (2) procedures for monitoring the dam or structure during periods of heavy rainfall and runoff, including personnel assignments and features of the dam to be inspected at given intervals during such periods; and (3) a formal notification system to alert appropriate local officials who are responsible for the warning and evacuation of residents in the inundation zone in the event of an emergency.

The Wolcott town engineer will, on occasion, inspect some dams in the town. The Town of Wolcott is responsible for maintaining the EAPs for the Scovill Reservoir, Lower Scovill Reservoir, and Chestnut Hill Reservoir. The Wolcott Land Conservation Trust is responsible for maintaining an EAP for Hitchcock Lake, and the New Britain Water Department is responsible for maintaining the EAP for the New Britain Reservoir. New Britain Reservoir is the only reservoir currently used as a water supply.

Wolcott's capabilities to mitigate for dam failure and prevent loss of life and property damage have increased since the initial hazard mitigation plan was adopted, partly as a

result of the recent statewide legislative actions described above. In the next few years, dam safety programs will continue to strengthen.

8.5 Vulnerabilities and Risk Assessment

By definition, failure of Class C dams may cause catastrophic loss of life and property. 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.

Loss Estimates – Four of the five Class C dams in Wolcott discharge into the Mad River or its tributaries, as does the Class B dam. A failure of any one of these dams could cause losses that are similar or greater than a 1% annual chance flood. Furthermore, failure of one of the three Scovill dams could impact the other(s) that are downstream.

With reference to the HAZUS analysis in Chapter 3, estimated building losses along Old Tannery Brook during a 1% annual chance flood are $2.36 million and business interruption losses were negligible. Failure of the Chestnut Hill Reservoir would causes equal or more excessive losses along this brook.

With reference to the HAZUS analysis, estimated building losses along the Mad River during a 1% annual chance flood are $4.45 million and business interruption losses were $20,000. Failure of the Scovill reservoir system, Cedar Swamp Pond dam, or Hitchcock Lake dam could cause equal or more excessive losses along this river.

The remaining Class C dam (New Britain Reservoir) drains directly east into the town of Southington, and losses in Wolcott would be minimal if the dam were to fail.

8.6 Potential Mitigation Strategies and Actions

Preventive measures associated with dam failure include semi-annual or annual inspections of each dam. Dam inspections in the State of Connecticut are required to be conducted by a licensed professional engineer. In addition, local communities should maintain a dialogue with Connecticut DEEP regarding the development of EAPs and Dam Failure Analysis for dams not owned by the municipality, and encourage Connecticut DEEP to approach dam owners of Class B and Class C dams to develop or update such plans as needed. Some of this will be forthcoming with the recent legislation.

Communities containing or located downstream from high and significant hazard dams should maximize their emergency preparedness for a potential dam failure. This can be done by having

copies of the EAP for each dam on file with the local emergency manager and the local engineering department as well as by including potential inundation areas in an emergency notification database. It is important to maintain up to date dam failure inundation mapping in order to properly direct notifications into potentially affected areas. Dam failure inundation areas should be mapped for all community-owned significant and high hazard dams. For dams without a mapped failure inundation area, the 100-year and 500-year floodplains described in Section 3 could be utilized to provide approximate failure inundation areas for the notification database.

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

Public education and awareness should be directed at dam owners in the community in order to keep them up to date on maintenance resources, repair resources, funding sources, and regulatory changes. Public education for residents will be similar to those for flooding, but should also be directed to residents in potential inundation areas. Such residents should be given information regarding preparing evacuation kits and potential evacuation procedures.

Structural projects for preventing dam failure are typically focused on maintaining and repairing subject dams to be in good condition, resizing spillways to pass a larger flood event without causing damage, and maintaining upstream dams such that sequential failures do not occur.

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 EAP 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 EAPs 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 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.

8.7 Status of Mitigation Strategies and Actions

The prior mitigation strategies associated with dam failure are listed below with commentary regarding the status of each.

Table 8-3
Status of Previous Strategies and Actions

Strategy or Action	Status
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.	The CT legislature passed an Act in 2013 to require owners of high and significant hazard dams to inspect their facilities and prepare inundation mapping and EAPs. This action is being addressed by the CT DEEP, but has been carried forward as a placeholder with the understanding that dam owners will be working with DEEP.
Consider implementing Town inspections of Class A, AA, B, and BB dams.	In accordance with the recent Act, the town will defer to DEEP with regard to inspections of Class B and BB dams. The town does not have the capability to inspect Class A and AA dams, and this action is deleted.
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.	The town looks forward to receiving copies of EAPs as they are developed per the recent state legislation. This action has been carried forward as a placeholder with the understanding that dam owners will be working with DEEP.
Copies of EOPs should be made available at the Town Hall for reference and public viewing.	Wolcott will work toward this action as EAPs are completed.

With the legislature passed in 2013, dam assessment and management capabilities will continue to increase in the state. The next edition of this plan will revisit dams and discuss the outcomes of the legislation and any new regulations administered by the Connecticut DEEP.

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 of any type 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.

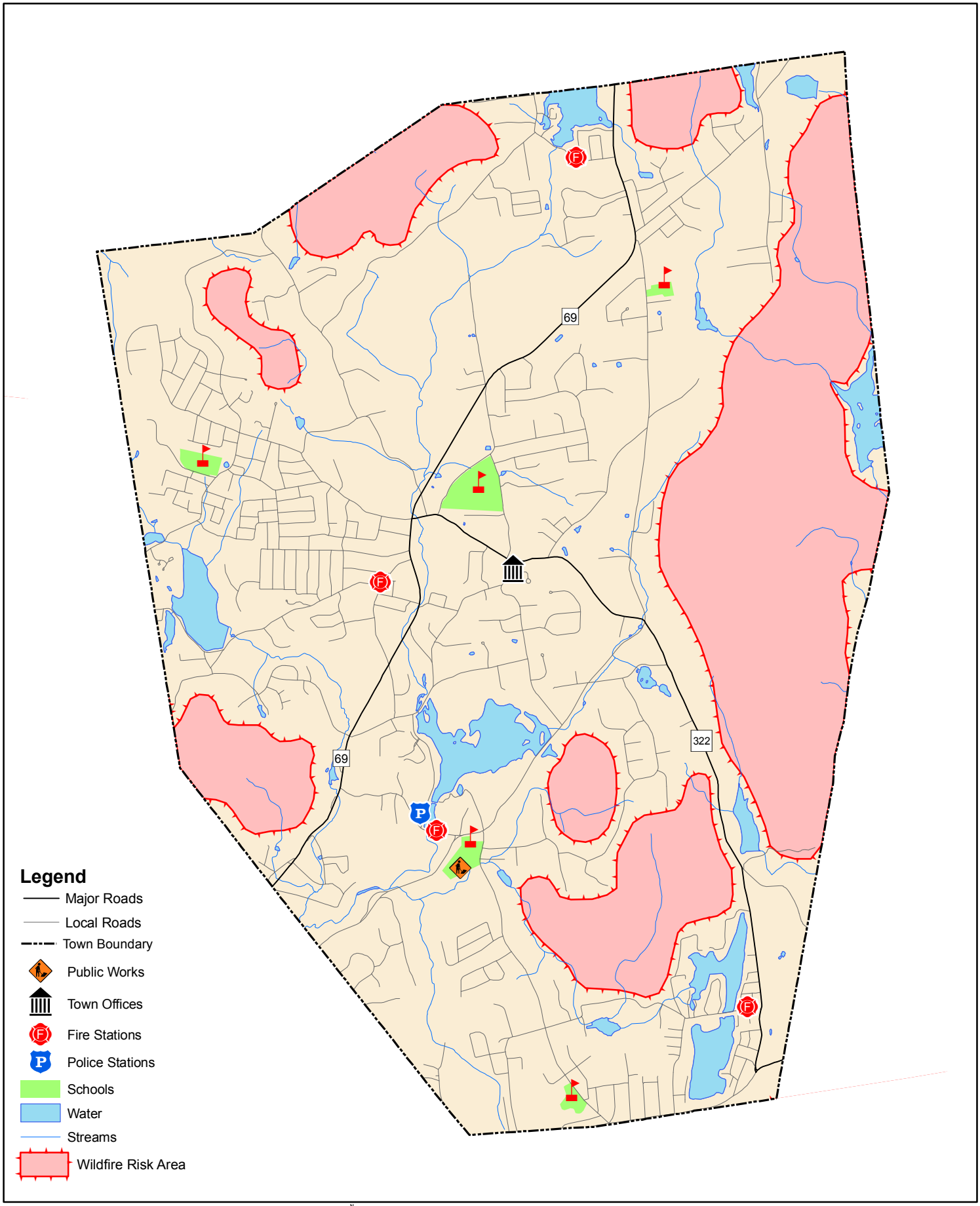
9.2 Hazard Assessment

Wildfires are any non-structure fire, other than a prescribed burn, that occurs in undeveloped areas. They are considered to be 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." According to the U.S. Bureau of Land Management, each of three elements (known as the fire triangle) must be present in order to have any type of fire:

The Fire Triangle. Public Domain Image Hosted by Wikimedia Commons.

- Fuel – Without fuel, a fire will stop. Fuel can be removed naturally (when the fire has consumed all burnable fuel), or manually by mechanically or chemically removing fuel from the fire. Fuel separation is important in wildfire suppression and is the basis for controlling prescribed burns and suppressing other wildfires. The type of fuel present in an area can help determine overall susceptibility to wildfires. According to the Forest Encyclopedia Network, four types of fuel are present in wildfires:
  - Ground Fuels, consisting of organic soils, forest floor duff, stumps, dead roots, and buried fuels;
  - Surface Fuels, consisting of the litter layer, downed woody materials, and dead and live plants to two meters in height;
  - Ladder Fuels, consisting of vine and draped foliage fuels; and
  - Canopy Fuels, consisting of tree crowns

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

N
W E
S

0 0.5 1 Miles

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- Heat – Without sufficient heat, a fire cannot begin or continue. Heat can be removed through the application of a substance, such as water, powder, or certain gases, that reduces the amount of heat available to the fire. Scraping embers from a burning structure also removes the heat source.

- Oxygen – Without oxygen, a fire cannot begin or continue. In most wildland fires, this is commonly the most abundant element of the fire triangle and is therefore not a major factor in suppressing wildfires.

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 primarily by lightning. According to the USGS, wildfires can increase the potential for flooding, debris flows, or landslides; increase pollutants in the air; temporarily destroy timber, foliage, habitats, scenic vistas, and watershed areas; and have long term impacts such as reduced access to recreational areas, destruction of community infrastructure, and reduction of cultural and economic resources.

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

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

9.3 Historic Record

According to the Connecticut DEEP Forestry Division, much of Connecticut was deforested by settlers and turned into farmland during the colonial period. A variety of factors in the 19th century caused the decline of farming in the State, and forests reclaimed abandoned farm fields. In the early 20th century, deforestation again occurred in Connecticut, this time for raw materials needed to ship goods throughout the world. Following this deforestation, shipping industries in Connecticut began to look to other states for raw materials, and the deciduous forests of today began to grow in the State.

During the early 20th century, wildfires regularly burned throughout Connecticut. Many of these fires began accidentally by sparks from railroads and industry, while others were deliberately set to clear underbrush in the forest and provide pasture for livestock. A total of 15,000 to 100,000 acres of land was burned annually during this period. This destruction of resources led to the

creation of the position of the State Forest Fire Warden and led to a variety of improved coordination measures.

According to the USDA Forest Service Annual Wildfire Summary Report for 1994 through 2003, an average of 600 acres per year in Connecticut was burned by wildfires. The National Interagency Fire Center (NIFC) reports that a total of 3,448 acres of land burned in Connecticut from 2002 through 2012 due to 2,334 non-prescribed wildfires, an average of 1.5 acres per fire and 313 acres per year (Table 9-1). The Connecticut DEEP Forestry Division estimates the average acreage burned per year to be much higher (1,000 acres per year) in the 2010 *Connecticut Natural Hazard Mitigation Plan Update*. In general, the fires are small and detected quickly, with most of the largest 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.

Table 9-1
Wildland Fire Statistics for Connecticut

Year	Number of Wildland Fires	Acres Burned	Number of Prescribed Burns	Acres Burned	Total Acres Burned
2012	180	417	4	42	459
2011	196	244	7	42	286
2010	93	262	6	52	314
2009	264	246	6	76	322
2008	330	893	6	68	961
2007	361	288	7	60	348
2006	322	419	6	56	475
2005	316	263	10	130	393
2004	74	94	12	185	279
2003	97	138	8	96	234
2002	101	184	13	106	290
Total	**2,334**	**3,448**	**85**	**913**	**4,361**

Source: National Interagency Fire Center

Traditionally, the highest forest fire danger in Connecticut occurs in the spring from mid-March to mid-May. The worst wildfire year in Connecticut since 1994 occurred during the extremely hot and dry summer of 1999. Over 1,733 acres of Connecticut burned in 345 separate wildfires, an average of about five acres per fire. Only one wildfire occurred between 1994 and 2003 that burned over 300 acres, and a wildfire in 1986 in the Mattatuck State Forest in the nearby Town Watertown burned 300 acres.

The Town of Wolcott reports that few wildfires have occurred since the adoption of the previous HMP. Most fires have been less than an acre in size. In particular, the spring of 2013 was a very quiet wildfire season.

9.4 Existing Capabilities

The Connecticut DEEP Division of Forestry monitors the weather each day during non-winter months as it relates to fire danger. The Division utilizes precipitation and soil moisture data to

compile and broadcast daily forest fire probability forecasts. Forest fire danger levels are classified as low, moderate, high, very high, or extreme. In addition, the NWS issues a Red Flag warning when winds will be sustained or there will be frequent gusts above a certain threshold (usually 25 mph), the relative humidity is below 30%, and precipitation for the previous five days has been less than one-quarter inch. Such conditions can cause wildfires to quickly spread from their source area.

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 is in the process of extending the system to the high school and to neighborhoods west of Route 69. In the remainder of Town, the fire department relies heavily on the use of fire ponds to supply fire fighting water. A recent proposed ordinance to require 10,000-gallon fire suppression water storage tanks in town was not passed. However, the town has required cisterns in some areas to provide 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 Fire Department recently found it necessary to enforce rules that prevent the burning of pallets and other fabricated wood products. This type of enforcement will help prevent wildland and other fires.

Since the adoption of the last HMP, some water main extensions have reduced the wildfire risk area. **Aside from moderate changes in State policy and improvements to the public water system, the town's capabilities to mitigate for wildfires and prevent loss of life and property have not changed significantly since the initial hazard mitigation plan was adopted. The town will continue to evaluate whether capabilities need to be strengthened in the future.**

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 DEEP, 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 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 1980s 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.

Loss Estimates – The 2014 Connecticut Natural Hazard Mitigation Plan provides annual estimated losses on a countywide basis for several hazards. Based on the population of Wolcott relative to New Haven County, the annual estimated loss is $1,084 for wildfires. This is reasonable for Wolcott, as most of the cost to fight wildfires is associated with the annual budgets of the Fire Department.

9.6 Potential Mitigation Strategies and Actions

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 another important class of potential mitigation for wildfires.

9.7 Status of Mitigation Strategies and Actions

The prior mitigation strategies associated with wildfires are listed below with commentary regarding the status of each.

Table 9-2
Status of Previous Strategies and Actions

Strategy or Action	Status
The Wolcott Water Department should continue to extend the public water supply systems into areas that require water for fire protection.	No progress was made due to a lack of funding. Two areas of expansion are currently planned: west of Route 69, and Wolcott High School. The next update of this plan will comment on the status of these projects.
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.	This is ongoing and is a capability.

Strategy or Action	Status
The Town of Wolcott should continue the excavation of fire ponds throughout the Town to ensure an adequate supply of firefighting water.	Cisterns are also allowed at this time. A new strategy is to allow fire ponds or cisterns.
Continue to promote inter-municipal cooperation in fire fighting efforts	This is ongoing and is a capability.
Continue to support public outreach programs to increase awareness of forest fire danger and how to use common fire fighting equipment	This is ongoing and is a capability.
Continue reviewing subdivision applications to ensure new neighborhoods and driveways are properly sized to allow access of emergency vehicles	This is ongoing and is a capability.
Provide outreach programs on how to properly manage burning and campfires on private property	This is ongoing and is a capability.
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	This is ongoing and is a capability, although this exact publication is not used. Others are utilized.
Patrol Town-owned open space and parks to prevent unauthorized campfires	This is ongoing and is a capability, although municipal open space and parks are not patrolled specifically for this purpose.
Enforce regulations and permits for open burning	This is ongoing and is a capability.
Continue to place utilities underground.	This is ongoing and is a capability.

Most of the above strategies and actions are already ongoing and are part of the town's capabilities. One new strategy is to install fire ponds or cisterns to facilitate firefighting in areas without public water supply. This is a modification of the previous strategy that mentioned only fire ponds.

10.0 MITIGATION STRATEGIES AND ACTIONS

10.1 Additional Strategies

Strategies that are applicable to a small number of hazards were discussed in the applicable subsections of Sections 3.0 through 9.0. For example, placing utilities underground is a strategy for hurricane, summer storm, winter storm, and wildfire mitigation. A remaining class of "all-hazard" strategies is applicable to all hazards, because it includes actions for improving public safety and planning for emergency response.

Wolcott has made great progress with all of the all-hazard strategies described in the previous HMP. Preparedness and disaster-related information is continuously provided in municipal facilities, and the town subscribes to the CT Alert notification system. The town's EOP is reviewed annually and updated as needed. These previous strategies are now considered capabilities.

Two new all-hazard strategies are proposed in this plan: (1) provision of standby power at Wolcott High School, and (2) passage of an ordinance to require standby power for group homes and assisted living facilities. Acquisition and installation of additional standby power supplies (generators) is needed throughout town. Consider, for example, that power outages caused by Tropical Storm Irene and Winter Storm Alfred caused outages at some of the town's facilities. The town would prefer to void these situations, going forward.

10.2 Summary of Proposed Strategies and Actions

Strategies and actions have been presented throughout this document in individual sections as related to each natural hazard. 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, is outlined in FEMA planning documents such as *Developing the Mitigation Plan* (FEMA 386-3) and *Using Benefit-Cost Review in Mitigation Planning* (FEMA 386-5). STAPLEE stands for the "Social, Technical, Administrative, Political, Legal, Economic, and Environmental" criteria for making planning decisions. The STAPLEE method was used in the previous HMP.

Overview of the STAPLEE Prioritization Process

Benefit-cost review was emphasized in the prioritization process. Criteria were divided into potential benefits (pros) and potential costs (cons) for each mitigation strategy. The following questions were asked about the proposed mitigation strategies:

- **Social**:
  - Benefits: Is the proposed strategy socially acceptable to the jurisdiction?

- Costs: Are there any equity issues involved that would mean that one segment of the region could be treated unfairly? Will the action disrupt established neighborhoods, break up voting districts, or cause the relocation of lower-income people? Is the action compatible with present and future community values?

- **Technical**:

  - Benefits: Will the proposed strategy work? Will it reduce losses in the long term with minimal secondary impacts?

  - Costs: Is the action technically feasible? Will it create more problems than it will solve? Does it solve the problem or only a symptom?

- **Administrative**:

  - Benefits: Does the project make it easier for each community to administer future mitigation or emergency response actions?

  - Costs: Does each community have the capability (staff, technical experts, and/or funding) to implement the action, or can it be readily obtained? Can the community perform the necessary maintenance? Can the project be accomplished in a timely manner?

- **Political**:

  - Benefits: Is the strategy politically beneficial? Is there public support both to implement and maintain the project? Is there a local champion willing to see the project to completion? Can the mitigation objectives be accomplished at the lowest cost to the community (grants, etc.)?

  - Costs: Have political leaders participated in the planning process? Do project stakeholders support the project enough to ensure success? Have the stakeholders been offered the opportunity to participate in the planning process?

- **Legal**:

  - Benefits: Is there a technical, scientific, or legal basis for the mitigation action? Are the proper laws, ordinances, and resolutions in place to implement the action?

  - Costs: Does the community have the authority to implement the proposed action? Are there any potential legal consequences? Will the community be liable for the actions or support of actions, or for lack of action? Is the action likely to be challenged by stakeholders who may be negatively affected?

- **Economic**:

  - Benefits: Are there currently sources of funds that can be used to implement the action? What benefits will the action provide? Does the action contribute to community goals, such as capital improvements or economic development?

- Costs: Does the cost seem reasonable for the size of the problem and the likely benefits? What burden will be placed on the tax base or local economy to implement this action? Should the considered action be tabled for implementation until outside sources of funding are available?

- **Environmental**:

  - Benefits: Will this action beneficially affect the environment (land, water, endangered species)?

  - Costs: Will this action comply with local, state, and federal environmental laws and regulations? Is the action consistent with community environmental goals?

Each proposed mitigation strategy presented in this plan was evaluated and quantitatively assigned a "benefit" score and a "cost" score for each of the seven STAPLEE criteria, as outlined below:

- For potential benefits, a score of "1" was assigned if the project will have a beneficial effect for that particular criterion; a score of "0.5" was assigned if there would be a slightly beneficial effect; or a "0" if the project would have a negligible effect or if the questions were not applicable to the strategy.

- For potential costs, a score of "-1" was assigned if the project would have an unfavorable impact for that particular criterion; a score of "-0.5" was assigned if there would be a slightly unfavorable impact; or a "0" if the project would have a negligible impact or if the questions were not applicable to the strategy.

- Technical and economic criteria were double weighted (x2) in the final sum of scores.

- The total benefit score and cost score for each mitigation strategy were summed to determine each strategy's final STAPLEE score. The highest possible score is 9.0, while the lowest possible score is -9.0.

An evaluation matrix with the total scores from each suggested action is presented in Appendix A. Page 1 of the STAPLEE matrix lists all of the strategies and actions from the previous edition of this HMP with commentary for each, plus new strategies and actions. The commentary in the matrix is based on the status of each as presented in the applicable sections of chapters 3 through 10. Page 2 lists only those previous strategies that are carried forward plus the new strategies and actions. Page 2 of the STAPLEE matrix presents the summary of scores. The highest scoring is determined to be of more importance economically, socially, environmentally, and politically and, hence, prioritized over those with lower scoring. In addition, structural projects were also evaluated qualitatively. Note that the scoring system inherently favors actions that have minimal incremental costs, such as modifying regulations (which is accomplished by existing municipal personnel and commissions).

Although a community may implement actions as prioritized by the STAPLEE method, an additional consideration is important for those actions that may be funded under the FEMA mitigation grant programs. To receive federal funding, the majority of mitigation actions require

the calculation of a benefit-cost ratio (BCR) that exceeds one; namely, that the benefits of the project outweigh its costs. Calculation of the BCR is typically conducted using FEMA's Benefit Cost Analysis (BCA) toolkit. The calculation may be complex, vary with the mitigation action of interest, and is dependent on detailed information such as property value appraisals, design and construction costs for structural projects, and tabulations of previous damages or NFIP claims.

Calculation of cost estimates for actions is not appropriate for a HMP, as this information can be misleading or inaccurate in several years and lead to problems when municipal personnel receive cost estimates from contractors. Potential costs of each action is therefore listed as "minimal", "low", "intermediate", or "high" on the STAPLEE matrix. These identifiers are defined as follows:

- "Low" costs only include printing, copying, or meetings of personnel. Direct expenditures are expected to be less than $1,000 (staff time is not included).

- "Intermediate" costs would require less than $100,000 to implement and may include studies, investigations, or small improvement projects. Such projects often require the use of outside consultants.

- "High" costs would require greater expenditures and may require grant funding to successfully complete the project. Such projects typically include capital expenditures for construction or infrastructure along with associated permitting and engineering costs.

10.3 Priority Strategies and Actions

The STAPLEE scores were used to prioritize the suggested mitigation strategies and actions. The highest ranking actions are listed below. The town plans to focus on the actions with the scores above 3.0 in the next few years, but may address other strategies as well. The following actions have scores above 3.0:

- Acquire standby power for Wolcott High School
- Extend water main to Wolcott High School
- Conduct drainage studies in specific areas as needed
- Consider joining FEMA's Community Rating System
- Address flooding in the Town Line Road area by working with building owners as needed
- Pass an ordinance to require standby power for group homes and assisted living facilities
- Extend/upgrade the public water supply systems into areas requiring water for fire protection

10.4 Sources of Funding

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

Community Disaster Loan Program
http://www.fema.gov/government/grant/fs_cdl.shtm

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

Continuing Training Grants (CTG)
http://www.grants.gov/web/grants/search-grants.html

This program provides funds to develop and deliver innovative training programs that are national in scope and meet emerging training needs in local communities.

Emergency Food and Shelter Program
http://www.fema.gov/government/grant/efs.shtm

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

Emergency Management Institute
http://training.fema.gov/

Provides training and education to the floodplain managers, fire service, emergency management officials, its allied professions, and the general public.

Emergency Management Performance Grants
http://www.fema.gov/emergency/empg/empg.shtm

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

Flood Mitigation Assistance (FMA) Program
http://www.fema.gov/government/grant/fma/index.shtm

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

Hazard Mitigation Grant Program (HMGP)
http://www.fema.gov/government/grant/hmgp/index.shtm

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

Homeland Security Grant Program (HSGP)
http://www.fema.gov/government/grant/hsgp/index.shtm

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

Intercity Passenger Rail (IPR) Program
http://www.fema.gov/fy-2013-intercity-passenger-rail-ipr-amtrak-0

This program provides funding to the National Passenger Railroad Corporation (Amtrak) to protect critical surface transportation infrastructure and the traveling public from acts of terrorism, and to increase the resilience of the Amtrak rail system.

National Flood Insurance Program (NFIP)
http://www.fema.gov/library/viewRecord.do?id=3005

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

Nonprofit Security Grant Program (NSGP)
http://www.fema.gov/fy-2014-urban-areas-security-initiative-uasi-nonprofit-security-grant-program-nsgp

This program provides funding support for hardening and other physical security enhancements to nonprofit organizations that are at high risk of terrorist attack and located within one of the specific Urban Areas Security Initiative (UASI)-eligible Urban Areas. The program seeks to integrate the preparedness activities of nonprofit organizations that are at high risk of terrorist attack with broader state and local preparedness efforts, and serve to promote coordination and collaboration in emergency preparedness activities among public and private community representatives and state and local government agencies.

Pre-Disaster Mitigation (PDM) Grant Program
http://www.fema.gov/government/grant/pdm/index.shtm

The purpose of the PDM program is to fund communities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. PDM grants are provided

to states, territories, Indian tribal governments, communities, and universities, which, in turn, provide sub-grants to local governments. PDM grants are awarded on a competitive basis. This grant program is administered through DEMHS.

Public Assistance Grant Program
http://www.fema.gov/government/grant/pa/index.shtm

The Public Assistance Grant Program (PA) is designed to assist State, Tribal and local governments, and certain types of private non-profit organizations in recovering from major disasters or emergencies. Along with helping to recover, this grant also encourages prevention against potential future disasters by strengthening hazard mitigation during the recovery process. The first grantee to apply and receive the PA would usually be the State, and the State could then allocate the granted funds to the sub-grantees in need of assistance.

Small Town Economic Assistance Program
http://www.ct.gov/opm/cwp/view.asp?Q=382970&opmNav
|

The Small Town Economic Assistance Program (STEAP) funds economic development, community conservation and quality of life projects for localities that are ineligible to receive Urban Action bonds. This program is administered by the Connecticut Office of Policy and Management (OPM). Connecticut municipalities may receive up to $500,000 per year if (1) they are not designated as a distressed municipality or a public investment community, and (2) the State Plan of Conservation and Development does not show them as having a regional center. Public Act 05-194 allows an Urban Act Town that is not designated as a regional center under the State Plan of Conservation and Development to opt out of the Urban Action program and become a STEAP town for a period of four years.

Transit Security Grant Program (TSGP)
http://www.fema.gov/government/grant/tsgp/index.shtm

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

U.S. Fire Administration

Assistance to Firefighters Grant Program (AFGP)
http://www.firegrantsupport.com/afg/
http://www.usfa.dhs.gov/fireservice/grants/

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

Fire Prevention & Safety Grants (FP&S)
http://www.firegrantsupport.com/fps/

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

National Fire Academy Education and Training
http://www.usfa.dhs.gov/nfa/

Provides training to increase the professional level of the fire service and others responsible for fire prevention and control.

Reimbursement for Firefighting on Federal Property
http://www.usfa.dhs.gov/fireservice/grants/rfff/

Reimbursement may be made to fire departments for fighting fires on property owned by the federal government for firefighting costs over and above normal operating costs. Claims are submitted directed to the U.S. Fire Administration.

Staffing for Adequate Fire & Emergency Response (SAFER)
http://www.firegrantsupport.com/safer/

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

Other Grant Programs

Flood Mitigation

- U.S. Army Corps of Engineers – *50/50 match funding for floodproofing 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 Energy and Environmental Protection – *assistance to municipalities to solve flooding and dam repair problems through the Flood and Erosion Control Board Program.*

Erosion Control and Wetland Protection

- U.S. Department of Agriculture – *technical assistance for erosion control.*
- 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 Town of Wolcott is authorized to update this hazard mitigation plan as described below and guide it through the FEMA approval process.

Local Coordinator – 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. A "local coordinator" will be designated as the primary individual in charge. In Wolcott, this is the Inland Wetlands commission chairman. Appendix A incorporates an implementation strategy and schedule, detailing the responsible department and anticipated time frame for the specific recommendations listed throughout this document.

Incorporation into Plans, Regulations, and Capital Improvement Plans – **Subsequent to the adoption of the initial Hazard Mitigation Plan, its policies were incorporated into the POCD adopted in 2011.** Refer to page 3-8 of this document for a discussion. Policies from the initial Hazard Mitigation Plan were not directly incorporated into the Zoning and Subdivision Regulations. **However, the Zoning Regulations and Ordinance 94 (Flood Plain Management Ordinance) were amended in accordance with the DFIRMS adopted in 2010.**

Upon adoption, this Update 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 POCD, department annual budgets, and the Zoning and Subdivision Regulations will reference this plan and its updates. However, the next edition of the POCD will not be developed until 2020-2021. The local coordinator and 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 local coordinator and Office of the Mayor will be responsible for assigning appropriate Town officials to update the Zoning Regulations, Subdivision Regulations, Wetlands Regulations, and Emergency Operations Plan to include the applicable 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.

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. **Actions from the initial Hazard Mitigation Plan were incorporated into capital improvement plans over the last five years as budgets allowed, funding projects such as the culvert replacements described in this plan.**

11.2 Progress Monitoring and Public Participation

The local coordinator will be responsible for monitoring the successful implementation of this HMP update, and will provide the linkage between the multiple departments involved in hazard mitigation at the local level relative to communication and participation. As the plans will be adopted by the local government, coordination is expected to be able to occur without significant barriers.

Site reconnaissance for Specific Suggested Actions – The local coordinator, with the assistance of appropriate department personnel, will annually perform reconnaissance-level inspections of sites that are associated with specific actions. Examples include structural projects. This will ensure that the suggested actions remain viable and appropriate. The worksheet in Appendix F will be filled out for specific project-related actions as appropriate. This worksheet is taken from the *Local Mitigation Planning Handbook.*

Site Reconnaissance to be completed between April 1 and November 1 each year

The local coordinator will be responsible for obtaining a current list of repetitive loss properties (RLPs) in the community each year. This list is available from the State NFIP Coordinator. The RLPs shall be subject to a windshield survey at least once every two years to ensure that the list is reasonably accurate relative to addresses and other basic information. Some of the reconnaissance-level inspections could occur incidentally during events such as flooding when response is underway.

Repetitive loss properties to be viewed biennially

Annual Reporting and Meeting – The local coordinator will be responsible for holding an annual meeting to review the plan. Matters to be reviewed on an annual basis include the goals and objectives of the HMP, hazards or disasters that occurred during the preceding year, mitigation activities that have been accomplished to date, a discussion of reasons that implementation may be behind schedule, and suggested actions for new projects and revised activities. Results of site reconnaissance efforts will be reviewed also. A meeting should be conducted in March or April of each year, at least two months before the annual application cycle for grants under the HMA program[1]. This will enable a list of possible projects to be circulated to applicable local departments to review and provide sufficient time to develop a grant application. The local coordinator shall prepare and maintain documentation and minutes of this annual review meeting.

Annual meeting to be conducted in March or April each year

Post-Disaster Reporting and Metering – Subsequent to federally-declared disasters in the State of Connecticut for New Haven County, a meeting shall be conducted by the local coordinator with representatives of appropriate departments to develop a list of possible projects for developing an HMGP application. The local coordinator shall prepare a report of the recent events and ongoing or recent mitigation activities for discussion and review at the HMGP meeting. Public outreach may be solicited for HMGP applications at a *separate* public meeting.

Meeting to be conducted within two months of each Federal disaster declaration in Connecticut

[1] PDM and FMA applications are typically due to the State in summer of any given year.

Continued Public Involvement – Continued public involvement will be sought regarding the monitoring, evaluating, and updating of the HMP. Public input can be solicited through community meetings, presentations on local cable access channels, and input to web-based information gathering tools. Public comment on changes to the HMP may be sought through posting of public notices and notifications posted on the town's web site and the COGCNV website.

11.3 Updating the Plan

The town will update the hazard mitigation plan if a consensus to do so is reached by the local coordinator and the Office of the Mayor, or at least once every five years. Updates to this HMP will be coordinated by the local coordinator. The town understands that this HMP will be considered current for a period of five years from the date of approval with the expiration date reported by FEMA via the approval letter. The local coordinator will be responsible for compiling the funding required to update the HMP in a timely manner such that the current plan will not expire while the plan update is being developed; the assistance of COGCNV may be solicited from time to time for this purpose.

Table 11-1 presents a schedule to guide the preparation for the plan update and then the actual update of the plan. The schedule assumes that the current version of this plan was adopted in January 2015 and will therefore expire in January 2020.

Table 11-1
Schedule for Hazard Mitigation Plan Update

Month and Year	Tasks
January 2016	Annual meeting to review plan content and progress
January 2017	Annual meeting to review plan content and progress
January 2018	Annual meeting to review plan content and progress
June 2018	Ensure that funding for the plan update is included in the fiscal year 2018-2019 budget
January 2019	Annual meeting to review plan content and progress
January 2019	Secure consultant to begin updating the plan, or begin updating in-house
July 2019	Forward draft updated plan to State for review
August-October 2019	Process edits from State and FEMA and obtain the Approval Pending Adoption (APA)
January 2020	Adopt updated plan

To update the Plan, the local coordinator will coordinate the appropriate group of local officials consisting of representatives of many of the same departments solicited for input to this HMP. In addition, local business leaders, community and neighborhood group leaders, relevant private and non-profit interest groups, and the neighboring municipalities will be solicited for representation, including the following:

- The Central Naugatuck Valley Emergency Planning Committee, managed by the COGCNV;
- 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.

The project action worksheets prepared by the local coordinator and annual reports described above will be reviewed. In addition, the following questions will be asked:

- Do the mitigation goals and objectives still reflect the concerns of local residents, business owners, and officials?
- Have local conditions changed so that findings of the risk and vulnerability assessments should be updated?
- Are new sources of information available that will improve the risk assessment?
- If risks and vulnerabilities have changed, do the mitigation goals and objectives still reflect the risk assessment?
- What hazards have caused damage locally since the last edition of the HMP was developed? Were these anticipated and evaluated in the HMP or should these hazards be added to the plan?
- Are current personnel and financial resources at the local level sufficient for implementing mitigation actions?
- For each mitigation action that has not been completed, what are the obstacles to implementation? What are potential solutions for overcoming these obstacles?
- For each mitigation action that has been completed, was the action effective in reducing risk?
- What mitigation actions should be added to the plan and proposed for implementation?
- If any proposed mitigation actions should be deleted from the plan, what is the rationale?

Future HMP updates may include deleting suggested actions as projects are completed, adding suggested actions as new hazard effects arise, or modifying hazard vulnerabilities as land use changes. For instance, several prior actions were removed from the HMP while preparing this update because they had become institutionalized capabilities, they were successfully completed, or they were subsumed by more specific local or State actions.

11.4 Technical and Financial Resources

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

Federal Resources

Federal Emergency Management Agency
Region I
99 High Street, 6th floor
Boston, MA 02110
(617) 956-7506
http://www.fema.gov/

Mitigation Division

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

FEMA Programs administered by the Risk Analysis Branch include:

- *Flood Hazard Mapping Program*, which maintains and updates National Flood Insurance Program maps
- *National Dam Safety Program*, which provides state assistance funds, research, and training in dam safety procedures
- *National Hurricane Program*, which conducts and supports projects and activities that help protect communities from hurricane hazards
- *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
- *Community Rating System (CRS)*, a voluntary incentive program under the National Flood Insurance Program that recognizes and encourages community floodplain management activities
- *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 *Technical Assistance Contracts (TAC)* in place 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.

Response & Recovery Division

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

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

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

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

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

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

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

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

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

- *Capitalization Grants for Clean Water 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 DEEP.

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 floodprone 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 several flood control acts and the Floodplain Management Services Program (FPMS). Specific programs used by the Corps for mitigation are listed below.

- *Section 205 – Small Flood Damage Reduction Projects*: This section of the 1948 Flood Control Act authorizes the Corps to study, design, and construct small flood control projects in partnership with non-Federal government agencies. Feasibility studies are 100 percent federally-funded up to $100,000, with additional costs shared equally. Costs for preparation of plans and construction are funded 65 percent with a 35 percent non-federal match. In certain cases, the non-Federal share for construction could be as high as 50 percent. The maximum federal expenditure for any project is $7 million.

- *Section 14 – Emergency Streambank and Shoreline Protection:* This section of the 1946 Flood Control Act authorizes the Corps to construct emergency shoreline and streambank protection works to protect public facilities such as bridges, roads, public buildings, sewage treatment plants, water wells, and non-profit public facilities such as churches, hospitals, and schools. Cost sharing is similar to Section 205 projects above. The maximum federal expenditure for any project is $1.5 million.

- *Section 103 – Hurricane and Storm Damage Reduction Projects:* This section of the 1962 River and Harbor Act authorizes the Corps to study, design, and construct small coastal storm damage reduction projects in partnership with non-Federal government agencies. Beach nourishment (structural) and floodproofing (non-structural) are examples of storm damage reduction projects constructed under this authority. Cost sharing is similar to Section 205 projects above. The maximum federal expenditure for any project is $5 million.

- *Section 208 – Clearing and Snagging Projects:* This section of the 1954 Flood Control Act authorizes the Corps to perform channel clearing and excavation with limited embankment construction to reduce nuisance flood damages caused by debris and minor shoaling of rivers. Cost sharing is similar to Section 205 projects above. The maximum federal expenditure for any project is $500,000.

- *Section 206 – Floodplain Management Services:* This section of the 1960 Flood Control Act, as amended, authorizes the Corps to provide a full range of technical services and planning guidance necessary to support effective floodplain management. General technical assistance efforts include determining the following: site-specific data on obstructions to flood flows, flood formation, and timing; flood depths, stages, or

floodwater velocities; the extent, duration, and frequency of flooding; information on natural and cultural floodplain resources; and flood loss potentials before and after the use of floodplain management measures. Types of studies conducted under FPMS include floodplain delineation, dam failure, hurricane evacuation, flood warning, floodway, flood damage reduction, stormwater management, floodproofing, and inventories of floodprone structures. When funding is available, this work is 100 percent federally funded.

In addition, the Corps also provides emergency flood assistance (under Public Law 84-99) after local and state funding has been used. This assistance can be used for both flood response and post-flood response. Corps assistance is limited to the preservation of life and improved property; direct assistance to individual homeowners or businesses is not permitted. In addition, the Corps can loan or issue supplies and equipment once local sources are exhausted during emergencies.

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 nonstructural 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 provides 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
Connecticut Office
344 Merrow Road, Suite A
Tolland, CT 06084-3917
(860) 871-4011

The Natural Resources Conservation Service provides technical assistance to individual landowners, 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, nonprofit organizations, and the private sector.

State Resources

Connecticut Department of Administrative Services, Division of Construction Services
165 Capitol Avenue
Hartford, CT 06106
(860) 713-5850
http://www.ct.gov/dcs/site/default.asp

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 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 Energy and Environmental Protection
79 Elm Street
Hartford, CT 06106-5127
(860) 424-3000
http://www.dep.state.ct.us/

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

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

- *National Flood Insurance Program State Coordinator*: Provides flood insurance and floodplain management technical assistance, floodplain management ordinance review, substantial damage/improvement requirements, community assistance visits, and other general flood hazard mitigation planning including the delineation of floodways.

- *Flood & Erosion Control Board Program*: Provides assistance to municipalities to solve flooding, beach erosion, and dam repair problems. Have the power to construct and repair flood and erosion management systems. Certain nonstructural 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 noncompetitive basis.

- *Inland Wetlands and Watercourses Management Program*: Provides training, technical, and planning assistance to local Inland Wetlands Commissions, reviews and approves municipal regulations for localities. Also controls flood management and natural disaster mitigations.

- *Dam Safety Program*: Charged with the responsibility for administration and enforcement of Connecticut's dam safety laws. Regulates the operation and maintenance of dams in the state. Permits the construction, repair or alteration of dams, dikes or similar structures and maintains a registration database of all known dams statewide. This program also operates a statewide inspection program.

Planning and Standards Division - Administers the Clean Water Fund and many other programs directly and indirectly related to hazard mitigation including the Section 319 nonpoint 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 Services and Public Protection
1111 Country Club Road
Middletown, CT 06457
(860) 685-8190
http://www.ct.gov/dps/

Connecticut Division 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 division responsible for emergency management. Specifically, responsibilities include emergency preparedness, response and recovery, mitigation, and an extensive training program. DEMHS is the state point of contact for most FEMA grant and assistance programs and oversees hazard mitigation planning and policy; administration of the Hazard Mitigation Grant Program, Flood Mitigation Assistance Program, and Pre-Disaster Mitigation Program; and the responsibility for making certain that the State Natural Hazard Mitigation Plan is updated every five years. 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. Additionally, the agency is available to provide technical assistance to sub-applicants during the planning process.

DEMHS operates and maintains the CT "Alert" emergency notification system powered by Everbridge. This system uses the state's Enhanced 911 database for location-based notifications to the public for life-threatening emergencies. The database includes traditional wire-line telephone numbers and residents have the option to register other numbers on-line in addition to the land line.

DEMHS employs the *State Hazard Mitigation Officer*, who is in charge of hazard mitigation planning and policy; oversight of administration of the Hazard Mitigation Grant Program, Flood Mitigation Assistance Program, and Pre-Disaster Mitigation Program, and has the responsibility of making certain that the State Natural Hazard Mitigation Plan is updated every five years.

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 that 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 that could be mitigation related.

Connecticut Office of Policy and Management
450 Capitol Avenue
Hartford, CT 06106
(860) 418-6200
http://www.ct.gov.opm

Small Town Economic Assistance Program

The Small Town Economic Assistance Program (STEAP) funds economic development, community conservation and quality of life projects for localities that are ineligible to receive Urban Action bonds. This program is administered by the Connecticut Office of Policy and Management (OPM). Connecticut municipalities may receive up to $500,000 per year if (1) they are not designated as a distressed municipality or a public investment community, and (2) the State Plan of Conservation and Development does not show them as having a regional center. Public Act 05-194 allows an Urban Act Town that is not designated as a regional center under the State Plan of Conservation and Development to opt out of the Urban Action program and become a STEAP town for a period of four years. Projects eligible for STEAP funds include:

1) economic development projects such as (a) constructing or rehabilitating commercial, industrial, or mixed-use structures and (b) constructing, reconstructing, or repairing roads, access ways, and other site improvements;
2) recreation and solid waste disposal projects;
3) social service-related projects, including day care centers, elderly centers, domestic violence and emergency homeless shelters, multi-purpose human resource centers, and food distribution facilities;
4) housing projects;
5) pilot historic preservation and redevelopment programs that leverage private funds; and
6) other kinds of development projects involving economic and community development, transportation, environmental protection, public safety, children and families and social service programs.

In recent years, STEAP grants have been used to help fund many types of projects that are consistent with the goals of hazard mitigation. Projects funded in 2013 and 2014 include streambank stabilization, dam removal, construction of several emergency operations centers (EOCs) in the state, conversion of a building to a shelter, public works garage construction and renovations, design and construct a public safety communication system, culvert replacements, drainage improvements, bridge replacements, generators, and open space acquisition.

Private and Other Resources

Association of State Dam Safety Officials (ASDSO)
450 Old Vine Street
Lexington, KY 40507
(859) 257-5140
http://www.damsafety.org

ASDSO is a non-profit organization of state and federal dam safety regulators, dam owners/operators, dam designers, manufacturers/suppliers, academia, contractors and others interested in dam safety. The mission is to advance and improve the safety of dams by supporting the dam safety community and state dam safety programs, raising awareness, facilitating cooperation, providing a forum for the exchange of information, representing dam safety interests before governments, providing outreach programs, and creating an unified community of dam safety advocates.

The Association of State Floodplain Managers (ASFPM)
2809 Fish Hatchery Road, Suite 204
Madison, WI 53713
(608) 274-0123
http://www.floods.org/

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

Connecticut Association of Flood Managers (CAFM)
P.O. Box 960
Cheshire, CT 06410
ContactCAFM@gmail.com

CAFM is a professional association of private consultants and local floodplain managers that provides training and outreach regarding flood management techniques. CAFM is the local state chapter of ASFPM.

Institute for Business & Home Safety
4775 East Fowler Avenue
Tampa, FL 33617
(813) 286-3400
http://www.ibhs.org/

A nonprofit 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.

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 floodproofing 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 that cannot be funded elsewhere.

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

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APPENDIX A
STAPLEE MATRIX

Part 1: Previous and New Strategies	Status Is the strategy in the prior edition of the plan?	Explanation/Comment	Outcome	Associated Report Sections							Category
				Inland Flooding	Hurricanes	Summer Storms and Tornadoes	Winter Storms	Earthquakes	Dam Failure	Wildfires	1. Prevention 2. Property Protection 3. Natural Resource Prot. 4. Structural Projects 5. Public Information
ALL HAZARDS											
Dissemination of informational pamphlets regarding natural hazards to public locations	Yes	LEPC continues to keep materials on display in the library, town hall, and senior center	Remove	x	x	x	x	x	x	x	1,2,5
Implementation of an emergency notification system	Yes	CodeRED was implemented then cut; Wolcott subscribes to the CT Alert system	Delete	x	x	x	x	x	x	x	1,2,5
Continue to review and update Emergency Operations Plan, at least once annually	Yes	LEPC updates the EOP annually and most recently added pet sheltering	Remove	x	x	x	x	x	x	x	1
A. Acquire standby power for Wolcott High School	No	New strategy	New strategy								
FLOOD - Prevention											
Streamline the permitting process to ensure maximum education of developer or applicant	Yes	Key personnel from Building, Public Works, Planning, and IWC review proposals together	Remove	x	x	x	x	x		x	1
Petition FEMA to more critically evaluate Letters of Map Amendment and Letters of Map Change Applications to prevent flooding increases	Yes	The IWC chairman addresses these on a case-by-case basis	Delete	x	x	x	x		x		1
Perform a Town-wide drainage study and continue to update every five years	Yes	Town-wide effort is not needed	Modify (C)	x	x	x	x		x		1
C. Conduct drainage studies in specific areas as needed	No	New strategy	New strategy								
Institute a Town-wide comprehensive catch basin cleaning and maintenance program	Yes	Catch basins are cleaner without road sand usage; and are being replaced as roads are improved	Remove	x	x	x	x				1
Consider joining FEMA's Community Rating System	Yes	Wolcott will continue to consider joining CRS	Carry forward	x	x	x	x				1
Continue to require Flood Hazard Area, subdivision, and commercial and industrial permits applications to provide needed flood data	Yes	Continuous/as needed	Remove	x	x	x	x		x		1
Encourage residents to move personal property out of the 100-year flood plain, especially in the Woodtick Road area south of Garthwait Road	Yes	The new blight ordinance may assist with this effort	Carry forward	x	x	x	x				1
Require new buildings constructed in flood prone areas to be protected to the highest recorded flood level regardless of SFHA	Yes	Wolcott does not allow new buildings in SFHAs	Delete	x	x	x	x				1,2
Require that new buildings be designed and graded to shunt drainage away from the building	Yes	This is in the building code	Delete	x	x	x	x				1,2
Assist with the MapMod Program to ensure an appropriate update to the FIS, FIRM, and Flood Boundary & Floodway Maps for the Town	Yes	MapMOD has been completed for this county	Delete	x	x	x	x				1
After the MapMod Program, use the Town two-foot contour maps to develop more exact regulatory flood maps using FEMA flood elevations	Yes	This is done case-by-case, but much of the town does not have BFEs	Modify (D)	x	x	x	x				1
D. Use two-foot contour maps or LiDAR topo to develop more exact regulatory flood maps as needed	No	New strategy	New strategy	x	x	x	x				1
FLOOD - 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	Yes	The new dog park will be developed on a recently-acquired RLP	Carry forward	x	x	x	x		x		2,3
Selectively pursue conservation objectives listed in the Plan of Conservation & Development	Yes	Continuous	Remove	x	x	x	x				3
Continue to regulate development in protected and sensitive areas, including steep slopes, wetlands, and floodplains	Yes	Continuous	Remove	x	x	x	x	x	x	x	3
E. Address flooding in the Town Line Road area by working with building owners as needed	No	New strategy	New strategy	x	x	x	x				1
FLOOD - Structural Projects											
Investigate incidences of roadway flooding near Cedar Swamp Pond and clear or resize drainage systems as appropriate	Yes	Improvements completed	Delete	x	x	x	x				2,4
Raise the level of Central Avenue near Todd Lake above the highest recorded flood level	Yes	Improvements completed	Delete	x	x	x	x				4
Repair the bridge spanning Lily Brook at Todd Road	Yes	The bridge is no longer believed to contribute to flooding	Delete	x	x	x	x				4
Enlarge the culvert passing Lily Brook under Woodtick Road and elevate the road if necessary	Yes	Still needed	Carry forward	x	x	x	x				4
Perform a feasibility analysis to determine the best way to address the flooding conditions in the Town Line Road area	Yes	Drainage improvements have helped with minor flooding but the area will remain in the SFHA	Modify (E)	x	x	x	x				1
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	Yes	Improvements completed	Delete	x	x	x	x				4
Consider extending a road from the existing baseball field complex off Nichols Road southwest through the utility easement to Tosun Road Extension	Yes	Not needed; egress can be provided by reversing the 1-way road direction	Delete	x	x	x	x	x	x	x	4
Repair the eroded hillside at Tosun Road Extension above Old Tannery Brook and install curbing	Yes	Improvements completed	Delete	x	x	x	x				3,4
Enlarge the culvert passing the Mad River under Mad River Road near Route 69 and elevate the road if necessary	Yes	Still needed; this flooded during Superstorm Sandy	Carry forward	x	x	x	x				4
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	Yes	Culverts capacities have been increased along this stream corridor	Delete	x	x	x	x				2
Increase the size of the culverts near Grove Street & Maple Avenue	Yes	Still needed	Carry forward	x	x	x	x				2,4
Petition the state to restore the 24-inch culvert on Route 322 near Grove Street & Maple Avenue	Yes	Still needed	Carry forward	x	x	x	x				2,4

Part 1: Previous and New Strategies	Status Is the strategy in the prior edition of the plan?	Explanation/Comment	Outcome	Associated Report Sections Inland Flooding	Hurricanes	Summer Storms and Tornadoes	Winter Storms	Earthquakes	Dam Failure	Wildfires	Category 1. Prevention 2. Property Protection 3. Natural Resource Prot. 4. Structural Projects 5. Public Information
Investigate ways to reduce poor drainage flooding on Meriden Road near Hitchcock Lake	Yes	Drainage improvements completed	Delete	x	x	x	x				1
Perform an conveyance analysis of the culverts in the Longmeadow Drive Extension area	Yes	Improvements completed	Delete	x	x	x	x				2
Investigate reports of localized flooding problems to determine cause and appropriate solution	Yes	Continuous/as needed	Remove	x	x	x	x				4
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	Yes	This has increased and will continue	Remove		x	x	x	x			1,2
Increase inspections of trees on private property near power lines and Town right-of-ways	Yes	This has increased and will continue	Remove		x	x	x	x			1
Continue outreach regarding dangerous trees on private property	Yes	This is believed complete, with maximum resident awareness attained	Delete		x	x	x	x			1
Continue to require that utilities be placed underground in new developments and pursue funding to move them underground in existing areas	Yes	Continuous for new developments, not of interest for existing utilities	Remove	x	x	x	x		x	x	2
Continue to require compliance with the amended Connecticut Building Code for wind speeds	Yes	This is in the building code	Delete		x	x	x				2
Provide for the Building Department to make literature available during the permitting process regarding appropriate design standards	Yes	As needed	Remove		x	x	x				1
B. Pass an ordinance to require standby power for group homes and assisted living facilities	No	New strategy	New strategy								
WINTER STORMS											
Compile and post a final list of plowing routes, prioritizing egress to shelters and critical facilities	Yes	Complete but not posted for public use	Delete				x				5
Complete and disseminate evacuation plan to ensure timely evacuation of shelterees from all areas of Wolcott	Yes	The choice of evacuation route depends on the nature of the event	Delete	x	x	x	x	x	x	x	1,5
Provide educational materials to property owners regarding using shutters, storm windows, pipe insulators, and removing snow from flat roofs	Yes	LEPC continues to keep materials on display in the library, town hall, and senior center	Remove		x	x	x				2,5
Provide educational materials with safety tips and reminders regarding cold weather	Yes	LEPC continues to keep materials on display in the library, town hall, and senior center	Remove				x				1,5
Encourage two modes of egress into every neighborhood by the creation of through streets	Yes	Dead-end streets must be less than 1,200 feet in length	Remove	x	x	x	x	x	x	x	1
EARTHQUAKES											
Preserve or convert areas of inactive faults into municipal open space	Yes	There is still some interest in pursuing this	Carry forward					x			1
Consider preventing residential development in areas prone to collapse, such as below steep slopes	Yes	This is reviewed on a case-by-case basis	Remove					x			1
Consider restricting residential development in areas on or below steep slopes (slopes exceeding 30%)	Yes	This is reviewed on a case-by-case basis	Remove					x			1
Continue to require adherence to the state building codes	Yes	This is in the building code	Delete		x	x	x	x			1
Ensure that municipal departments have adequate backup facilities (power generation, heat, water, etc.) in case earthquake damage occurs	Yes	This work is underway	Modify (F)		x	x	x	x			1
F. Extend water main to Wolcott High School and install standby power at the school	No	New strategy	New strategy								
Consider bracing systems for assets and equipment inside critical facilities	No	New strategy	New strategy								
DAM FAILURE											
Continue to require or conduct regular inspections of all Class C dams and perform or require upkeep and maintenance as needed	Yes	Additional effort may be needed	Carry forward	x					x		2,4
Consider implementing Town inspections of Class A, AA, B, and BB dams	Yes	Town does not have the resources and needs to rely on the state for this	Delete	x					x		2,4
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	Yes	Additional effort may be needed	Carry forward	x					x		1
Have copies of the Class C dam EOPs and Dam Failure Analyses on file at the Town Hall for public viewing	Yes	Additional effort may be needed	Carry forward						x		5

Part 1: Previous and New Strategies	Status Is the strategy in the prior edition of the plan?	Explanation/Comment	Outcome	Associated Report Sections Inland Flooding	Hurricanes	Summer Storms and Tornadoes	Winter Storms	Earthquakes	Dam Failure	Wildfires	Category 1. Prevention 2. Property Protection 3. Natural Resource Prot. 4. Structural Projects 5. Public Information
WILDFIRES											
Continue to have the Wolcott Water Department extend/upgrade the public water supply systems into areas requiring water for fire protection	Yes	Some extensions have been completed; additional work is planned	Carry forward			x				x	4
Continue installing fire ponds throughout Town to ensure an adequate supply of firefighting water in areas without water service	Yes	Cisterns are also allowed	Modify (G)			x				x	1
G. Continue installing fire ponds or cisterns to facilitate firefighting in areas without public water supply	No	New strategy	New strategy								
Continue to promote inter-municipal cooperation in fire-fighting efforts	Yes	Continuous	Remove			x				x	1
Continue to support public outreach programs to increase awareness of forest fire danger and how to use common fire fighting equipment	Yes	Continuous	Remove							x	5
Continue reviewing subdivision applications to ensure proper access for emergency vehicles	Yes	Continuous	Remove	x	x	x	x	x	x	x	1
Provide outreach programs that include tips on how to properly manage burning and campfires on private property	Yes	Continuous	Remove							x	5
Patrol Town-owned open space and parks to prevent campfires	Yes	Municipal open space and parks are not partolled specifically for this purpose	Delete							x	3
Enforce regulations and permits for open burning	Yes	Continuous	Remove							x	1,3

[1]**Notes**

Carry forward: strategy is carried forward to the updated plan
Delete: strategy may be deleted from the plan because it has been completed or is no longer applicable or necessary
Remove: activity is ongoing and will continue in its current capacity and level of effort (capability)
Modify: strategy has been modified and the new strategy is provided elsewhere (new strategies C, D, E, F, G)
New strategy: strategy was not in the last edition of the plan

	Part 2: Current Actions and Strategies	Responsible Department[1]	Timeframe	Cost Low = Minimal[2] Intermediate = <$100,000 High = >$100,000	Potential[3] Funding Sources	Weighted STAPLEE Criteria[4]															Total STAPLEE Score
						Benefits								*Costs*							
						Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	**STAPLEE Subtotal**	Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	**STAPLEE Subtotal**	
	ALL HAZARDS																				
1	Acquire standby power for Wolcott High School	LEPC	1/2016-12/2016	Intermediate	Municipal, HMA*	1	1	1	1	0	1	0	**7.0**	0	0	-0.5	0	0	-1	0	**-2.5**	***4.5***
	FLOOD - Prevention																				
2	Conduct drainage studies in specific areas as needed	DPW	7/2015-6/2017	Intermediate	Municipal	1	1	1	0	0	0.5	1	**6.0**	0	0	-0.5	0	0	-0.5	0	**-1.5**	***4.5***
3	Consider joining FEMA's Community Rating System	IWC	1/2016-12/2016	Low	Municipal	1	0.5	0	1	0	1	0	**5.0**	0	0	-0.5	0	0	-0.5	0	**-1.5**	***3.5***
4	Encourage residents to move personal property out of the 100-year flood plain, especially in the Woodtick Road area south of Garthwait Road	ZEO	7/2015-12/2015	Low	Municipal	0	1	0	0	0	0.5	1	**4.0**	-0.5	0	-0.5	0	-0.5	-1	0	**-3.5**	***0.5***
5	Use two-foot contour maps or LiDAR topo to develop more precise regulatory flood maps as needed	DPW	1/2016-12/2016	Intermediate	Municipal	0	1	0	0	0	0	1	**3.0**	0	0	-0.5	0	0	-0.5	0	**-1.5**	***1.5***
	FLOOD - Property and Natural Resource Protection																				
6	Acquire additional open space properties within SFHAs and set aside as greenways, parks, or other non-residential, non-commercial, or non-industrial use	Mayor	1/2016-12/2017	High	Municipal, HMA, Private	1	1	0	1	0	0	1	**5.0**	0	0	-0.5	0	0	-1	0	**-2.5**	***2.5***
7	Address flooding in the Town Line Road area by working with building owners as needed	DPW, IWC	1/2016-12/2016	Low	Building owners, HMA*	0	1	0	1	0	1	1	**6.0**	0	0	-0.5	0	0	-1	0	**-2.5**	***3.5***
	FLOOD - Structural Projects																				
8	Enlarge the culvert passing the Mad River under Mad River Road near Route 69 and elevate the road if necessary	DPW	7/2018-6/2019	High	Municipal, HMA*	0.5	1	0.5	1	0	0	1	**5.0**	0	0	-0.5	0	0	-1	0	**-2.5**	***2.5***
9	Increase the size of the culverts near Grove Street & Maple Avenue	DPW	7/2017-6/2018	High	Municipal, HMA*	0.5	1	0.5	1	0	0	1	**5.0**	0	0	-0.5	0	0	-1	0	**-2.5**	***2.5***
10	Enlarge the culvert passing Lily Brook under Woodtick Road and elevate the road if necessary	DPW	7/2017-6/2018	High	Municipal, HMA*	0.5	1	0.5	1	0	0	1	**5.0**	0	0	-0.5	0	0	-1	0	**-2.5**	***2.5***
11	Petition the state to restore the 24-inch culvert on Route 322 near Grove Street & Maple Avenue	Mayor, DPW	7/2015-12/2016	Intermediate	Municipal, CT DOT	0.5	1	0.5	1	0	0	1	**5.0**	0	0	-0.5	0	0	-1	0	**-2.5**	***2.5***
	WIND DAMAGE RELATED TO HURRICANES, SUMMER STORMS, AND WINTER STORMS																				
12	Pass an ordinance to require standby power for group homes and assisted living facilities	LEPC, Mayor	7/2015-12/2015	Low	Municipal	1	1	1	0	1	1	0	**7.0**	0	0	-0.5	0	0	-0.5	0	**-1.5**	***5.5***
	WINTER STORMS																				
	No strategies in the current edition of the plan																				
	EARTHQUAKES																				
13	Preserve or convert areas of inactive faults into municipal open space in the western part of the town	PZC	1/2018-12/2019	High	Municipal, Private	0	0.5	0	0	0	0	1	**2.0**	0	0	-0.5	0	0	-1	0	**-2.5**	***-0.5***
14	Extend water main to Wolcott High School and install standby power at the school	W&SD	7/2016-6/2017	High	Municipal	1	1	0.5	1	0	1	0	**6.5**	0	0	-0.5	0	0	-1	0	**-2.5**	***4.0***
15	Consider bracing systems for assets and equipment inside critical facilities	LEPC, DPW	1/2016-12/2016	Intermediate	Municipal	0	0.5	0.5	0	0	0.5	0	**2.5**	0	0	-0.5	0	0	-0.5	0	**-1.5**	***1.0***
	DAM FAILURE																				
16	Continue to require or conduct regular inspections of all Class C dams and perform or require upkeep and maintenance as needed	DPW	5/2015-12/2015	Intermediate	Dam owners	1	0.5	0.5	0	0	0	1	**3.5**	0	0	-0.5	0	0	-0.5	0	**-1.5**	***2.0***
17	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	DPW, LEPC	7/2015-6/2016	Intermediate	Dam owners	1	0.5	0.5	0	0	0	1	**3.5**	0	0	-0.5	0	0	-0.5	0	**-1.5**	***2.0***
18	Have copies of the Class C dam EOPs and Dam Failure Analyses on file at the Town Hall for public viewing	LEPC	1/2016-12/2016	Low	Municipal	1	0.5	1	0	0	0	0	**3.0**	0	0	-0.5	0	0	0	0	**-0.5**	***2.5***
	WILDFIRES																				
19	Extend/upgrade the public water supply systems into areas requiring water for fire protection	W&SD	7/2016-12/2017	High	Municipal, DWSRF	1	1	1	1	0	1	0	**7.0**	0	0	-0.5	0	0	-1	0	**-2.5**	***4.5***
20	Install fire ponds or cisterns to facilitate firefighting in areas without public water supply	LEPC	7/2018-6/2019	Intermediate	Municipal, AFG	1	1	1	0	0	0	0	**4.0**	0	0	-0.5	0	0	-0.5	0	**-1.5**	***2.5***

1. Departments
   LEPC = Local emergency planning commission
   ZEO = Zoning Enforcement Officer
   DPW = Department of Public Works
   W&SD = Wolcott Water and Sewer Department
   IWC = Inland Wetland Commission

2. Low = To be completed by staff or volunteers where costs are primarily printing, copying, or meetings and costs are less than $10,000; Moderate = Costs are less than $100,000; High = Costs are > than $100,000

3. Funding sources:
   HMA = Hazard Mitigation Assistance
   A * by "HMA" indicates that it has a potential for a benefit-cost ratio above 1.0
   EOC = Emergency Operations Center grant (not currently active)
   AFG = Assistance to Firefighters Grant
   DWSRF = Drinking Water State Revolving Fund
   Private = Either fees from developers, or through the Wolcott Land Conservation Trust

4. A beneficial or favorable rating = 1; an unfavorable rating = -1. Technical and Financial benefits and costs are double-weighted (i.e. their values are counted twice in each subtotal

APPENDIX 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.

Meeting Agenda
HAZARD MITIGATION PLAN FOR TOWN OF WOLCOTT
May 14, 2013

---

1. Purpose and Need for Hazard Mitigation Plan
   a. Disaster Mitigation Act of 2000
   b. Status of Wolcott's hazard mitigation plan

2. Update on Hazard Mitigation Grant Programs (PDM, HMGP)
   a. Congressional role
   b. Connecticut has funds to distribute under HMGP
   c. Types of projects that get funded

3. What's New with Local Plan Updates and Approvals
   a. Develop goals that connect to the strategies
   b. HAZUS analysis
   c. Better public involvement and outreach to neighboring towns
   d. Make plan maintenance more specific
   e. More emphasis on benefit-cost analysis
   f. Incorporate effects of recent disasters into plan
   g. Incorporation of hazard mitigation plan into other town plans

4. Project Scope
   a. Data collection, outreach
   b. Update vulnerability analysis
   c. Revisit strategies and update plan
   d. DEEP and FEMA review and approval

5. Project Schedule

6. Review of Hazards and Events from 2007-2013 (Table attached)

7. Review of Table of Strategies from Last Plan

8. Data Collection Needs

9. Outreach and Public Involvement
   a. Public meeting vs. surveymonkey survey
   b. Letters to surrounding communities

10. Next Steps

11. Matching Grant

12. Association of State Floodplain Managers (ASFPM) Conference

Hazard Mitigation Plan Update
Wolcott, Connecticut

Presented by:
David Murphy, P.E., CFM
Associate
Milone & MacBroom, Inc.

May 14, 2013

MILONE & MACBROOM®

Purpose and Need for Hazard Mitigation Plan

- 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
- Status of Wolcott's Plan
  - Developed 2007
  - Adopted and Approved 2008
  - Expires 2013

MILONE & MACBROOM®

What is a Natural Hazard?

- An extreme natural event that poses a risk to people, infrastructure, and resources

MILONE & MACBROOM®

What is Hazard Mitigation?

- Actions that reduce or eliminate long-term risk to people, property, and resources from natural hazards and their effects

MILONE & MACBROOM®

Update on Hazard Mitigation Grant Programs

- Local communities must have a FEMA-approved Hazard Mitigation Plan in place to receive Federal Grant Funds for Hazard Mitigation Projects
  - PDM (Pre-Disaster Mitigation)
  - HMGP (Hazard Mitigation Grant Program)
  - FMA (Flood Mitigation Assistance)
  - RFC (Repetitive Flood Claims)
  - SRL (Severe Repetitive Loss)
- Congress is re-arranging some programs
- Connecticut has >$20M to distribute under HMGP

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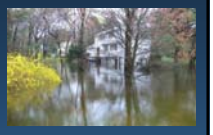
Update on Hazard Mitigation Grant Programs

State	Description	Grant
Connecticut	Home elevations	$641,025
Connecticut	Culvert replacement	$500,000
Connecticut	Home acquisition	$411,000
Connecticut	East Haven home elevation	$75,206
Connecticut	Home elevation	$64,575
Connecticut	Home elevation	$56,700
Maine	Floodplain acquisition and structure removal	$2,157,678
Massachusetts	Downtown flood mitigation/culvert replacement	$3,000,000
Massachusetts	Pond flood hazard project	$1,745,700
Massachusetts	Flood hazard mitigation project	$1,079,925
Massachusetts	Culvert project	$525,000
Massachusetts	Housing elevation and retrofit	$473,640
Massachusetts	Housing elevation and retrofit	$449,935
Massachusetts	Road mitigation project	$186,348
Massachusetts	Flood mitigation project	$145,503
New Hampshire	Water planning for firefighting	$134,810
New Hampshire	Culvert project	$112,500
New Hampshire	Box culvert project	$102,000
New Hampshire	Culvert project	$72,750
New Hampshire	Dry hydrants	$15,251
New York	Beach road elevation	$1,792,521
New York	Subdivision utilities: overhead to underground	$300,767
New York	WWTP Floodwall construction	$223,200
New York	Culvert project	$122,664
Vermont	Fluvial erosion risk assessment	$337,498
Vermont	Road mitigation project	$140,441
Vermont	Inundation & erosion controls to a public building	$99,188



Connecticut is currently accepting HMGP applications to fund standby power supply!

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What's New with Local Plan Updates and Approvals

- Develop goals that connect to the strategies
- HAZUS analysis
- Improve public involvement and outreach to neighboring towns
- Make plan maintenance more specific
- More emphasis on benefit-cost analysis
- Incorporate effects of recent disasters
- Show how the plan will be incorporated into other town plans

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Project Scope of Services

- Task 1 – Project Initiation and Data Collection
- Task 2 – Risk and Vulnerability Assessment
- Task 3 – Strategy Update and Plan Development
- Task 4 – DEEP and FEMA Review and Plan Adoption

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Project Schedule

- Task 1 – Project Initiation and Data Collection: May and June 2013
- Task 2 – Risk and Vulnerability Assessment: May and June 2013
- Task 3 – Strategy Update and Plan Development: June and July 2013
- Task 4 – DEEP and FEMA Review and Plan Adoption: *The goal is to be ahead of the State Plan*

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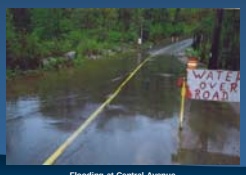
Review of Hazards and Events, 2007-2013

- Hazards in the Wolcott Plan:
  - Flooding
  - Hurricanes and tropical storms
  - Summer storms and tornadoes
  - Winter storms and nor'easters
  - Earthquakes
  - Wildfires
  - Dam failure



Flooding at Central Avenue

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Review of Hazard Mitigation Strategies

Riprap along Mad River at Garthwait Road

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Review of Hazard Mitigation Strategies

- Elevate or remove flood-prone buildings
- Wet and dry floodproofing
- Move critical facilities from flood zones
- Strengthen or reinforce the shelters
- Remove and replace undersized and/or failing bridges and culverts
- Replace overhead utilities with underground utilities
- Organize tree maintenance priorities and scheduling
- Enhance fire suppression capabilities
- Public education programs – dissemination of public safety information

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Data Collection and Discussion

- What are Wolcott's critical facilities?
- Shelters and evacuation routes
- Discussion of recent storms
- Development and redevelopment trends
- Utilities above/below ground?
- How are drainage complaints received and tracked?
- Areas of flooding
- Repetitive loss properties

Businesses on Nutmeg Valley Road

Milone & MacBroom®

Data Collection and Discussion

- Areas prone to wind damage
- Tree maintenance
- Snow and ice removal routes
- Areas prone to icing in winter
- Dams and effects of dam failure
- Areas with and without fire protection
- Areas prone to wildfires, fire department off-road capability, coordination with utilities/nearby municipalities

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Outreach and Public Involvement

- Letters to surrounding municipalities
- Public meeting vs. using surveymonkey.com

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Next Steps

- Date for survey or public information meeting
- Date for receipt of any materials resulting from this meeting

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Matching Grant

- Work with City of Waterbury to track staff time
- Commission/volunteer time does not need to be tracked

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One Last Thing!

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"SEMPER FI"

SEMPER FI or the full-- Semper Fidelis--

"Always Faithful"- two words that are more than just the Marine Corps motto for two Wolcott Veteran Marines - Luis Hernandez Sr & Luis Hernandez Jr. For this father and son, it is truly their way of life. These two men were asked if they would consider escorting this year's Grand Marshall's car in the Wolcott Memorial Day Parade. Upon hearing that this year's Grand Marshall was going to be Frances McCann, a Gold Star Mother (a mother whose child was killed in the line of duty of military service), though they had never met her, the answer was a resounding "WE"LL BE THERE!" Mrs. McCann's Marine son, PFC James P. Carney Jr. was killed in Quang Nam, South Vietnam on February 27, 1969.

"Franny" as most know her, has dedicated her life to serving Veterans, active Military , Military and other Gold Star Families.

Luis Sr and Luis Jr, not only graciously accepted the assignment (leaving behind picnics, family members and friends), but went above and beyond the call of duty by being her Honor Guard through the parade route THEN ADDITIONALLY, on their own volition, stood in Honor at her side through the ceremonies end of the parade at the Woodtick Recreation area, making sure she was safely to her ride home at the end of the evening.

Uncommon valor is not only notable on the battle-field, it is alive and well here in Wolcott, thanks to Luis Hernandez Sr and Luis Hernandez Jr!

THANK YOU FOR YOUR SERVICE IN THE LINE OF DUTY AND AT HOME.

Public Forum about Mitigation of Natural Hazards

Tropical Storm Irene, October snowstorm Alfred, and Superstorm Sandy are recent events that caused severe damage in the region and resulted in Federal disaster declarations. Flooding, heavy snow, wind, and downed power lines cause damage to property, disrupt our daily routines, close our schools and businesses, and jeopardize the health and safety of the citizens of Wolcott.

What can be done to minimize our vulnerabilities to natural hazards? The Town of Wolcott is updating its hazard mitigation plan to identify activities that can be undertaken before natural hazards occur in order to minimize property damage, risk of life, and the costs that are shared by all. The plan will discuss the occurrence and consequences of floods, winter storms, tornadoes, hurricanes and tropical storms, wildfires, earthquakes, and dam failure. The plan will outline the steps that Wolcott can take to mitigate for future natural hazards.

In order to gain input to the hazard mitigation plan, the town has developed an internet-based survey. Residents and business owners are invited to take the survey and offer ideas for minimizing the damage that occurs and the costs that are borne by our town. Please go to https://www.surveymonkey.com/s/wolcotthazardmitigationplan. For more information, please contact Mr. Mark Garrigus of the Wolcott Inland Wetlands Commission.

One father is more than
a hundred Schoolemasters.
~George Herbert, Outlandish Proverbs, 1640

Wolcott Youth Athletic Association

Registration for the Fall 2013 Instructional Season will begin on June 1st running thru July 31st. All players must be 4 on or before 8/1/2013. A birth certificate must be sent in, if the child is new to the program. All players are required to have shin guards and cleats to play.

Registration for the Fall 2013 Competitive Season will begin on June 1st thru July 15th. All travel players must be 7 on or before 8/1/2013. All travel players are required to have a birth certificate on file and provide a WALLET size photo to the registrar by July 30th.

Please see our website www.WYAA.com for further details and registration information.

The Wolcott Grange May meeting was attended by Rhode Island State Master Stephen Logan, Wolcott Grange Master Joseph Ouimet, and Connecticut State Grange Master Jody Cameron.

The Grange has grown from 13 members to more than 70, including 10 new members sworn in on May 28th.

Wolcott Grange Special Meeting

A special meeting will be held on Saturday, June 15th at 3pm at the Wolcott Grange, 313 Boundline Road, Wolcott, CT 06716. All new members aged 14 and older who would like to join are asked to appear for a special induction ceremony. Membership is $35 per member. A presentation will follow. We are proud to announce the appointment five youth ambassadors who will help to get the word out about our Grange and perform a variety of community service projects throughout the year including the community garden we are starting.

If you would like to learn more, please join us on facebook or contact Joe at 203-768-6535. If you would like to learn more about Granges around Connecticut, please visit ctstategrange.org

Town Clerk Tidbits

Debbie Slater

By Dolores "Debbie" Slater, Town Clerk

ATTENTION VETERANS

I want to personally thank you for your service to our country - it is because of your sacrifice that we are able to enjoy the freedoms we have today!

As a veteran, you may be eligible for local tax exemptions if you file your Honorable Discharge Papers (DD Form 214) in the Town Clerk's Office. We will record your information and return the original document to you. If you lived in another town in Connecticut and filed your DD Form 214 there, bring us the DD Form 214 with the recording information from the previous town, and we will record your information here. Your DD Form 214 must be filed by October 1st for the exemption to be applied to next year's tax bill.

Even if you are not eligible for tax exemptions at the moment, it is recommended that you file your DD Form 214 now. Dates of eligibility may change and you may one day become eligible. If your original is lost or destroyed, your information will be permanently on file in our office.

REMINDER – ALL DOG LICENSES RENEW IN JUNE

Many of you have already stopped in to our office and renewed your dog(s)'s licenses in person, or used the form in last month's Community News and have renewed by mail. If you have not renewed your dog(s)'s license(s) yet, please do so by the end of the month to avoid late charges. The fee (in June) for a spayed or neutered dog is $8.00; for an unaltered dog, $19.00.

TOWN HALL HOURS

Monday, Tuesday, Wednesday	8:00 am to 4:30 pm
Thursday	8:00 am to 5:30 pm
Friday	8:00 am to 12:00 noon

HAVE A SAFE AND HAPPY SUMMER!

Wolcott Connecticut Welcomes You

Quick Links

- Wolcott Chamber Of Commerce
- Wolcott Public Schools
- Wolcott Police Department
- Wolcott Senior Center
- Farmingbury Hills Golf Course

Calendar Of Events

June 2013

S	M	T	W	T	F	S
26	27	28	29	30	31	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	1	2	3	4	5	6

Our News

View All

Survey about Mitigation of Natural Hazards

Tropical Storm Irene, October snowstorm Alfred, and Superstorm Sandy are recent events that caused severe damage in the region and resulted in Federal disaster declarations. Flooding, heavy snow, wind, and downed power lines cause damage to property, disrupt our daily routines, close our schools and businesses, and jeopardize the health and safety of the citizens of Wolcott.

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Username: Password: Log In Register / Forgotten Password?

NETTTS HAVE YOU BEEN THINKING ABOUT MAKING A CHANGE IN YOUR LIFE? CLICK

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REP-AM.COM RepublicanAmerican

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LOCAL

No comments posted. | E-mail | Print | Search Archives

Town asking for input in natural hazard plan

Sunday, July 7, 2013 4:05 PM EDT

REPUBLICAN-AMERICAN

WOLCOTT -- The town is asking for feedback as it updates its hazard mitigation plan.

The updated plan will identify activities that can be undertaken before a natural hazard to minimize property damage, risk of live and costs.

Read more of this story and more!
7-Day Subscribers have FREE access to everything on rep-am.com and our E-Edition.
CLICK HERE to register and activate your access,.

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Latest News

- Delle Donne to miss All-Star game with concussion Fri 11:59 am
- Vandals deface Lincoln Memorial Fri 11:39 am
- UConn in 2 national games on same night|Men's hoop, football in primetime showcase Nov. 8 Fri 11:27 am
- Troopers stop stolen SUV in Waterbury, nab driver after foot chase Fri 7:39 am
- Death of man in Bristol Park suicide, medical examiner says Fri 7:38 am
- Prospect man, 18, accused of providing liquor to minors Fri 7:38 am

Most Popular

Most Commented

Latest Local News

WEB EXTRAS
TODAY AT REP-AM.COM

>> IN THE RED ZONE View a photo galleries and video highlights from the Oxford-Notre Dame of Fairfield and Cheshire-West Haven games. Also, watch a video from the Pomperaug-New Milford game.

>> UCONN FOOTBALL Watch a video of Coach P. talking about the team's energy heading into today's game at Buffalo.

>> SENIOR BOWLING Watch a video report on the Sky Top Lanes senior league.

High **70**
Low **45**
Plenty of sun today; Dress for chilly weather tonight.
Page **8A**

Accent **1D**	Crossword **5D**	People **4D**
Annie's Mailbox **4D**	Editorials **6A**	Public notices **7C**
Births **2B**	Horoscope **4D**	Public record **2A**
Business **8D**	Lottery **2A**	Stocks **7D**
Classified **3C**	Movie theaters **2D**	Sudoku **5D**
Comics **6D**	Obituaries **4-5B**	Television **5D**

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6 34373 12494 2

Read it at rep-am.com

Coppa. The league, which meets every Friday afternoon, has one rule: Nobody under 60 is allowed. See story on Page 3B.

VISIT REP-AM.COM FOR A VIDEO ON THE LEAGUE

Ready for nature's nastiness

Towns need plans to be eligible for funds

BY QUANNAH LEONARD
REPUBLICAN-AMERICAN

In Watertown, whenever the Steele Brook rises, it first floods The Gowans-Knight Co. Inc. on Knight Street.

That business, which builds and refurbishes fire trucks, floods before Bradshaw Chrysler Jeep on Main Street and well before Watertown Plaza off Route 63, said Charles Berger Jr., Watertown's town engineer. The Gowans-Knight Co. is at the lowest point along Steele Brook, he said.

It's a tiny brook and then it's a nightmare, said Day Palmer, vice president of The Gowans-Knight Co. Every

See **FLOOD**, *Page* **7A**

DARLENE DOUTY REPUBLICAN-AMERICAN

Day Palmer, vice president of Gowans-Knight Co. in Watertown, holds a photo taken when the business was flooded after tropical storm Lee in 2011. Cities and towns in Greater Waterbury are updating their plans to mitigate natural hazards.

Keno ge step clo to appr

Legislators s OK of video

BY MARK PAZNIO
©THE CONNECTICUT M

The Connecticut took a step Thursda bringing keno to bar rants and other out year, while legisl Hartford began a stu feasibility of int video slots to pari-n cilities in Bridgep Haven and Windsor

Keno seems a su The General Assem ed its authorization

See **KENO**,

LOTTERY

Keno is ex to expand tery's netw vendors by as 600 new

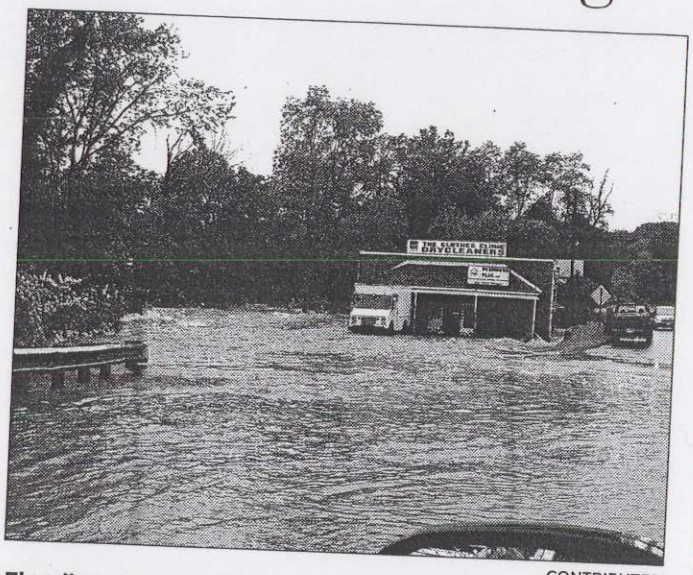
FLOOD: Plans in various stages

Continued from Page One

time it rains, the business has to be on alert, so it can be ready to move trucks and other equipment, she said outside her business Thursday morning.

"We understand that the town is trying to correct the problem, but the amount of money it's going to cost to correct the problem is probably ... it's never going to happen," Palmer said. "So therefore, every time we have a flood, we do more things when we're doing our repairs to make it not affect us as much."

Reducing the persistent flooding along Steele Brook is just one example of the projects in Greater Waterbury that could qualify for federal hazard mitigation funds through the Federal Emergency Management Agency. To be eligible for those funds, though, communities must have an approved natural hazard mitigation plan, state and local officials said.



CONTRIBUTED

Flooding along Steele Brook in Watertown spills over and floods this business on Riverside Street in 2011. Cities and towns in Greater Waterbury are updating their plans to mitigate natural hazards. Communities must do this to be eligible for FEMA funds for certain projects.

WATERTOWN AND 12 other towns in the Central Naugatuck Valley Region have plan updates underway, with the municipalities at different stages of the process, said David Murphy, managing project engineer in water resources with Milone & MacBroom, Cheshire, the consulting firm hired to write the plans. The updated plans will discuss the occurrence and consequences of floods, winter storms, tornadoes, hurricanes and tropical storms, wildfires, earthquakes, landslides and dam failure.

Watertown, Woodbury and Oxford have completed a first draft, which is in the reviewing process, said Murphy, project manager.

Waterbury, Cheshire, Prospect and Wolcott finished drafts in the spring, and already have done surveys and hosted a public meeting. Some of those communities are now reviewing the drafts, he said.

The remaining six towns, Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury and Thomaston, have [illegible]

small portion is set aside for addressing future known issues, he said.

Scott Devico, spokesman for the state Division of Emergency Management and Homeland Security, said the state division provides assistance and recommendations on hazard mitigation plans if asked by towns. It's a joint venture with the state Department of Energy and Environmental Protection, he said.

In Waterbury, the city has applied for FEMA hazard mitigation funding to pay for drainage improvements at the Chase Building on Grand Street. Waterbury can't receive that funding until the city's plan is updated, Murphy said.

The project cost estimate is $221,000, said Lou Spina, the city's provisional director of public works. The project entails installing a storm drain that would connect to an existing storm drain system on Leavenworth Street, said Mark Pronovost, Waterbury's city engineer.

During an intense storm, water builds up in a low spot in that parking area. Workers from streets and public works typically will put down about 40 to 50 sandbags to protect the basement, Spina said. He

proofing, Berger said.

Watertown has applied to FEMA for hazard mitigation grant funds to flood proof all businesses along Steele Brook that are subject to significant flooding, he said. That application is under review, he said.

Total project costs for that option is about $1.9 million, Berger said. If approved, FEMA would pay 75 percent, or about $1.5 million. Property owners would be responsible for 25 percent.

Berger said the plan update is a reinforcement of what the town knows it needs to address as far as hazard mitigation, as well as looking for new ideas.

"The whole goal is to be prepared as we can, take as many steps as we can ahead of time and be prepared to react afterward if something gets significantly damaged," Berger said.

At The Gowans-Knight Co., Day has pictures in her office of the flooding that occurred on site when Storm Lee hit in 2011. The company got two-and-a-half feet of water, she said.

The company has spent $150,000 in the last two years to protect itself against flooding, Palmer said. That doesn't include the $7,000 it paid [illegible]

KENO: L

Continued from Page One

the Malloy administration is negotiating profit-sharing terms with tribal casinos and, now, the lottery's board has authorized developing the infrastructure necessary to produce the game by June 1, 2014.

The odds are less certain for the introduction of video slot machines at three parimutuel facilities. The study was initiated by lawmakers in those communities who say slots might be necessary to hang onto gambling revenues in the face of growing competition in New York and Massachusetts.

The confluence of the day's events underlined the importance and the volatility of the gambling industry in the Northeast, where a rapid expansion of casinos and other betting facilities is undercutting Connecticut's two tribal casinos, Foxwoods and Mohegan Sun.

"The fact of the matter is the state of Connecticut is in the gaming industry, and we've been seeing revenues continue to drop," said Sen. Andres Ayala, D-Bridgeport, as lawmakers began their public look at video slots.

From a high of $718 million in 2006, the state saw its annual gambling income drop to $612 million last year. The revenue comes primarily from two sources: the shrinking slots revenue from the tribal casinos and the growing profits of the lottery.

Keno represents a twofold expansion for the lottery: It is a new game, and it also is

DON'T

Watertown, Woodbury and Oxford have completed a first draft, which is in the reviewing process, said Murphy, project manager.

Waterbury, Cheshire, Prospect and Wolcott finished drafts in the spring, and already have done surveys and hosted a public meeting. Some of those communities are now reviewing the drafts, he said.

The remaining six towns, Beacon Falls, Bethlehem, Middlebury, Naugatuck, Southbury and Thomaston, have started the planning process and have or will host informational meetings and online surveys sometime soon, he said.

Towns in the Litchfield Hills Council of Elected Officials region have begun to update their plans, and those in the Northwestern Connecticut Council of Governments have just started their first mitigation plans, Murphy said.

Samuel Gold, acting executive director of the Council of Governments Central Naugatuck Valley, which is coordinating the updates, said the hazard mitigation plans are only good for five years.

WHEN A NATURAL DISASTER OCCURS, and when a disaster is declared in Connecticut, a small portion of FEMA funds are available to address known hazards that could be a future problem, Gold said. Most money is spent for recovery, while a

phy said.

The project cost estimate is $221,000, said Lou Spina, the city's provisional director of public works. The project entails installing a storm drain that would connect to an existing storm drain system on Leavenworth Street, said Mark Pronovost, Waterbury's city engineer.

During an intense storm, water builds up in a low spot in that parking area. Workers from streets and public works typically will put down about 40 to 50 sandbags to protect the basement, Spina said. He said the city is trying to avoid any expensive damage and to keep the building online to conduct city business.

Watertown has its first draft posted on the town website, www.watertownct.org. for public comment.

Berger said the town doesn't have a preferred alternative yet for the Steele Brook flood mitigation project.

WATERTOWN HAS CONDUCTED A NUMBER OF STUDIES and has been looking at a number of alternatives over the years, he said. Those alternatives range from buying out people who are in the flood plain and relocating their businesses to a flood-free site, to more of a structural project, where the town would build flood walls and pump stations to try to protect properties where they are now.

And in between those alternatives are several more alternatives, including flood

prepared as we can, take as many steps as we can ahead of time and be prepared to react afterward if something gets significantly damaged," Berger said.

At The Gowans-Knight Co., Day has pictures in her office of the flooding that occurred on site when Storm Lee hit in 2011. The company got two-and-a-half feet of water, she said.

The company has spent $150,000 in the last two years to protect itself against flooding, Palmer said. That doesn't include the $7,000 it paid to repair pavement damaged by flooding, she said.

The business now stores everything six inches to a foot-and-a-half off the floor in the shop. It also has installed an interior mezzanine for securing welding equipment and bought two additional sets of lifts for lifting up fire trucks.

"We are doing our own hazard mitigation because we know it's just going to keep happening and we can't afford to move somewhere else," Palmer said. "Because the cost of moving is astronomical, even though we've looked into it numerous times."

Residents and business owners can email ideas about the plans to the Council of Governments Central Naugatuck Valley at comments@cogcnv.org.

Contact Quannah Leonard at qleonard@rep-am.com, on Facebook at RA The Valley or on Twitter @RA_Quannah.

SPY: Violators allowed to retire

Continued from Page One

prosecution, Ellard's letter said. In some cases, U.S. prosecutors declined to take action but in nearly every case the employees were allowed to retire without punishment.

In one case, a worker was suspended without pay then retired; in another case, a worker's promotion was canceled; in two cases, military employees suffered a reduction in rank, extra duty and brief reduction in salary for two months.

Public concerns about how telephone and Internet surveillance data is handled by the NSA have intensified in the wake of leaks about the

TODAY'S POLL

VOTE ONLINE AT **REP-AM.COM**

RA

If you had access to the technology, would you spy on a spouse, boyfriend or girlfriend?

FIND RESULTS OF YESTERDAY'S QUESTION ON PAGE 2A.

correct internal problems that led to the NSA's accidental collection of 56,000 emails and other communications by Americans, and they insisted that willful abuse of surveillance data by officials is almost non-existent.

Grassley, who had asked Ellard last month to provide more information about the 12

his foreign girlfriend's telephone number in 2004. The official also tried to retrieve data about his own phone but was prevented because internal mechanisms prevented queries on domestic phone numbers without authorization. The matter was referred to the Justice Department. The official retired in 2012 before internal disciplinary action could be taken.

In another case, the foreign girlfriend of a U.S official reported her suspicions that the official was listening to her telephone calls.

An internal investigation found that the official had made internal surveillance queries on the phones of nine

Reno represents a twofold expansion for the lottery: It is a new game, and it also is

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May 23, 2013

Mr. Tony Lorenzetti, Director of Public Works
Town of Plymouth
80 Main Street
Terryville, CT 06786

RE: Town of Wolcott Hazard Mitigation Plan Update
MMI #1014-49

Dear Mr. ~~Lorenzetti~~ Tony:

Milone & MacBroom, Inc. (MMI) is working with the Town of Wolcott to update the Hazard Mitigation Plan that was approved by the Federal Emergency Management Agency in 2007. In this plan, the town indicated that it would make an effort to coordinate with surrounding communities when the plan was updated. The Town of Wolcott and MMI are interested in coordinating with the Town of Plymouth relative to hazards that could cross municipal boundaries such as flooding, as well as strategies for hazard mitigation that could be addressed by the two communities.

We understand that you are the representative from Plymouth that worked with the Central Connecticut Regional Planning Agency on its multijurisdictional Hazard Mitigation Plan and, therefore, will have the most valuable input for the update of the Wolcott Hazard Mitigation Plan. Please take a moment to share your thoughts for the following:

1. Do the communities of Wolcott and Plymouth face any shared hazards that could be addressed by both communities? An example could be windstorms that damage power lines that cross the municipal boundary.

2. Can you think of any strategies for hazard mitigation that could benefit both communities?

3. Do the communities of Wolcott and Plymouth currently cooperate on any of the following:
   - Local emergency communications or response
   - Road maintenance, drainage system maintenance, public works, etc.
   - Communications with water, sewer, electric, and other utility providers

You may contact either of the undersigned via email or telephone. A written response is not necessary. Thank you for your time.

Very truly yours,

MILONE & MACBROOM, INC.

David Murphy, P.E., CFM
Associate
davem@miloneandmacbroom.com

Scott Bighinatti
Senior Environmental Scientist
scottb@miloneandmacbroom.com

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Engineering, Planning
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May 23, 2013

Mr. Walter Veselka, Director of Public Works
City of Bristol
111 North Main Street
Bristol, CT 06010

RE: Town of Wolcott Hazard Mitigation Plan Update
MMI #1014-49

Dear Mr. Veselka:

Milone & MacBroom, Inc. (MMI) is working with the Town of Wolcott to update the Hazard Mitigation Plan that was approved by the Federal Emergency Management Agency in 2007. In this plan, the town indicated that it would make an effort to coordinate with surrounding communities when the plan was updated. The Town of Wolcott and MMI are interested in coordinating with the City of Bristol relative to hazards that could cross municipal boundaries such as flooding, as well as strategies for hazard mitigation that could be addressed by the two communities.

We understand that you are the representative from Bristol that worked with the Central Connecticut Regional Planning Agency on its multijurisdictional Hazard Mitigation Plan and, therefore, will have the most valuable input for the update of the Wolcott Hazard Mitigation Plan. Please take a moment to share your thoughts for the following:

1. Do the communities of Wolcott and Bristol face any shared hazards that could be addressed by both communities? Examples could be flooding associated with Cedar Lake or windstorms that damage power lines that cross the municipal boundary.

2. Can you think of any strategies for hazard mitigation that could benefit both communities?

3. Do the communities of Wolcott and Bristol currently cooperate on any of the following:
   - Local emergency communications or response
   - Road maintenance, drainage system maintenance, public works, etc.
   - Communications with water, sewer, electric, and other utility providers

You may contact either of the undersigned via email or telephone. A written response is not necessary. Thank you for your time.

Very truly yours,

MILONE & MACBROOM, INC.

David Murphy, P.E., CFM
Associate
davem@miloneandmacbroom.com

Scott Bighinatti
Senior Environmental Scientist
scottb@miloneandmacbroom.com

cc: Ray Rogozinski – City of Bristol Engineer

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May 23, 2013

Mr. Jim Grappone, Acting Town Engineer
Town of Southington
75 Main Street
Southington, CT 06489

RE: Town of Wolcott Hazard Mitigation Plan Update
MMI #1014-49

Dear Mr. Grappone:

Milone & MacBroom, Inc. (MMI) is working with the Town of Wolcott to update the Hazard Mitigation Plan that was approved by the Federal Emergency Management Agency in 2007. In this plan, the town indicated that it would make an effort to coordinate with surrounding communities when the plan was updated. The Town of Wolcott and MMI are interested in coordinating with the Town of Southington relative to hazards that could cross municipal boundaries such as flooding, as well as strategies for hazard mitigation that could be addressed by the two communities.

We understand that you are the representative from Southington that worked with the Central Connecticut Regional Planning Agency on its multijurisdictional Hazard Mitigation Plan and, therefore, will have the most valuable input for the update of the Wolcott Hazard Mitigation Plan. Please take a moment to share your thoughts for the following:

1. Do the communities of Wolcott and Southington face any shared hazards that could be addressed by both communities? Examples could be flooding originating from the steep eastern slope of Wolcott or windstorms that damage power lines that cross the municipal boundary.

2. Can you think of any strategies for hazard mitigation that could benefit both communities?

3. Do the communities of Wolcott and Southington currently cooperate on any of the following:
   - Local emergency communications or response
   - Road maintenance, drainage system maintenance, public works, etc.
   - Communications with water, sewer, electric, and other utility providers

You may contact either of the undersigned via email or telephone. A written response is not necessary. Thank you for your time.

Very truly yours,

MILONE & MACBROOM, INC.

David Murphy, P.E., CFM
Associate
davem@miloneandmacbroom.com

Scott Bighinatti
Senior Environmental Scientist
scottb@miloneandmacbroom.com

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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

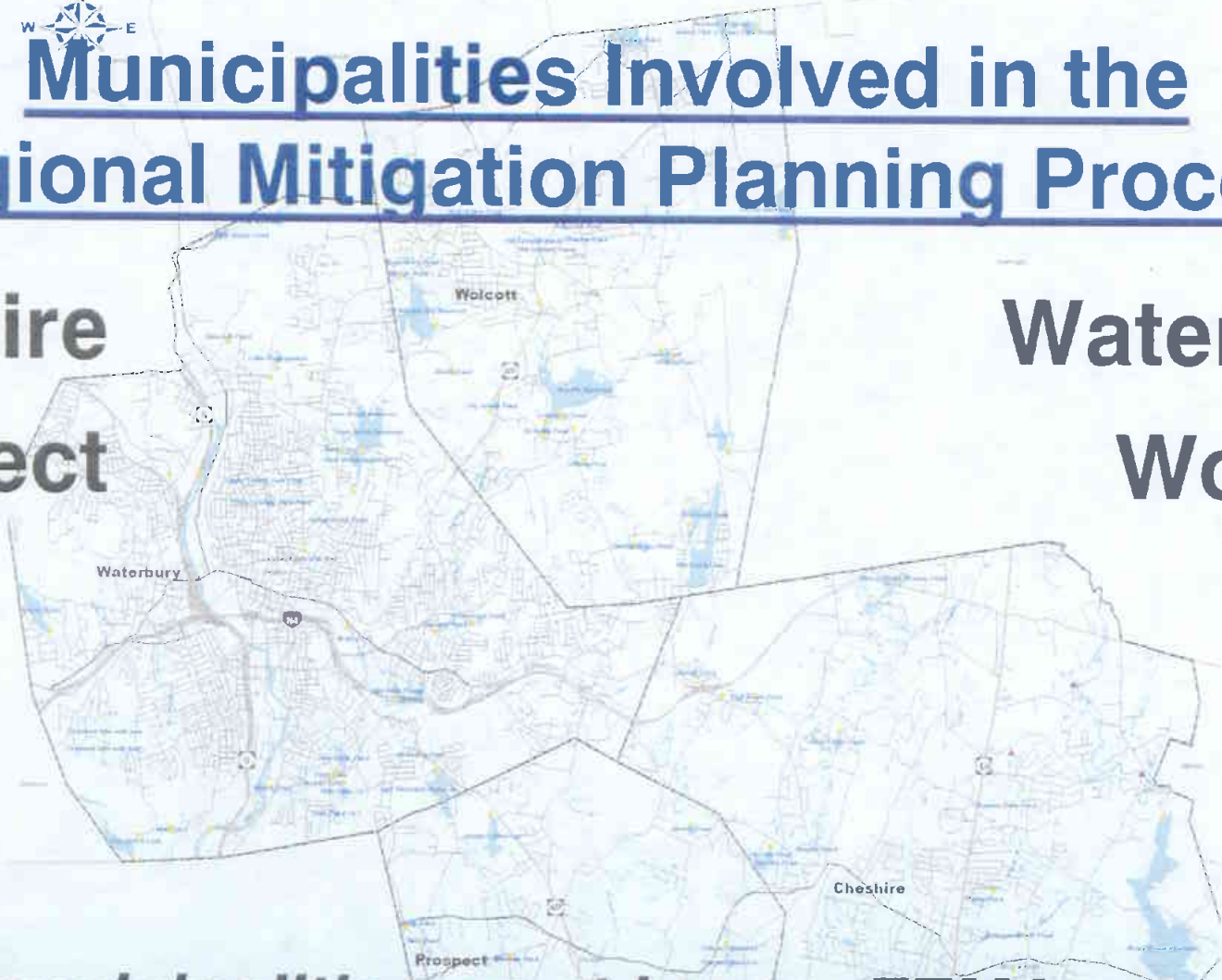
Municipalities Involved in the Regional Mitigation Planning Process

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

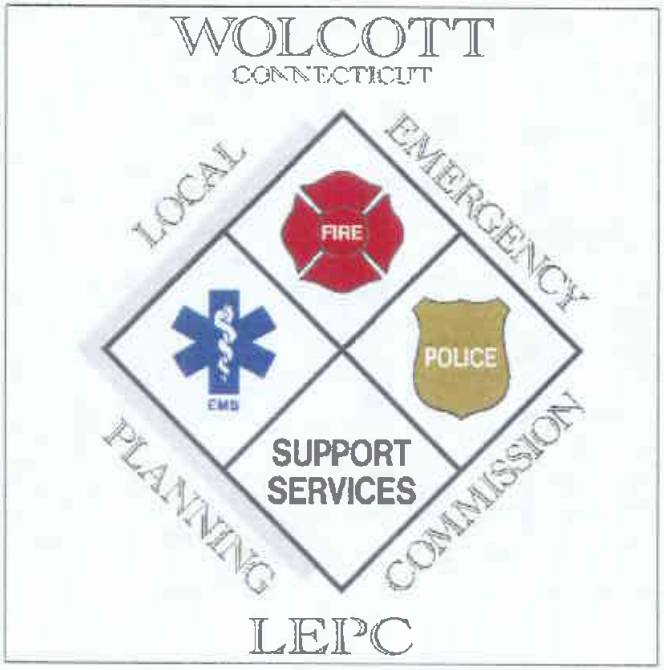
- Terrorism and Sabotage
- Disaster Response and Recovery
- Human Induced Emergencies (some fires, hazardous spills and contamination, disease, etc.)

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
HAZUS DOCUMENTATION

Hazus-MH: Flood Event Report

Region Name: Wolcott

Flood Scenario: Lindsley Brook - Wolcott

Print Date: Thursday, May 02, 2013

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Connecticut

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 20 square miles and contains 207 census blocks. The region contains over 5 thousand households and has a total population of 15,215 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 6,031 buildings in the region with a total building replacement value (excluding contents) of 1,254 million dollars (2006 dollars). Approximately 91.89% of the buildings (and 77.69% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 6,031 buildings in the region which have an aggregate total replacement value of 1,254 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	973,837	77.7%
Commercial	180,847	14.4%
Industrial	67,796	5.4%
Agricultural	5,288	0.4%
Religion	11,098	0.9%
Government	2,142	0.2%
Education	12,517	1.0%
Total	**1,253,525**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	57,655	84.7%
Commercial	4,295	6.3%
Industrial	1,963	2.9%
Agricultural	362	0.5%
Religion	1,669	2.5%
Government	2,037	3.0%
Education	122	0.2%
Total	**68,103**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 5 schools, no fire stations, 1 police station and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	Wolcott
Scenario Name:	Lindsley Brook - Wolcott
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 0 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	**0**		**0**		**0**		**0**		**0**		**0**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	0	0	0	0
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	5	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

Analysis has not been performed for this Scenario.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 7 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 2 people (out of a total population of 15,215) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 0.09 million dollars, which represents 0.14 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 0.09 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 54.26% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	0.04	0.00	0.01	0.00	0.05
	Content	0.02	0.01	0.01	0.00	0.04
	Inventory	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.05**	**0.01**	**0.03**	**0.00**	**0.09**
Business Interruption						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	0.00	0.00	0.00	0.00	0.00
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
ALL	**Total**	**0.05**	**0.01**	**0.03**	**0.00**	**0.09**

Appendix A: County Listing for the Region

Connecticut

- New Haven

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
New Haven	15,215	973,837	279,688	1,253,525
Total	**15,215**	**973,837**	**279,688**	**1,253,525**
Total Study Region	**15,215**	**973,837**	**279,688**	**1,253,525**

Hazus-MH: Flood Event Report

Region Name: Wolcott

Flood Scenario: Mad River - Wolcott

Print Date: Thursday, May 02, 2013

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Connecticut

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 20 square miles and contains 207 census blocks. The region contains over 5 thousand households and has a total population of 15,215 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 6,031 buildings in the region with a total building replacement value (excluding contents) of 1,254 million dollars (2006 dollars). Approximately 91.89% of the buildings (and 77.69% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 6,031 buildings in the region which have an aggregate total replacement value of 1,254 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	973,837	77.7%
Commercial	180,847	14.4%
Industrial	67,796	5.4%
Agricultural	5,288	0.4%
Religion	11,098	0.9%
Government	2,142	0.2%
Education	12,517	1.0%
Total	**1,253,525**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	110,717	51.2%
Commercial	87,370	40.4%
Industrial	13,433	6.2%
Agricultural	1,651	0.8%
Religion	2,796	1.3%
Government	105	0.0%
Education	347	0.2%
Total	**216,419**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 5 schools, no fire stations, 1 police station and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	Wolcott
Scenario Name:	Mad River - Wolcott
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 0 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	**0**		**0**		**0**		**0**		**0**		**0**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	0	0	0	0
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	5	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

Analysis has not been performed for this Scenario.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 16 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 6 people (out of a total population of 15,215) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 4.47 million dollars, which represents 2.06 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 4.45 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 15.76% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	0.43	0.53	0.16	0.08	1.20
	Content	0.27	1.96	0.37	0.54	3.15
	Inventory	0.00	0.03	0.07	0.01	0.10
	Subtotal	**0.70**	**2.52**	**0.59**	**0.63**	**4.45**
Business Interruption						
	Income	0.00	0.01	0.00	0.00	0.01
	Relocation	0.00	0.00	0.00	0.00	0.00
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.01	0.00	0.00	0.01
	Subtotal	**0.00**	**0.02**	**0.00**	**0.00**	**0.02**
ALL	**Total**	**0.70**	**2.53**	**0.59**	**0.64**	**4.47**

Appendix A: County Listing for the Region

Connecticut

- New Haven

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Connecticut				
New Haven	15,215	973,837	279,688	1,253,525
Total	**15,215**	**973,837**	**279,688**	**1,253,525**
Total Study Region	**15,215**	**973,837**	**279,688**	**1,253,525**

Hazus-MH: Flood Event Report

Region Name: Wolcott

Flood Scenario: Old Tannery Brook - Wolcott

Print Date: Thursday, May 02, 2013

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Connecticut

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 20 square miles and contains 207 census blocks. The region contains over 5 thousand households and has a total population of 15,215 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 6,031 buildings in the region with a total building replacement value (excluding contents) of 1,254 million dollars (2006 dollars). Approximately 91.89% of the buildings (and 77.69% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 6,031 buildings in the region which have an aggregate total replacement value of 1,254 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	973,837	77.7%
Commercial	180,847	14.4%
Industrial	67,796	5.4%
Agricultural	5,288	0.4%
Religion	11,098	0.9%
Government	2,142	0.2%
Education	12,517	1.0%
Total	**1,253,525**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	84,808	60.8%
Commercial	23,172	16.6%
Industrial	28,165	20.2%
Agricultural	2,818	2.0%
Religion	436	0.3%
Government	0	0.0%
Education	0	0.0%
Total	**139,399**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 5 schools, no fire stations, 1 police station and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	Wolcott
Scenario Name:	Old Tannery Brook - Wolcott
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 0 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	**0**		**0**		**0**		**0**		**0**		**0**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	0	0	0	0
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	5	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

Analysis has not been performed for this Scenario.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 9 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 4 people (out of a total population of 15,215) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 2.36 million dollars, which represents 1.69 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 2.36 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 4.92% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	0.08	0.17	0.25	0.06	0.56
	Content	0.04	0.62	0.70	0.25	1.60
	Inventory	0.00	0.02	0.14	0.03	0.19
	Subtotal	**0.12**	**0.81**	**1.09**	**0.34**	**2.36**
Business Interruption						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	0.00	0.00	0.00	0.00	0.00
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
ALL	**Total**	**0.12**	**0.81**	**1.09**	**0.34**	**2.36**

Appendix A: County Listing for the Region

Connecticut

- New Haven

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
New Haven	15,215	973,837	279,688	1,253,525
Total	**15,215**	**973,837**	**279,688**	**1,253,525**
Total Study Region	**15,215**	**973,837**	**279,688**	**1,253,525**

Hazus-MH: Hurricane Event Report

Region Name: Wolcott

Hurricane Scenario: Probabilistic 10-year Return Period

Print Date: Thursday, May 02, 2013

Disclaimer:
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Connecticut

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 21.08 square miles and contains 3 census tracts. There are over 5 thousand households in the region and has a total population of 15,215 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 6 thousand buildings in the region with a total building replacement value (excluding contents) of 1,254 million dollars (2006 dollars). Approximately 92% of the buildings (and 78% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 6,031 buildings in the region which have an aggregate total replacement value of 1,254 million (2006 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	973,837	77.7%
Commercial	180,847	14.4%
Industrial	67,796	5.4%
Agricultural	5,288	0.4%
Religious	11,098	0.9%
Government	2,142	0.2%
Education	12,517	1.0%
Total	**1,253,525**	**100.0%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 5 schools, no fire stations, 1 police stations and no emergency operation facilities.

Hurricane Scenario

Hazus used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

Hazus estimates that about 0 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the region. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

Table 2: Expected Building Damage by Occupancy : 10 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	25	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	322	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	9	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	3	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	110	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	20	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	5,542	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	**6,031**		**0**		**0**		**0**		**0**	

Table 3: Expected Building Damage by Building Type : 10 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	67	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	499	100.00	0	0.00	0	0.00	0	0.00	0	0.00
MH	4	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	242	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	5,216	100.00	0	0.00	0	0.00	0	0.00	0	0.00

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use. After one week, none of the beds will be in service. By 30 days, none will be operational.

Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
Police Stations	1	0	0	1
Schools	5	0	0	5

Induced Hurricane Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0 tons of debris will be generated. Of the total amount, 0 tons (0%) is Other Tree Debris. Of the remaining 0 tons, Brick/Wood comprises 0% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 0 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 0 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 0 households to be displaced due to the hurricane. Of these, 0 people (out of a total population of 15,215) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the hurricane is 0.0 million dollars, which represents 0.00 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 0 million dollars. 0% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 0% of the total loss. Table 4 below provides a summary of the losses associated with the building damage.

Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	0.00	0.00	0.00	0.00	0.00
	Content	0.00	0.00	0.00	0.00	0.00
	Inventory	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Business Interruption Loss						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	0.00	0.00	0.00	0.00	0.00
	Rental	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Total						
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Appendix A: County Listing for the Region

Connecticut
- New Haven

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
New Haven	15,215	973,837	279,688	1,253,525
Total	**15,215**	**973,837**	**279,688**	**1,253,525**
Study Region Total	**15,215**	**973,837**	**279,688**	**1,253,525**

Hazus-MH: Hurricane Event Report

Region Name: Wolcott

Hurricane Scenario: Probabilistic 20-year Return Period

Print Date: Thursday, May 02, 2013

Disclaimer:
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Connecticut

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 21.08 square miles and contains 3 census tracts. There are over 5 thousand households in the region and has a total population of 15,215 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 6 thousand buildings in the region with a total building replacement value (excluding contents) of 1,254 million dollars (2006 dollars). Approximately 92% of the buildings (and 78% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

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Residential	973,837	77.7%
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Agricultural	5,288	0.4%
Religious	11,098	0.9%
Government	2,142	0.2%
Education	12,517	1.0%
Total	**1,253,525**	**100.0%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 5 schools, no fire stations, 1 police stations and no emergency operation facilities.

Hurricane Scenario

Hazus used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

Hazus estimates that about 0 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the region. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

Table 2: Expected Building Damage by Occupancy : 20 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	25	99.83	0	0.17	0	0.00	0	0.00	0	0.00
Commercial	321	99.79	1	0.21	0	0.00	0	0.00	0	0.00
Education	9	99.77	0	0.23	0	0.00	0	0.00	0	0.00
Government	3	99.76	0	0.24	0	0.00	0	0.00	0	0.00
Industrial	110	99.75	0	0.25	0	0.00	0	0.00	0	0.00
Religion	20	99.81	0	0.19	0	0.00	0	0.00	0	0.00
Residential	5,541	99.98	1	0.02	0	0.00	0	0.00	0	0.00
Total	**6,029**		**2**		**0**		**0**		**0**	

Table 3: Expected Building Damage by Building Type : 20 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	67	99.72	0	0.28	0	0.00	0	0.00	0	0.00
Masonry	498	99.74	1	0.26	0	0.00	0	0.00	0	0.00
MH	4	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	241	99.75	1	0.25	0	0.00	0	0.00	0	0.00
Wood	5,216	99.99	0	0.01	0	0.00	0	0.00	0	0.00

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use. After one week, none of the beds will be in service. By 30 days, none will be operational.

Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
Police Stations	1	0	0	1
Schools	5	0	0	5

Induced Hurricane Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0 tons of debris will be generated. Of the total amount, 0 tons (0%) is Other Tree Debris. Of the remaining 0 tons, Brick/Wood comprises 0% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 0 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 0 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 0 households to be displaced due to the hurricane. Of these, 0 people (out of a total population of 15,215) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the hurricane is 0.0 million dollars, which represents 0.00 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 0 million dollars. 0% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 100% of the total loss. Table 4 below provides a summary of the losses associated with the building damage.

Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	3.94	0.00	0.00	0.00	3.94
	Content	0.00	0.00	0.00	0.00	0.00
	Inventory	0.00	0.00	0.00	0.00	0.00
	Subtotal	**3.94**	**0.00**	**0.00**	**0.00**	**3.94**
Business Interruption Loss						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	0.05	0.00	0.00	0.00	0.05
	Rental	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.05**	**0.00**	**0.00**	**0.00**	**0.05**
Total						
	Total	**3.99**	**0.00**	**0.00**	**0.00**	**3.99**

Appendix A: County Listing for the Region

Connecticut
- New Haven

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
New Haven	15,215	973,837	279,688	1,253,525
Total	**15,215**	**973,837**	**279,688**	**1,253,525**
Study Region Total	**15,215**	**973,837**	**279,688**	**1,253,525**

Hazus-MH: Hurricane Event Report

Region Name: Wolcott

Hurricane Scenario: Probabilistic 50-year Return Period

Print Date: Thursday, May 02, 2013

Disclaimer:
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The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

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Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 21.08 square miles and contains 3 census tracts. There are over 5 thousand households in the region and has a total population of 15,215 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 6 thousand buildings in the region with a total building replacement value (excluding contents) of 1,254 million dollars (2006 dollars). Approximately 92% of the buildings (and 78% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

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Agricultural	5,288	0.4%
Religious	11,098	0.9%
Government	2,142	0.2%
Education	12,517	1.0%
Total	**1,253,525**	**100.0%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 5 schools, no fire stations, 1 police stations and no emergency operation facilities.

Hurricane Scenario

Hazus used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

Hazus estimates that about 1 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the region. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

Table 2: Expected Building Damage by Occupancy : 50 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	25	99.34	0	0.63	0	0.03	0	0.00	0	0.00
Commercial	320	99.29	2	0.70	0	0.02	0	0.00	0	0.00
Education	9	99.29	0	0.71	0	0.00	0	0.00	0	0.00
Government	3	99.27	0	0.73	0	0.00	0	0.00	0	0.00
Industrial	109	99.18	1	0.81	0	0.02	0	0.00	0	0.00
Religion	20	99.43	0	0.56	0	0.01	0	0.00	0	0.00
Residential	5,516	99.52	26	0.46	1	0.01	0	0.00	0	0.00
Total	**6,001**		**29**		**1**		**0**		**0**	

Table 3: Expected Building Damage by Building Type : 50 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	66	99.11	1	0.89	0	0.00	0	0.00	0	0.00
Masonry	493	98.80	5	1.10	0	0.09	0	0.00	0	0.00
MH	4	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	240	99.22	2	0.77	0	0.01	0	0.00	0	0.00
Wood	5,195	99.60	20	0.39	0	0.01	0	0.00	0	0.00

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use. After one week, none of the beds will be in service. By 30 days, none will be operational.

Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
Police Stations	1	0	0	1
Schools	5	0	0	5

Induced Hurricane Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 95 tons of debris will be generated. Of the total amount, 0 tons (0%) is Other Tree Debris. Of the remaining 95 tons, Brick/Wood comprises 100% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 4 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 0 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 0 households to be displaced due to the hurricane. Of these, 0 people (out of a total population of 15,215) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the hurricane is 1.2 million dollars, which represents 0.10 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 1 million dollars. 0% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 97% of the total loss. Table 4 below provides a summary of the losses associated with the building damage.

Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	1,152.65	28.74	6.78	4.21	1,192.38
	Content	6.60	0.00	0.00	0.00	6.60
	Inventory	0.00	0.00	0.00	0.00	0.00
	Subtotal	**1,159.25**	**28.74**	**6.78**	**4.21**	**1,198.98**
Business Interruption Loss						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	1.29	0.23	0.00	0.02	1.54
	Rental	0.93	0.00	0.00	0.00	0.93
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**2.22**	**0.23**	**0.00**	**0.02**	**2.47**
Total						
	Total	**1,161.47**	**28.97**	**6.78**	**4.24**	**1,201.46**

Appendix A: County Listing for the Region

Connecticut

- New Haven

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
New Haven	15,215	973,837	279,688	1,253,525
Total	**15,215**	**973,837**	**279,688**	**1,253,525**
Study Region Total	**15,215**	**973,837**	**279,688**	**1,253,525**

Hazus-MH: Hurricane Event Report

Region Name: Wolcott

Hurricane Scenario: Probabilistic 100-year Return Period

Print Date: Thursday, May 02, 2013

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Connecticut

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 21.08 square miles and contains 3 census tracts. There are over 5 thousand households in the region and has a total population of 15,215 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 6 thousand buildings in the region with a total building replacement value (excluding contents) of 1,254 million dollars (2006 dollars). Approximately 92% of the buildings (and 78% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 6,031 buildings in the region which have an aggregate total replacement value of 1,254 million (2006 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	973,837	77.7%
Commercial	180,847	14.4%
Industrial	67,796	5.4%
Agricultural	5,288	0.4%
Religious	11,098	0.9%
Government	2,142	0.2%
Education	12,517	1.0%
Total	**1,253,525**	**100.0%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 5 schools, no fire stations, 1 police stations and no emergency operation facilities.

Hurricane Scenario

Hazus used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

Hazus estimates that about 15 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the region. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

Table 2: Expected Building Damage by Occupancy : 100 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	24	96.23	1	3.14	0	0.45	0	0.16	0	0.00
Commercial	313	97.13	8	2.60	1	0.25	0	0.02	0	0.00
Education	9	97.37	0	2.54	0	0.09	0	0.00	0	0.00
Government	3	97.49	0	2.43	0	0.07	0	0.00	0	0.00
Industrial	106	96.74	3	2.87	0	0.29	0	0.09	0	0.00
Religion	19	97.42	0	2.48	0	0.09	0	0.01	0	0.00
Residential	5,314	95.88	215	3.88	13	0.23	0	0.00	0	0.00
Total	**5,788**		**228**		**14**		**0**		**0**	

Table 3: Expected Building Damage by Building Type : 100 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	65	96.91	2	2.97	0	0.12	0	0.00	0	0.00
Masonry	473	94.82	21	4.16	5	0.95	0	0.07	0	0.00
MH	4	99.94	0	0.05	0	0.01	0	0.00	0	0.00
Steel	235	97.28	6	2.51	0	0.20	0	0.02	0	0.00
Wood	5,013	96.11	195	3.74	8	0.15	0	0.00	0	0.00

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use. After one week, none of the beds will be in service. By 30 days, none will be operational.

Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
Police Stations	1	0	0	1
Schools	5	0	0	5

Induced Hurricane Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 7,681 tons of debris will be generated. Of the total amount, 4,908 tons (64%) is Other Tree Debris. Of the remaining 2,773 tons, Brick/Wood comprises 18% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 20 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 2,266 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 0 households to be displaced due to the hurricane. Of these, 0 people (out of a total population of 15,215) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the hurricane is 4.8 million dollars, which represents 0.38 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 5 million dollars. 1% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 93% of the total loss. Table 4 below provides a summary of the losses associated with the building damage.

Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	4,029.13	161.51	58.70	26.01	4,275.35
	Content	217.85	18.53	15.80	2.67	254.85
	Inventory	0.00	0.33	3.24	0.19	3.76
	Subtotal	**4,246.98**	**180.36**	**77.74**	**28.88**	**4,533.96**
Business Interruption Loss						
	Income	0.00	17.07	0.92	3.72	21.71
	Relocation	141.20	12.63	3.17	2.42	159.42
	Rental	69.75	7.84	0.93	0.22	78.74
	Wage	0.00	6.07	1.53	8.74	16.33
	Subtotal	**210.95**	**43.60**	**6.54**	**15.10**	**276.20**
Total						
	Total	**4,457.94**	**223.97**	**84.28**	**43.97**	**4,810.15**

Appendix A: County Listing for the Region

Connecticut
- New Haven

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
New Haven	15,215	973,837	279,688	1,253,525
Total	**15,215**	**973,837**	**279,688**	**1,253,525**
Study Region Total	**15,215**	**973,837**	**279,688**	**1,253,525**

Hazus-MH: Hurricane Event Report

Region Name: Wolcott

Hurricane Scenario: Probabilistic 200-year Return Period

Print Date: Thursday, May 02, 2013

Disclaimer:
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Connecticut

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 21.08 square miles and contains 3 census tracts. There are over 5 thousand households in the region and has a total population of 15,215 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 6 thousand buildings in the region with a total building replacement value (excluding contents) of 1,254 million dollars (2006 dollars). Approximately 92% of the buildings (and 78% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 6,031 buildings in the region which have an aggregate total replacement value of 1,254 million (2006 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	973,837	77.7%
Commercial	180,847	14.4%
Industrial	67,796	5.4%
Agricultural	5,288	0.4%
Religious	11,098	0.9%
Government	2,142	0.2%
Education	12,517	1.0%
Total	**1,253,525**	**100.0%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 5 schools, no fire stations, 1 police stations and no emergency operation facilities.

Hurricane Scenario

Hazus used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

Hazus estimates that about 86 buildings will be at least moderately damaged. This is over 1% of the total number of buildings in the region. There are an estimated 1 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

Table 2: Expected Building Damage by Occupancy : 200 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	22	86.92	2	9.86	1	2.15	0	0.99	0	0.08
Commercial	291	90.51	26	8.01	4	1.33	0	0.15	0	0.00
Education	8	91.26	1	7.79	0	0.91	0	0.03	0	0.00
Government	3	91.41	0	7.67	0	0.90	0	0.02	0	0.00
Industrial	98	89.46	9	8.16	2	1.77	1	0.57	0	0.04
Religion	18	90.69	2	8.48	0	0.79	0	0.04	0	0.00
Residential	4,789	86.41	676	12.20	74	1.34	1	0.03	1	0.02
Total	**5,229**		**716**		**81**		**3**		**1**	

Table 3: Expected Building Damage by Building Type : 200 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	60	90.24	6	8.46	1	1.28	0	0.03	0	0.00
Masonry	426	85.45	52	10.50	18	3.57	2	0.44	0	0.04
MH	4	99.34	0	0.51	0	0.13	0	0.00	0	0.01
Steel	221	91.23	18	7.30	3	1.30	0	0.17	0	0.00
Wood	4,525	86.75	632	12.12	56	1.08	2	0.03	1	0.02

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use. After one week, none of the beds will be in service. By 30 days, none will be operational.

Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
Police Stations	1	0	0	1
Schools	5	0	0	5

Induced Hurricane Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 10,555 tons of debris will be generated. Of the total amount, 6,222 tons (59%) is Other Tree Debris. Of the remaining 4,333 tons, Brick/Wood comprises 34% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 59 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 2,853 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 5 households to be displaced due to the hurricane. Of these, 1 people (out of a total population of 15,215) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the hurricane is 12.8 million dollars, which represents 1.02 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 13 million dollars. 1% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 88% of the total loss. Table 4 below provides a summary of the losses associated with the building damage.

Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	9,267.51	501.25	273.93	98.02	10,140.71
	Content	1,368.93	80.28	147.68	21.13	1,618.01
	Inventory	0.00	1.55	29.67	1.49	32.70
	Subtotal	**10,636.44**	**583.08**	**451.28**	**120.64**	**11,791.43**
Business Interruption Loss						
	Income	0.00	102.26	4.18	11.08	117.52
	Relocation	394.71	82.93	14.50	15.89	508.03
	Rental	187.27	53.86	3.54	1.17	245.84
	Wage	0.00	99.43	6.84	30.66	136.92
	Subtotal	**581.98**	**338.48**	**29.06**	**58.80**	**1,008.31**
Total						
	Total	**11,218.42**	**921.55**	**480.34**	**179.44**	**12,799.75**

Appendix A: County Listing for the Region

Connecticut
- New Haven

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
New Haven	15,215	973,837	279,688	1,253,525
Total	**15,215**	**973,837**	**279,688**	**1,253,525**
Study Region Total	**15,215**	**973,837**	**279,688**	**1,253,525**

Hazus-MH: Hurricane Event Report

Region Name: Wolcott

Hurricane Scenario: Probabilistic 500-year Return Period

Print Date: Thursday, May 02, 2013

Disclaimer:
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Connecticut

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 21.08 square miles and contains 3 census tracts. There are over 5 thousand households in the region and has a total population of 15,215 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 6 thousand buildings in the region with a total building replacement value (excluding contents) of 1,254 million dollars (2006 dollars). Approximately 92% of the buildings (and 78% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 6,031 buildings in the region which have an aggregate total replacement value of 1,254 million (2006 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	973,837	77.7%
Commercial	180,847	14.4%
Industrial	67,796	5.4%
Agricultural	5,288	0.4%
Religious	11,098	0.9%
Government	2,142	0.2%
Education	12,517	1.0%
Total	**1,253,525**	**100.0%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 5 schools, no fire stations, 1 police stations and no emergency operation facilities.

Hurricane Scenario

Hazus used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

Hazus estimates that about 424 buildings will be at least moderately damaged. This is over 7% of the total number of buildings in the region. There are an estimated 21 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

Table 2: Expected Building Damage by Occupancy : 500 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	16	65.79	6	22.21	2	7.70	1	3.75	0	0.56
Commercial	232	71.99	63	19.58	23	7.27	4	1.15	0	0.01
Education	7	73.09	2	19.33	1	6.83	0	0.75	0	0.00
Government	2	73.52	1	18.82	0	6.92	0	0.74	0	0.00
Industrial	77	70.12	20	18.44	9	8.45	3	2.68	0	0.30
Religion	14	72.10	4	21.32	1	5.99	0	0.59	0	0.00
Residential	3,677	66.36	1,485	26.80	329	5.93	30	0.55	20	0.37
Total	**4,026**		**1,580**		**366**		**38**		**21**	

Table 3: Expected Building Damage by Building Type : 500 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	47	70.87	13	19.50	6	8.80	1	0.82	0	0.00
Masonry	325	65.07	106	21.16	57	11.44	10	1.99	2	0.34
MH	4	95.98	0	2.56	0	1.24	0	0.04	0	0.19
Steel	177	73.05	43	17.69	19	7.82	3	1.43	0	0.01
Wood	3,484	66.79	1,410	27.03	276	5.29	27	0.53	19	0.37

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use. After one week, none of the beds will be in service. By 30 days, none will be operational.

Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
Police Stations	1	0	0	1
Schools	5	0	0	0

Induced Hurricane Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 30,425 tons of debris will be generated. Of the total amount, 17,742 tons (58%) is Other Tree Debris. Of the remaining 12,683 tons, Brick/Wood comprises 35% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 181 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 8,165 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 41 households to be displaced due to the hurricane. Of these, 8 people (out of a total population of 15,215) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the hurricane is 45.5 million dollars, which represents 3.63 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 45 million dollars. 2% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 85% of the total loss. Table 4 below provides a summary of the losses associated with the building damage.

Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	27,547.85	1,946.09	1,195.72	390.20	31,079.86
	Content	8,102.02	574.56	811.01	127.11	9,614.69
	Inventory	0.00	10.66	157.27	7.17	175.10
	Subtotal	**35,649.87**	**2,531.31**	**2,164.00**	**524.47**	**40,869.65**
Business Interruption Loss						
	Income	0.00	290.17	17.32	30.89	338.38
	Relocation	2,305.81	358.11	74.54	74.17	2,812.63
	Rental	829.13	218.72	15.19	5.58	1,068.61
	Wage	0.00	279.55	28.60	93.18	401.33
	Subtotal	**3,134.93**	**1,146.56**	**135.64**	**203.81**	**4,620.94**
Total						
	Total	**38,784.81**	**3,677.86**	**2,299.64**	**728.28**	**45,490.60**

Appendix A: County Listing for the Region

Connecticut
- New Haven

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
New Haven	15,215	973,837	279,688	1,253,525
Total	**15,215**	**973,837**	**279,688**	**1,253,525**
Study Region Total	**15,215**	**973,837**	**279,688**	**1,253,525**

Hazus-MH: Hurricane Event Report

Region Name: Wolcott

Hurricane Scenario: Probabilistic 1000-year Return Period

Print Date: Thursday, May 02, 2013

Disclaimer:
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Connecticut

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 21.08 square miles and contains 3 census tracts. There are over 5 thousand households in the region and has a total population of 15,215 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 6 thousand buildings in the region with a total building replacement value (excluding contents) of 1,254 million dollars (2006 dollars). Approximately 92% of the buildings (and 78% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 6,031 buildings in the region which have an aggregate total replacement value of 1,254 million (2006 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	973,837	77.7%
Commercial	180,847	14.4%
Industrial	67,796	5.4%
Agricultural	5,288	0.4%
Religious	11,098	0.9%
Government	2,142	0.2%
Education	12,517	1.0%
Total	**1,253,525**	**100.0%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 5 schools, no fire stations, 1 police stations and no emergency operation facilities.

Hurricane Scenario

Hazus used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

Hazus estimates that about 990 buildings will be at least moderately damaged. This is over 16% of the total number of buildings in the region. There are an estimated 83 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

Table 2: Expected Building Damage by Occupancy : 1000 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	12	46.01	8	30.32	4	14.76	2	7.43	0	1.48
Commercial	167	51.82	87	26.89	55	17.09	13	4.17	0	0.03
Education	5	52.69	2	26.48	2	17.06	0	3.77	0	0.00
Government	2	53.70	1	25.59	1	17.11	0	3.59	0	0.00
Industrial	55	49.96	27	24.13	20	18.14	8	6.97	1	0.80
Religion	10	52.47	6	29.89	3	14.80	1	2.84	0	0.00
Residential	2,672	48.22	1,989	35.89	681	12.29	118	2.13	82	1.48
Total	**2,922**		**2,119**		**765**		**142**		**83**	

Table 3: Expected Building Damage by Building Type : 1000 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	34	50.07	17	24.93	14	20.88	3	4.11	0	0.00
Masonry	230	46.10	133	26.60	105	21.14	26	5.11	5	1.04
MH	4	90.05	0	5.09	0	3.71	0	0.29	0	0.85
Steel	127	52.63	57	23.59	45	18.49	13	5.24	0	0.05
Wood	2,536	48.62	1,909	36.59	588	11.27	107	2.05	76	1.46

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use. After one week, none of the beds will be in service. By 30 days, none will be operational.

Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
Police Stations	1	0	0	1
Schools	5	0	0	0

Induced Hurricane Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 61,265 tons of debris will be generated. Of the total amount, 35,249 tons (58%) is Other Tree Debris. Of the remaining 26,016 tons, Brick/Wood comprises 37% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 385 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 16,393 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 144 households to be displaced due to the hurricane. Of these, 28 people (out of a total population of 15,215) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the hurricane is 109.2 million dollars, which represents 8.71 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 109 million dollars. 1% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 85% of the total loss. Table 4 below provides a summary of the losses associated with the building damage.

Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	61,192.46	4,799.96	2,766.81	905.37	69,664.60
	Content	23,050.83	1,875.86	2,022.85	358.51	27,308.05
	Inventory	0.00	31.56	382.50	15.79	429.85
	Subtotal	**84,243.28**	**6,707.38**	**5,172.17**	**1,279.67**	**97,402.50**
Business Interruption Loss						
	Income	1.10	327.80	44.64	27.09	400.63
	Relocation	6,801.32	908.66	179.98	178.23	8,068.19
	Rental	2,279.79	558.16	34.79	13.47	2,886.22
	Wage	2.58	329.75	73.42	77.28	483.03
	Subtotal	**9,084.79**	**2,124.37**	**332.84**	**296.07**	**11,838.07**
Total						
	Total	**93,328.07**	**8,831.75**	**5,505.01**	**1,575.74**	**109,240.57**

Appendix A: County Listing for the Region

Connecticut
- New Haven

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
New Haven	15,215	973,837	279,688	1,253,525
Total	**15,215**	**973,837**	**279,688**	**1,253,525**
Study Region Total	**15,215**	**973,837**	**279,688**	**1,253,525**

Hazus-MH: Hurricane Event Report

Region Name: Wolcott

Hurricane Scenario: UN-NAMED-1938-4

Print Date: Thursday, May 02, 2013

Disclaimer:
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The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Connecticut

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 21.08 square miles and contains 3 census tracts. There are over 5 thousand households in the region and has a total population of 15,215 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 6 thousand buildings in the region with a total building replacement value (excluding contents) of 1,254 million dollars (2006 dollars). Approximately 92% of the buildings (and 78% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 6,031 buildings in the region which have an aggregate total replacement value of 1,254 million (2006 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	973,837	77.7%
Commercial	180,847	14.4%
Industrial	67,796	5.4%
Agricultural	5,288	0.4%
Religious	11,098	0.9%
Government	2,142	0.2%
Education	12,517	1.0%
Total	**1,253,525**	**100.0%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 5 schools, no fire stations, 1 police stations and no emergency operation facilities.

Hurricane Scenario

Hazus used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name:	UN-NAMED-1938-4
Type:	Historic
Max Peak Gust in Study Region:	108 mph

Building Damage

General Building Stock Damage

Hazus estimates that about 269 buildings will be at least moderately damaged. This is over 4% of the total number of buildings in the region. There are an estimated 10 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

Table 2: Expected Building Damage by Occupancy

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	18	73.69	5	18.02	1	5.36	1	2.59	0	0.33
Commercial	255	79.30	50	15.58	15	4.51	2	0.61	0	0.00
Education	7	80.41	1	15.30	0	3.99	0	0.30	0	0.00
Government	2	80.56	0	15.04	0	4.10	0	0.30	0	0.00
Industrial	85	77.72	16	14.96	6	5.45	2	1.69	0	0.18
Religion	16	79.31	3	16.90	1	3.53	0	0.25	0	0.00
Residential	4,088	73.76	1,213	21.89	218	3.92	14	0.26	10	0.17
Total	**4,473**		**1,289**		**241**		**19**		**10**	

Table 3: Expected Building Damage by Building Type

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	53	78.63	11	15.78	4	5.27	0	0.32	0	0.00
Masonry	363	72.74	88	17.67	41	8.15	6	1.26	1	0.19
MH	4	97.36	0	1.80	0	0.73	0	0.01	0	0.10
Steel	195	80.38	34	14.10	12	4.77	2	0.75	0	0.01
Wood	3,869	74.18	1,147	21.98	179	3.43	13	0.25	9	0.17

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use. After one week, none of the beds will be in service. By 30 days, none will be operational.

Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
Police Stations	1	0	0	1
Schools	5	0	0	0

Induced Hurricane Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 21,412 tons of debris will be generated. Of the total amount, 12,498 tons (58%) is Other Tree Debris. Of the remaining 8,914 tons, Brick/Wood comprises 36% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 128 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 5,725 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 22 households to be displaced due to the hurricane. Of these, 5 people (out of a total population of 15,215) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the hurricane is 30.2 million dollars, which represents 2.41 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 30 million dollars. 2% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 85% of the total loss. Table 4 below provides a summary of the losses associated with the building damage.

Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	19,240.69	1,284.95	783.33	259.56	21,568.53
	Content	4,781.47	320.62	503.37	74.78	5,680.25
	Inventory	0.00	6.13	99.07	4.66	109.86
	Subtotal	**24,022.16**	**1,611.70**	**1,385.78**	**338.99**	**27,358.64**
Business Interruption Loss						
	Income	0.00	249.15	11.72	27.47	288.34
	Relocation	1,271.86	232.43	47.14	49.26	1,600.70
	Rental	489.59	144.47	10.17	3.67	647.90
	Wage	0.00	235.38	19.34	79.63	334.34
	Subtotal	**1,761.46**	**861.42**	**88.37**	**160.03**	**2,871.29**
Total						
	Total	**25,783.62**	**2,473.13**	**1,474.15**	**499.03**	**30,229.92**

Appendix A: County Listing for the Region

Connecticut
- New Haven

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
New Haven	15,215	973,837	279,688	1,253,525
Total	**15,215**	**973,837**	**279,688**	**1,253,525**
Study Region Total	**15,215**	**973,837**	**279,688**	**1,253,525**

Police Station Facility Functionality: 10 - year Event

May 02, 2013

	Count	Functionality (%)
Connecticut		
New Haven	1	100.00
Total	**1**	**100.00**
Study Region Total	**1**	**100.00**

Police Station Facility Functionality: 20 - year Event

May 02, 2013

	Count	Functionality (%)
Connecticut		
New Haven	1	100.00
Total	**1**	**100.00**
Study Region Total	**1**	**100.00**

Police Station Facility Functionality: 50 - year Event

May 02, 2013

	Count	Functionality (%)
Connecticut		
New Haven	1	100.00
Total	**1**	**100.00**
Study Region Total	**1**	**100.00**

Police Station Facility Functionality: 100 - year Event

May 02, 2013

	Count	Functionality (%)
Connecticut		
New Haven	1	100.00
Total	**1**	**100.00**
Study Region Total	**1**	**100.00**

Police Station Facility Functionality: 200 - year Event

May 02, 2013

	Count	Functionality (%)
Connecticut		
New Haven	1	100.00
Total	**1**	**100.00**
Study Region Total	**1**	**100.00**

Police Station Facility Functionality: 500 - year Event

May 02, 2013

	Count	Functionality (%)
Connecticut		
New Haven	1	100.00
Total	**1**	**100.00**
Study Region Total	**1**	**100.00**

Police Station Facility Functionality: 1000 - year Event

May 02, 2013

	Count	Functionality (%)
Connecticut		
New Haven	1	100.00
Total	**1**	**100.00**
Study Region Total	**1**	**100.00**

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

School Functionality: 10 - year Event

May 02, 2013

	Count	Functionality (%)
Connecticut		
New Haven	5	100.00
Total	**5**	**100.00**
Study Region	**5**	**100.00**

School Functionality: 20 - year Event

May 02, 2013

	Count	Functionality (%)
Connecticut		
New Haven	5	100.00
Total	**5**	**100.00**
Study Region	**5**	**100.00**

School Functionality: 50 - year Event

May 02, 2013

	Count	Functionality (%)
Connecticut		
New Haven	5	100.00
Total	**5**	**100.00**
Study Region	**5**	**100.00**

School Functionality: 100 - year Event

May 02, 2013

	Count	Functionality (%)
Connecticut		
New Haven	5	100.00
Total	**5**	**100.00**
Study Region	**5**	**100.00**

School Functionality: 200 - year Event

May 02, 2013

	Count	Functionality (%)
Connecticut		
New Haven	5	100.00
Total	**5**	**100.00**
Study Region	**5**	**100.00**

School Functionality: 500 - year Event

May 02, 2013

	Count	Functionality (%)
Connecticut		
New Haven	5	0.00
Total	**5**	**0.00**
Study Region	**5**	**0.00**

School Functionality: 1000 - year Event

May 02, 2013

	Count	Functionality (%)
Connecticut		
New Haven	5	0.00
Total	**5**	**0.00**
Study Region	**5**	**0.00**

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Hazus-MH: Hurricane Event Report

Region Name: Wolcott

Hurricane Scenario: GLORIA

Print Date: Thursday, May 02, 2013

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The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

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Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 21.08 square miles and contains 3 census tracts. There are over 5 thousand households in the region and has a total population of 15,215 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 6 thousand buildings in the region with a total building replacement value (excluding contents) of 1,254 million dollars (2006 dollars). Approximately 92% of the buildings (and 78% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 6,031 buildings in the region which have an aggregate total replacement value of 1,254 million (2006 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	973,837	77.7%
Commercial	180,847	14.4%
Industrial	67,796	5.4%
Agricultural	5,288	0.4%
Religious	11,098	0.9%
Government	2,142	0.2%
Education	12,517	1.0%
Total	**1,253,525**	**100.0%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 5 schools, no fire stations, 1 police stations and no emergency operation facilities.

Hurricane Scenario

Hazus used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name:	GLORIA
Type:	Historic
Max Peak Gust in Study Region:	79 mph

Building Damage

General Building Stock Damage

Hazus estimates that about 1 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the region. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

Table 2: Expected Building Damage by Occupancy

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	25	99.15	0	0.80	0	0.05	0	0.01	0	0.00
Commercial	319	99.17	3	0.80	0	0.03	0	0.00	0	0.00
Education	9	99.18	0	0.82	0	0.00	0	0.00	0	0.00
Government	3	99.08	0	0.91	0	0.01	0	0.00	0	0.00
Industrial	109	99.00	1	0.96	0	0.03	0	0.00	0	0.00
Religion	20	99.29	0	0.70	0	0.01	0	0.00	0	0.00
Residential	5,504	99.31	37	0.67	1	0.02	0	0.00	0	0.00
Total	**5,989**		**41**		**1**		**0**		**0**	

Table 3: Expected Building Damage by Building Type

Building	None		Minor		Moderate		Severe		Destruction	
Type	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	66	98.98	1	1.02	0	0.00	0	0.00	0	0.00
Masonry	492	98.52	7	1.32	1	0.15	0	0.01	0	0.00
MH	4	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	240	99.11	2	0.87	0	0.02	0	0.00	0	0.00
Wood	5,185	99.40	30	0.58	1	0.01	0	0.00	0	0.00

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use. After one week, none of the beds will be in service. By 30 days, none will be operational.

Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
Police Stations	1	0	0	1
Schools	5	0	0	5

Induced Hurricane Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 446 tons of debris will be generated. Of the total amount, 228 tons (51%) is Other Tree Debris. Of the remaining 218 tons, Brick/Wood comprises 61% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 5 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 85 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 0 households to be displaced due to the hurricane. Of these, 0 people (out of a total population of 15,215) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the hurricane is 1.5 million dollars, which represents 0.12 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 1 million dollars. 0% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 96% of the total loss. Table 4 below provides a summary of the losses associated with the building damage.

Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	1,375.05	36.73	12.05	5.92	1,429.75
	Content	40.96	0.00	0.00	0.00	40.96
	Inventory	0.00	0.00	0.00	0.00	0.00
	Subtotal	**1,416.01**	**36.73**	**12.05**	**5.92**	**1,470.71**
Business Interruption Loss						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	3.94	0.38	0.02	0.04	4.38
	Rental	4.61	0.00	0.00	0.00	4.61
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**8.54**	**0.38**	**0.02**	**0.04**	**8.98**
Total						
	Total	**1,424.56**	**37.11**	**12.07**	**5.96**	**1,479.69**

Appendix A: County Listing for the Region

Connecticut
- New Haven

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Connecticut				
New Haven	15,215	973,837	279,688	1,253,525
Total	**15,215**	**973,837**	**279,688**	**1,253,525**
Study Region Total	**15,215**	**973,837**	**279,688**	**1,253,525**

Fire Station Facilities Functionality

May 02, 2013

	Count	Functionality(%) At Day 1
Total		
Region Total		

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.

Police Station Facilities Functionality

May 02, 2013

	Count	Functionality(%) At Day 1
Connecticut		
New Haven	1	54.20
Total	**1**	**54.20**
Region Total	**1**	**54.20**

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.

Hazus-MH: Earthquake Event Report

Region Name: Wolcott

Earthquake Scenario: East Haddam 6.4

Print Date: May 02, 2013

Totals only reflect data for those census tracts/blocks included in the user's study region.

Disclaimer:

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

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General Description of the Region

Hazus is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop earthquake losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from earthquakes and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Connecticut

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 21.08 square miles and contains 3 census tracts. There are over 5 thousand households in the region which has a total population of 15,215 people (2002 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 6 thousand buildings in the region with a total building replacement value (excluding contents) of 1,253 (millions of dollars). Approximately 92.00 % of the buildings (and 78.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 142 and 0 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 6 thousand buildings in the region which have an aggregate total replacement value of 1,253 (millions of dollars) . Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 86% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 0 hospitals in the region with a total bed capacity of 0 beds. There are 5 schools, 0 fire stations, 1 police stations and 0 emergency operation facilities. With respect to high potential loss facilities (HPL), there are 8 dams identified within the region. Of these, 6 of the dams are classified as 'high hazard'. The inventory also includes 0 hazardous material sites, 0 military installations and 0 nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 142.00 (millions of dollars). This inventory includes over 20 kilometers of highways, 4 bridges, 333 kilometers of pipes.

Table 1: Transportation System Lifeline Inventory

System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	4	6.90
	Segments	3	135.50
	Tunnels	0	0.00
		Subtotal	**142.40**
Railways	Bridges	0	0.00
	Facilities	0	0.00
	Segments	0	0.00
	Tunnels	0	0.00
		Subtotal	**0.00**
Light Rail	Bridges	0	0.00
	Facilities	0	0.00
	Segments	0	0.00
	Tunnels	0	0.00
		Subtotal	**0.00**
Bus	Facilities	0	0.00
		Subtotal	**0.00**
Ferry	Facilities	0	0.00
		Subtotal	**0.00**
Port	Facilities	0	0.00
		Subtotal	**0.00**
Airport	Facilities	0	0.00
	Runways	0	0.00
		Subtotal	**0.00**
		Total	**142.40**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	3.30
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**3.30**
Waste Water	Distribution Lines	NA	2.00
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**2.00**
Natural Gas	Distribution Lines	NA	1.30
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**1.30**
Oil Systems	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**0.00**
Electrical Power	Facilities	0	0.00
		Subtotal	**0.00**
Communication	Facilities	0	0.00
		Subtotal	**0.00**
		Total	**6.70**

Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

Scenario Name	East Haddam 6.4
Type of Earthquake	Arbitrary
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	NA
Longitude of Epicenter	-72.40
Latitude of Epicenter	41.50
Earthquake Magnitude	6.40
Depth (Km)	10.00
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	Central & East US (CEUS 2008)

Building Damage

Hazus estimates that about 431 buildings will be at least moderately damaged. This is over 7.00 % of the buildings in the region. There are an estimated 7 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	15	0.33	5	0.52	4	0.97	1	1.68	0	2.08
Commercial	186	4.08	65	6.26	53	14.50	15	25.51	3	35.52
Education	5	0.12	2	0.17	2	0.41	0	0.67	0	1.03
Government	2	0.03	1	0.06	1	0.17	0	0.30	0	0.51
Industrial	60	1.31	22	2.10	21	5.74	6	10.55	1	15.79
Other Residential	413	9.06	97	9.27	46	12.72	10	16.47	1	16.44
Religion	13	0.30	4	0.34	2	0.62	1	0.98	0	1.15
Single Family	3,861	84.77	849	81.27	237	64.87	25	43.84	2	27.48
Total	**4,555**		**1,045**		**365**		**58**		**8**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	4,072	89.40	890	85.14	232	63.49	20	33.93	1	12.19
Steel	119	2.60	49	4.67	54	14.82	17	28.67	4	45.96
Concrete	29	0.64	10	0.94	10	2.87	2	3.89	0	5.18
Precast	9	0.20	2	0.21	2	0.68	1	1.60	0	0.50
RM	63	1.39	11	1.03	11	2.97	3	5.34	0	0.80
URM	261	5.72	83	7.91	54	14.89	15	25.85	3	34.20
MH	2	0.05	1	0.10	1	0.27	0	0.73	0	1.17
Total	**4,555**		**1,045**		**365**		**58**		**8**	

*Note:
RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 0 hospital beds available for use. On the day of the earthquake, the model estimates that only 0 hospital beds (0.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 0.00% of the beds will be back in service. By 30 days, 0.00% will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	0	0	0	0
Schools	5	0	0	5
EOCs	0	0	0	0
PoliceStations	1	0	0	1
FireStations	0	0	0	0

Transportation and Utility Lifeline Damage

Table 6 provides damage estimates for the transportation system.

Table 6: Expected Damage to the Transportation Systems

System	Component		Number of Locations			
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	3	0	0	3	3
	Bridges	4	0	0	4	4
	Tunnels	0	0	0	0	0
Railways	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	0	0	0	0	0
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	0	0	0	0	0
	Runways	0	0	0	0	0

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	0	0	0	0	0
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	0	0	0	0	0
Communication	0	0	0	0	0

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	167	16	4
Waste Water	100	8	2
Natural Gas	67	3	1
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	5,414	0	0	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0.01 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 46.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 400 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 11 households to be displaced due to the earthquake. Of these, 6 people (out of a total population of 15,215) will seek temporary shelter in public shelters.

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	1	0	0	0
	Single Family	4	0	0	0
	Total	**6**	**1**	**0**	**0**
2 PM	Commercial	4	1	0	0
	Commuting	0	0	0	0
	Educational	2	0	0	0
	Hotels	0	0	0	0
	Industrial	1	0	0	0
	Other-Residential	0	0	0	0
	Single Family	1	0	0	0
	Total	**8**	**2**	**0**	**0**
5 PM	Commercial	4	1	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	1	0	0	0
	Other-Residential	1	0	0	0
	Single Family	2	0	0	0
	Total	**7**	**1**	**0**	**0**

Economic Loss

The total economic loss estimated for the earthquake is 44.83 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 44.68 (millions of dollars); 25 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 50 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.00	0.42	2.59	0.16	0.05	3.22
	Capital-Related	0.00	0.17	2.75	0.10	0.02	3.03
	Rental	0.32	0.31	0.96	0.05	0.03	1.66
	Relocation	1.17	0.16	1.29	0.22	0.25	3.08
	Subtotal	**1.49**	**1.06**	**7.57**	**0.52**	**0.34**	**10.98**
Capital Stock Losses							
	Structural	2.32	0.46	1.61	0.69	0.34	5.42
	Non_Structural	10.83	1.94	4.89	1.84	0.75	20.24
	Content	3.78	0.47	2.04	1.10	0.34	7.74
	Inventory	0.00	0.00	0.03	0.26	0.01	0.30
	Subtotal	**16.93**	**2.87**	**8.58**	**3.89**	**1.44**	**33.70**
	Total	**18.42**	**3.93**	**16.15**	**4.41**	**1.78**	**44.68**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Hazus estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 14 presents the results of the region for the given earthquake.

Table 12: Transportation System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	135.50	$0.00	0.00
	Bridges	6.89	$0.02	0.36
	Tunnels	0.00	$0.00	0.00
	Subtotal	**142.40**	**0.00**	
Railways	Segments	0.00	$0.00	0.00
	Bridges	0.00	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Light Rail	Segments	0.00	$0.00	0.00
	Bridges	0.00	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Bus	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Ferry	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Port	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Airport	Facilities	0.00	$0.00	0.00
	Runways	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
	Total	**142.40**	**0.00**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Lines	3.30	$0.07	2.12
	Subtotal	**3.33**	**$0.07**	
Waste Water	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Lines	2.00	$0.04	1.78
	Subtotal	**2.00**	**$0.04**	
Natural Gas	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Lines	1.30	$0.01	0.92
	Subtotal	**1.33**	**$0.01**	
Oil Systems	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Electrical Power	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Communication	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**$0.00**	
	Total	**6.66**	**$0.12**	

Table 14. Indirect Economic Impact with outside aid

(Employment as # of people and Income in millions of $)

LOSS	Total	%

Appendix A: County Listing for the Region

New Haven,CT

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Connecticut					
	New Haven	15,215	973	279	1,253
Total State		**15,215**	**973**	**279**	**1,253**
Total Region		**15,215**	**973**	**279**	**1,253**

Police Station Facilities Functionality

May 02, 2013

	Count	Functionality(%) At Day 1
Connecticut		
New Haven	1	65.90
Total	**1**	**65.90**
Region Total	**1**	**65.90**

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.

School Functionality

May 02, 2013

	Count	Functionality (%)
Connecticut		
New Haven	5	66.60
Total	**5**	**66.60**
Region Total	**5**	**66.60**

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.

Hazus-MH: Earthquake Event Report

Region Name: Wolcott

Earthquake Scenario: Haddam 5.7

Print Date: May 02, 2013

Totals only reflect data for those census tracts/blocks included in the user's study region.

Disclaimer:

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General Description of the Region

Hazus is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop earthquake losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from earthquakes and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Connecticut

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 21.08 square miles and contains 3 census tracts. There are over 5 thousand households in the region which has a total population of 15,215 people (2002 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 6 thousand buildings in the region with a total building replacement value (excluding contents) of 1,253 (millions of dollars). Approximately 92.00 % of the buildings (and 78.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 142 and 0 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 6 thousand buildings in the region which have an aggregate total replacement value of 1,253 (millions of dollars) . Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 86% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 0 hospitals in the region with a total bed capacity of 0 beds. There are 5 schools, 0 fire stations, 1 police stations and 0 emergency operation facilities. With respect to high potential loss facilities (HPL), there are 8 dams identified within the region. Of these, 6 of the dams are classified as 'high hazard'. The inventory also includes 0 hazardous material sites, 0 military installations and 0 nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 142.00 (millions of dollars). This inventory includes over 20 kilometers of highways, 4 bridges, 333 kilometers of pipes.

Table 1: Transportation System Lifeline Inventory

System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	4	6.90
	Segments	3	135.50
	Tunnels	0	0.00
		Subtotal	**142.40**
Railways	Bridges	0	0.00
	Facilities	0	0.00
	Segments	0	0.00
	Tunnels	0	0.00
		Subtotal	**0.00**
Light Rail	Bridges	0	0.00
	Facilities	0	0.00
	Segments	0	0.00
	Tunnels	0	0.00
		Subtotal	**0.00**
Bus	Facilities	0	0.00
		Subtotal	**0.00**
Ferry	Facilities	0	0.00
		Subtotal	**0.00**
Port	Facilities	0	0.00
		Subtotal	**0.00**
Airport	Facilities	0	0.00
	Runways	0	0.00
		Subtotal	**0.00**
		Total	**142.40**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	3.30
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**3.30**
Waste Water	Distribution Lines	NA	2.00
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**2.00**
Natural Gas	Distribution Lines	NA	1.30
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**1.30**
Oil Systems	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**0.00**
Electrical Power	Facilities	0	0.00
		Subtotal	**0.00**
Communication	Facilities	0	0.00
		Subtotal	**0.00**
		Total	**6.70**

Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

Scenario Name	Haddam 5.7
Type of Earthquake	Arbitrary
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	NA
Longitude of Epicenter	-72.55
Latitude of Epicenter	41.47
Earthquake Magnitude	5.70
Depth (Km)	10.00
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	Central & East US (CEUS 2008)

Building Damage

Hazus estimates that about 189 buildings will be at least moderately damaged. This is over 3.00 % of the buildings in the region. There are an estimated 1 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	20	0.39	3	0.50	1	0.83	0	1.30	0	1.26
Commercial	255	4.90	41	6.43	22	12.88	4	19.34	0	24.45
Education	7	0.14	1	0.18	1	0.35	0	0.47	0	0.73
Government	2	0.04	0	0.06	0	0.14	0	0.18	0	0.29
Industrial	86	1.66	14	2.20	8	4.87	1	6.85	0	9.24
Other Residential	479	9.20	62	9.64	23	13.49	3	18.14	0	20.45
Religion	16	0.31	2	0.37	1	0.66	0	1.03	0	1.33
Single Family	4,336	83.35	516	80.61	113	66.79	10	52.69	1	42.25
Total	**5,202**		**640**		**169**		**19**		**2**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	4,570	87.85	533	83.21	105	62.32	7	36.57	0	13.57
Steel	187	3.60	31	4.91	20	11.74	3	15.74	0	22.05
Concrete	42	0.80	6	0.98	4	2.26	0	1.84	0	2.07
Precast	12	0.22	1	0.23	1	0.74	0	1.73	0	0.33
RM	75	1.45	7	1.05	5	3.02	1	5.12	0	0.52
URM	313	6.02	61	9.50	33	19.59	7	38.68	1	61.35
MH	4	0.07	1	0.13	1	0.32	0	0.31	0	0.12
Total	**5,202**		**640**		**169**		**19**		**2**	

*Note:
RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 0 hospital beds available for use. On the day of the earthquake, the model estimates that only 0 hospital beds (0.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 0.00% of the beds will be back in service. By 30 days, 0.00% will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	0	0	0	0
Schools	5	0	0	5
EOCs	0	0	0	0
PoliceStations	1	0	0	1
FireStations	0	0	0	0

Transportation and Utility Lifeline Damage

Table 6 provides damage estimates for the transportation system.

Table 6: Expected Damage to the Transportation Systems

System	Component		Number of Locations			
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	3	0	0	3	3
	Bridges	4	0	0	4	4
	Tunnels	0	0	0	0	0
Railways	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	0	0	0	0	0
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	0	0	0	0	0
	Runways	0	0	0	0	0

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	0	0	0	0	0
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	0	0	0	0	0
Communication	0	0	0	0	0

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	167	5	1
Waste Water	100	2	1
Natural Gas	67	1	0
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	5,414	0	0	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0.00 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 61.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 120 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 4 households to be displaced due to the earthquake. Of these, 2 people (out of a total population of 15,215) will seek temporary shelter in public shelters.

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	1	0	0	0
	Single Family	2	0	0	0
	Total	**3**	**0**	**0**	**0**
2 PM	Commercial	1	0	0	0
	Commuting	0	0	0	0
	Educational	1	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	0	0	0	0
	Single Family	0	0	0	0
	Total	**2**	**0**	**0**	**0**
5 PM	Commercial	1	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	0	0	0	0
	Single Family	1	0	0	0
	Total	**2**	**0**	**0**	**0**

Economic Loss

The total economic loss estimated for the earthquake is 18.31 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 18.27 (millions of dollars); 21 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 57 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.00	0.12	0.83	0.05	0.02	1.01
	Capital-Related	0.00	0.05	0.86	0.03	0.01	0.95
	Rental	0.15	0.12	0.34	0.01	0.01	0.63
	Relocation	0.53	0.07	0.42	0.07	0.08	1.17
	Subtotal	**0.68**	**0.36**	**2.45**	**0.16**	**0.11**	**3.75**
Capital Stock Losses							
	Structural	1.15	0.18	0.50	0.19	0.11	2.13
	Non_Structural	5.22	0.84	1.84	0.69	0.28	8.87
	Content	1.72	0.21	0.88	0.44	0.15	3.40
	Inventory	0.00	0.00	0.01	0.10	0.00	0.12
	Subtotal	**8.08**	**1.23**	**3.24**	**1.42**	**0.54**	**14.52**
	Total	**8.76**	**1.58**	**5.69**	**1.58**	**0.66**	**18.27**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Hazus estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 14 presents the results of the region for the given earthquake.

Table 12: Transportation System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	135.50	$0.00	0.00
	Bridges	6.89	$0.00	0.03
	Tunnels	0.00	$0.00	0.00
	Subtotal	**142.40**	**0.00**	
Railways	Segments	0.00	$0.00	0.00
	Bridges	0.00	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Light Rail	Segments	0.00	$0.00	0.00
	Bridges	0.00	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Bus	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Ferry	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Port	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Airport	Facilities	0.00	$0.00	0.00
	Runways	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
	Total	**142.40**	**0.00**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Lines	3.30	$0.02	0.66
	Subtotal	**3.33**	**$0.02**	
Waste Water	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Lines	2.00	$0.01	0.56
	Subtotal	**2.00**	**$0.01**	
Natural Gas	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Lines	1.30	$0.00	0.29
	Subtotal	**1.33**	**$0.00**	
Oil Systems	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Electrical Power	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Communication	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**$0.00**	
	Total	**6.66**	**$0.04**	

Table 14. Indirect Economic Impact with outside aid

(Employment as # of people and Income in millions of $)

LOSS		Total	%

Appendix A: County Listing for the Region

New Haven,CT

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Connecticut					
	New Haven	15,215	973	279	1,253
Total State		**15,215**	**973**	**279**	**1,253**
Total Region		**15,215**	**973**	**279**	**1,253**

Police Station Facilities Functionality

May 02, 2013

	Count	Functionality(%) At Day 1
Connecticut		
New Haven	1	60.90
Total	**1**	**60.90**
Region Total	**1**	**60.90**

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.

School Functionality

May 02, 2013

	Count	Functionality (%)
Connecticut		
New Haven	5	60.30
Total	**5**	**60.30**
Region Total	**5**	**60.30**

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.

Hazus-MH: Earthquake Event Report

Region Name: Wolcott

Earthquake Scenario: Portland 5.7

Print Date: May 02, 2013

Totals only reflect data for those census tracts/blocks included in the user's study region.

Disclaimer:

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The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

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Note:
Appendix A contains a complete listing of the counties contained in the region.

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The replacement value of the transportation and utility lifeline systems is estimated to be 142 and 0 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 6 thousand buildings in the region which have an aggregate total replacement value of 1,253 (millions of dollars) . Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 86% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 0 hospitals in the region with a total bed capacity of 0 beds. There are 5 schools, 0 fire stations, 1 police stations and 0 emergency operation facilities. With respect to high potential loss facilities (HPL), there are 8 dams identified within the region. Of these, 6 of the dams are classified as 'high hazard'. The inventory also includes 0 hazardous material sites, 0 military installations and 0 nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

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	Segments	3	135.50
	Tunnels	0	0.00
		Subtotal	**142.40**
Railways	Bridges	0	0.00
	Facilities	0	0.00
	Segments	0	0.00
	Tunnels	0	0.00
		Subtotal	**0.00**
Light Rail	Bridges	0	0.00
	Facilities	0	0.00
	Segments	0	0.00
	Tunnels	0	0.00
		Subtotal	**0.00**
Bus	Facilities	0	0.00
		Subtotal	**0.00**
Ferry	Facilities	0	0.00
		Subtotal	**0.00**
Port	Facilities	0	0.00
		Subtotal	**0.00**
Airport	Facilities	0	0.00
	Runways	0	0.00
		Subtotal	**0.00**
		Total	**142.40**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	3.30
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**3.30**
Waste Water	Distribution Lines	NA	2.00
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**2.00**
Natural Gas	Distribution Lines	NA	1.30
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**1.30**
Oil Systems	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**0.00**
Electrical Power	Facilities	0	0.00
		Subtotal	**0.00**
Communication	Facilities	0	0.00
		Subtotal	**0.00**
		Total	**6.70**

Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

Scenario Name	Portland 5.7
Type of Earthquake	Arbitrary
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	NA
Longitude of Epicenter	-72.60
Latitude of Epicenter	41.60
Earthquake Magnitude	5.70
Depth (Km)	10.00
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	Central & East US (CEUS 2008)

Building Damage

Hazus estimates that about 305 buildings will be at least moderately damaged. This is over 5.00 % of the buildings in the region. There are an estimated 3 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	17	0.36	5	0.52	2	0.91	1	1.52	0	1.62
Commercial	220	4.53	56	6.45	37	13.86	8	22.59	1	28.80
Education	6	0.13	2	0.18	1	0.39	0	0.56	0	0.84
Government	2	0.04	1	0.06	0	0.16	0	0.25	0	0.39
Industrial	73	1.50	19	2.21	14	5.42	3	8.75	0	11.90
Other Residential	446	9.18	80	9.30	34	12.75	6	16.74	1	16.97
Religion	15	0.30	3	0.36	2	0.64	0	1.01	0	1.20
Single Family	4,082	83.96	699	80.92	176	65.87	17	48.57	2	38.28
Total	**4,862**		**864**		**266**		**35**		**4**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	4,305	88.55	727	84.23	168	63.23	13	35.88	1	18.15
Steel	153	3.15	43	4.98	36	13.69	8	22.43	1	32.51
Concrete	35	0.73	8	0.98	7	2.62	1	2.88	0	3.41
Precast	10	0.21	2	0.22	2	0.70	1	1.70	0	0.41
RM	69	1.43	9	1.03	8	2.93	2	5.28	0	0.65
URM	286	5.87	73	8.45	44	16.50	11	31.36	2	44.58
MH	3	0.06	1	0.12	1	0.32	0	0.46	0	0.29
Total	**4,862**		**864**		**266**		**35**		**4**	

*Note:
RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 0 hospital beds available for use. On the day of the earthquake, the model estimates that only 0 hospital beds (0.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 0.00% of the beds will be back in service. By 30 days, 0.00% will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	0	0	0	0
Schools	5	0	0	5
EOCs	0	0	0	0
PoliceStations	1	0	0	1
FireStations	0	0	0	0

Transportation and Utility Lifeline Damage

Table 6 provides damage estimates for the transportation system.

Table 6: Expected Damage to the Transportation Systems

System	Component		Number of Locations			
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	3	0	0	3	3
	Bridges	4	0	0	4	4
	Tunnels	0	0	0	0	0
Railways	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	0	0	0	0	0
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	0	0	0	0	0
	Runways	0	0	0	0	0

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	0	0	0	0	0
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	0	0	0	0	0
Communication	0	0	0	0	0

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	167	8	2
Waste Water	100	4	1
Natural Gas	67	1	0
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	5,414	0	0	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0.01 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 53.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 240 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 7 households to be displaced due to the earthquake. Of these, 4 people (out of a total population of 15,215) will seek temporary shelter in public shelters.

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	1	0	0	0
	Single Family	3	0	0	0
	Total	**4**	**1**	**0**	**0**
2 PM	Commercial	2	0	0	0
	Commuting	0	0	0	0
	Educational	1	0	0	0
	Hotels	0	0	0	0
	Industrial	1	0	0	0
	Other-Residential	0	0	0	0
	Single Family	0	0	0	0
	Total	**5**	**1**	**0**	**0**
5 PM	Commercial	2	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	0	0	0	0
	Single Family	1	0	0	0
	Total	**4**	**1**	**0**	**0**

Economic Loss

The total economic loss estimated for the earthquake is 31.25 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 31.18 (millions of dollars); 22 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 54 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.00	0.24	1.58	0.09	0.03	1.95
	Capital-Related	0.00	0.10	1.68	0.06	0.01	1.84
	Rental	0.23	0.21	0.60	0.03	0.02	1.09
	Relocation	0.85	0.11	0.79	0.13	0.15	2.03
	Subtotal	**1.08**	**0.66**	**4.65**	**0.31**	**0.21**	**6.91**
Capital Stock Losses							
	Structural	1.74	0.30	0.95	0.39	0.20	3.59
	Non_Structural	8.29	1.40	3.24	1.21	0.50	14.65
	Content	2.95	0.37	1.49	0.76	0.26	5.82
	Inventory	0.00	0.00	0.02	0.18	0.01	0.21
	Subtotal	**12.98**	**2.07**	**5.71**	**2.54**	**0.97**	**24.27**
	Total	**14.06**	**2.73**	**10.36**	**2.85**	**1.18**	**31.18**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Hazus estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 14 presents the results of the region for the given earthquake.

Table 12: Transportation System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	135.50	$0.00	0.00
	Bridges	6.89	$0.01	0.08
	Tunnels	0.00	$0.00	0.00
	Subtotal	**142.40**	**0.00**	
Railways	Segments	0.00	$0.00	0.00
	Bridges	0.00	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Light Rail	Segments	0.00	$0.00	0.00
	Bridges	0.00	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Bus	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Ferry	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Port	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Airport	Facilities	0.00	$0.00	0.00
	Runways	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
	Total	**142.40**	**0.00**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Lines	3.30	$0.04	1.08
	Subtotal	**3.33**	**$0.04**	
Waste Water	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Lines	2.00	$0.02	0.91
	Subtotal	**2.00**	**$0.02**	
Natural Gas	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Lines	1.30	$0.01	0.47
	Subtotal	**1.33**	**$0.01**	
Oil Systems	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Electrical Power	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Communication	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**$0.00**	
	Total	**6.66**	**$0.06**	

Table 14. Indirect Economic Impact with outside aid

(Employment as # of people and Income in millions of $)

LOSS	Total	%

Appendix A: County Listing for the Region

New Haven,CT

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Connecticut					
	New Haven	15,215	973	279	1,253
Total State		**15,215**	**973**	**279**	**1,253**
Total Region		**15,215**	**973**	**279**	**1,253**

Police Station Facilities Functionality

May 02, 2013

	Count	Functionality(%) At Day 1
Connecticut		
New Haven	1	85.50
Total	**1**	**85.50**
Region Total	**1**	**85.50**

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.

School Functionality

May 02, 2013

	Count	Functionality (%)
Connecticut		
New Haven	5	85.70
Total	**5**	**85.70**
Region Total	**5**	**85.70**

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.

Hazus-MH: Earthquake Event Report

Region Name: Wolcott

Earthquake Scenario: Stamford 5.7

Print Date: May 02, 2013

Totals only reflect data for those census tracts/blocks included in the user's study region.

Disclaimer:

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

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General Description of the Region

Hazus is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop earthquake losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from earthquakes and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Connecticut

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 21.08 square miles and contains 3 census tracts. There are over 5 thousand households in the region which has a total population of 15,215 people (2002 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 6 thousand buildings in the region with a total building replacement value (excluding contents) of 1,253 (millions of dollars). Approximately 92.00 % of the buildings (and 78.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 142 and 0 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 6 thousand buildings in the region which have an aggregate total replacement value of 1,253 (millions of dollars) . Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 86% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 0 hospitals in the region with a total bed capacity of 0 beds. There are 5 schools, 0 fire stations, 1 police stations and 0 emergency operation facilities. With respect to high potential loss facilities (HPL), there are 8 dams identified within the region. Of these, 6 of the dams are classified as 'high hazard'. The inventory also includes 0 hazardous material sites, 0 military installations and 0 nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 142.00 (millions of dollars). This inventory includes over 20 kilometers of highways, 4 bridges, 333 kilometers of pipes.

Table 1: Transportation System Lifeline Inventory

System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	4	6.90
	Segments	3	135.50
	Tunnels	0	0.00
		Subtotal	**142.40**
Railways	Bridges	0	0.00
	Facilities	0	0.00
	Segments	0	0.00
	Tunnels	0	0.00
		Subtotal	**0.00**
Light Rail	Bridges	0	0.00
	Facilities	0	0.00
	Segments	0	0.00
	Tunnels	0	0.00
		Subtotal	**0.00**
Bus	Facilities	0	0.00
		Subtotal	**0.00**
Ferry	Facilities	0	0.00
		Subtotal	**0.00**
Port	Facilities	0	0.00
		Subtotal	**0.00**
Airport	Facilities	0	0.00
	Runways	0	0.00
		Subtotal	**0.00**
		Total	**142.40**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	3.30
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**3.30**
Waste Water	Distribution Lines	NA	2.00
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**2.00**
Natural Gas	Distribution Lines	NA	1.30
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**1.30**
Oil Systems	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**0.00**
Electrical Power	Facilities	0	0.00
		Subtotal	**0.00**
Communication	Facilities	0	0.00
		Subtotal	**0.00**
		Total	**6.70**

Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

Scenario Name	Stamford 5.7
Type of Earthquake	Arbitrary
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	NA
Longitude of Epicenter	-73.60
Latitude of Epicenter	41.15
Earthquake Magnitude	5.70
Depth (Km)	10.00
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	Central & East US (CEUS 2008)

Building Damage

Hazus estimates that about 32 buildings will be at least moderately damaged. This is over 1.00 % of the buildings in the region. There are an estimated 0 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	24	0.41	1	0.52	0	0.81	0	1.08	0	0.88
Commercial	306	5.25	12	6.91	4	12.61	0	17.06	0	19.09
Education	9	0.15	0	0.18	0	0.32	0	0.40	0	0.57
Government	3	0.05	0	0.06	0	0.10	0	0.11	0	0.15
Industrial	105	1.80	4	2.25	1	4.15	0	5.03	0	5.44
Other Residential	543	9.31	19	11.16	5	16.85	1	22.22	0	27.32
Religion	19	0.33	1	0.44	0	0.81	0	1.20	0	1.60
Single Family	4,822	82.71	132	78.48	19	64.34	1	52.89	0	44.95
Total	**5,830**		**168**		**30**		**3**		**0**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	5,066	86.90	131	78.22	16	53.08	1	28.42	0	0.00
Steel	231	3.97	8	4.53	2	8.10	0	7.83	0	6.26
Concrete	50	0.86	1	0.89	0	1.37	0	0.62	0	0.00
Precast	14	0.23	1	0.31	0	1.07	0	2.19	0	0.15
RM	84	1.44	2	1.40	1	4.08	0	5.56	0	0.00
URM	380	6.51	24	14.49	10	31.91	1	55.17	0	93.59
MH	5	0.08	0	0.17	0	0.39	0	0.21	0	0.00
Total	**5,830**		**168**		**30**		**3**		**0**	

*Note:
RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 0 hospital beds available for use. On the day of the earthquake, the model estimates that only 0 hospital beds (0.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 0.00% of the beds will be back in service. By 30 days, 0.00% will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	0	0	0	0
Schools	5	0	0	5
EOCs	0	0	0	0
PoliceStations	1	0	0	1
FireStations	0	0	0	0

Transportation and Utility Lifeline Damage

Table 6 provides damage estimates for the transportation system.

Table 6: Expected Damage to the Transportation Systems

System	Component		Number of Locations			
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	3	0	0	3	3
	Bridges	4	0	0	4	4
	Tunnels	0	0	0	0	0
Railways	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	0	0	0	0	0
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	0	0	0	0	0
	Runways	0	0	0	0	0

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	0	0	0	0	0
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	0	0	0	0	0
Communication	0	0	0	0	0

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	167	1	0
Waste Water	100	1	0
Natural Gas	67	0	0
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	5,414	0	0	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0.00 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 74.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 0 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 0 households to be displaced due to the earthquake. Of these, 0 people (out of a total population of 15,215) will seek temporary shelter in public shelters.

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	0	0	0	0
	Single Family	0	0	0	0
	Total	**1**	**0**	**0**	**0**
2 PM	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	0	0	0	0
	Single Family	0	0	0	0
	Total	**0**	**0**	**0**	**0**
5 PM	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	0	0	0	0
	Single Family	0	0	0	0
	Total	**0**	**0**	**0**	**0**

Economic Loss

The total economic loss estimated for the earthquake is 2.65 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 2.64 (millions of dollars); 22 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 58 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.00	0.02	0.12	0.01	0.00	0.15
	Capital-Related	0.00	0.01	0.12	0.00	0.00	0.14
	Rental	0.03	0.02	0.06	0.00	0.00	0.11
	Relocation	0.09	0.01	0.07	0.01	0.01	0.19
	Subtotal	**0.11**	**0.06**	**0.37**	**0.02**	**0.02**	**0.58**
Capital Stock Losses							
	Structural	0.23	0.03	0.08	0.03	0.02	0.39
	Non_Structural	0.80	0.12	0.25	0.09	0.04	1.29
	Content	0.17	0.02	0.10	0.05	0.02	0.36
	Inventory	0.00	0.00	0.00	0.01	0.00	0.01
	Subtotal	**1.19**	**0.18**	**0.43**	**0.18**	**0.07**	**2.06**
	Total	**1.30**	**0.24**	**0.81**	**0.20**	**0.09**	**2.64**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Hazus estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 14 presents the results of the region for the given earthquake.

Table 12: Transportation System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	135.50	$0.00	0.00
	Bridges	6.89	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Subtotal	**142.40**	**0.00**	
Railways	Segments	0.00	$0.00	0.00
	Bridges	0.00	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Light Rail	Segments	0.00	$0.00	0.00
	Bridges	0.00	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Bus	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Ferry	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Port	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Airport	Facilities	0.00	$0.00	0.00
	Runways	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
	Total	**142.40**	**0.00**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Lines	3.30	$0.00	0.14
	Subtotal	**3.33**	**$0.00**	
Waste Water	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Lines	2.00	$0.00	0.12
	Subtotal	**2.00**	**$0.00**	
Natural Gas	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Lines	1.30	$0.00	0.06
	Subtotal	**1.33**	**$0.00**	
Oil Systems	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Electrical Power	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Communication	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**$0.00**	
	Total	**6.66**	**$0.01**	

Table 14. Indirect Economic Impact with outside aid

(Employment as # of people and Income in millions of $)

LOSS		Total	%

Appendix A: County Listing for the Region

New Haven,CT

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Connecticut					
	New Haven	15,215	973	279	1,253
Total State		**15,215**	**973**	**279**	**1,253**
Total Region		**15,215**	**973**	**279**	**1,253**

APPENDIX D
RECORD OF MUNICIPAL ADOPTION

#395

RESOLUTION ADOPTING THE TOWN OF WOLCOTT HAZARD MITIGATION PLAN UPDATE, 2015

WHEREAS, the Town of Wolcott has historically experienced severe damage from natural hazards and it continues to be vulnerable to the effects of those natural hazards profiled in the plan (e.g. *flooding, high wind, thunderstorms, winter storms, earthquakes, dam failure, and wildfires)*, resulting in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS, the Wolcott Town Council approved the previous version of the Plan in 2008; and

WHEREAS, the Town of Wolcott has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its Hazard Mitigation Plan Update, 2015 under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held in 2013 regarding the development and review of the Hazard Mitigation Plan Update, 2015; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedure for the Town of Wolcott; and

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

WHEREAS, adoption of this Plan will make the Town of Wolcott eligible for funding to alleviate the impacts of future hazards; now therefore be it

RESOLVED by the Town Council:

1. The Plan is hereby adopted as an official plan of the Town of Wolcott;
2. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;
3. Future revisions and Plan maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as a part of this resolution for a period of five (5) years from the date of this resolution.
4. An annual report on the progress of the implementation elements of the Plan shall be presented to the Town Council.

Adopted this 20th day of January, 2015 by the Town Council of Wolcott, Connecticut

David Valletta, Town Council Chairman

IN WITNESS WHEREOF, the undersigned has affixed her signature and the corporate seal of the Town of Wolcott this 21st day of January, 2015.

Dolores C. Slater, Town Clerk

APPENDIX E
SNOW LOAD GUIDANCE

FEMA Snow Load Safety Guidance

FEMA

www.FEMA.gov

This flyer summarizes warning signs of overstress conditions during a snow event, key safety issues and risks a snow event poses to buildings, and what to do after a snow event.

Warning Signs of Overstress Conditions during a Snow Event

Overstressed roofs typically display some warning signs. Wood and steel structures may show noticeable signs of excessive ceiling or roof sagging before failure. The following warning signs are common in wood, metal, and steel constructed buildings:

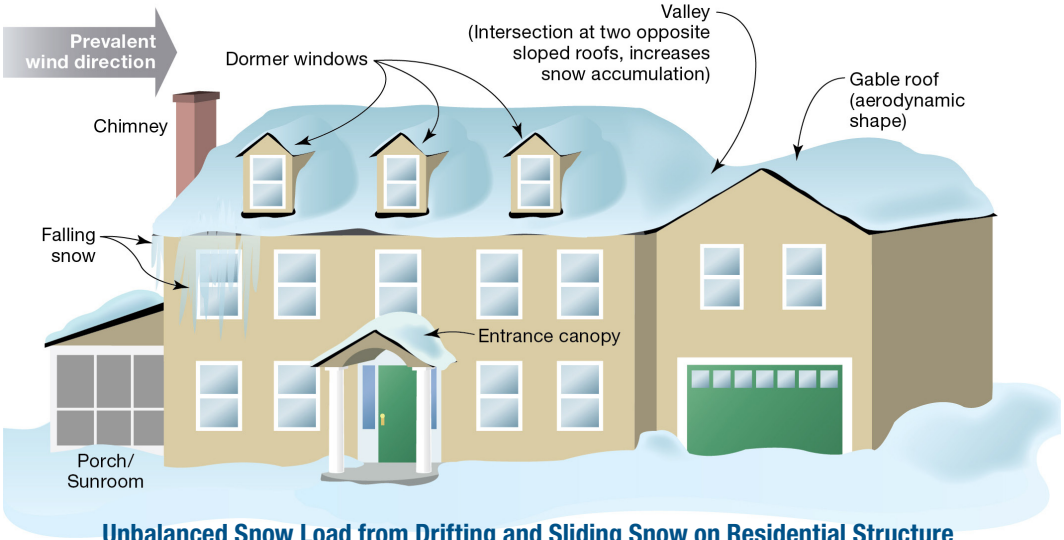
- Sagging ceiling tiles or boards, ceiling boards falling out of the ceiling grid, and/or sagging sprinkler lines and sprinkler heads
- Sprinkler heads deflecting below suspended ceilings
- Popping, cracking, and creaking noises
- Sagging roof members, including metal decking or plywood sheathing
- Bowing truss bottom chords or web members
- Doors and/or windows that can no longer be opened or closed
- Cracked or split wood members
- Cracks in walls or masonry
- Severe roof leaks
- Excessive accumulation of water at nondrainage locations on low slope roofs

Warning! If any of these warning signs are observed, the building should be promptly evacuated and a local building authority and/or a qualified design professional should be contacted to perform a detailed structural inspection.

Key Safety Issues and Risks

Snow accumulation in excess of building design conditions can result in structural failure and possible collapse. Structural failure due to roof snow loads may be linked to several possible causes, including but not limited to the following:

- **Unbalanced snow load from drifting and sliding snow.** When snow accumulates at different depths in different locations on a roof, it results in high and concentrated snow loads that can potentially overload the roof structure.
- **Rain-on-snow load.** Heavy rainfall on top of snow may cause snow to melt and become further saturated, significantly increasing the load on the roof structure.
- **Snow melt between snow events.** If the roof drainage system is blocked, improperly designed or maintained, ice dams may form, which creates a concentrated load at the eaves and reduces the ability of sloped roofs to shed snow. On flat or low slope roof systems, snow melt may accumulate in low areas on roofs, creating a concentrated load.
- **Roof geometry.** Simple roofs with steep slopes shed snow most easily. Roofs with geometric irregularities and obstructions collect snow drifts in an unbalanced pattern. These roof geometries include flat roofs with parapets, stepped roofs, saw-tooth roofs, and roofs with obstructions such as equipment or chimneys.



Unbalanced Snow Load from Drifting and Sliding Snow on Residential Structure

What to Do After a Snow Event

After a snow event, snow removal may be in order. To determine whether snow removal is necessary, one may enlist valuable resources such as a local building authority and/or a qualified design professional, who will be familiar with the snow conditions of the region and the design capacities of local buildings per the building code. If it is determined that the snow should be removed, snow removal should only be performed by qualified individuals. The qualified individual should follow necessary protocols for safe snow removal to minimize risk of personal injury and lower the potential for damaging the roof covering during the snow removal process.

> Warning! Snow removal is a dangerous activity that should only be done by qualified individuals following safety protocols to minimize risks. If at any time there is concern that snow loads may cause a collapse of the roof structure, cease all removal activity and evacuate the building.

If subsequent snow events are anticipated, removing snow from the roof will minimize the risk of accumulating snow causing structural damage. One benefit of immediate snow removal is that the effort required to remove the snow from the rooftop is reduced.

Safety Measures for Snow Removal

Below are some safety measures to take during snow removal to minimize risk of personal injury.

- Any roof snow removal should be conducted following proper OSHA protocol for work on rooftops. Use roof fall arrest harnesses where applicable.
- Always have someone below the roof to keep foot traffic away from locations where falling snow or ice could cause injuries.
- Ensure someone confirms that the area below removal site is free of equipment that could be damaged by falling snow or ice.
- Whenever snow is being removed from a roof, be careful of dislodged icicles. An icicle falling from a short height can still cause damage or injury.
- When using a non-metallic snow rake, be aware that roof snow can slide at any moment. Keep a safe distance away from the eave to remain outside of the sliding range.
- Buried skylights pose a high risk to workers on a roof removing snow. Properly mark this hazard as well as other rooftop hazards.

Methods of Snow Removal

Below are some recommended methods of snow removal that allow the qualified individual to remove snow safely and minimize risk of personal injury and property damage.

- Removing snow completely from a roof surface can result in serious damage to the roof covering and possibly lead to leaks and additional damage. At least a couple of inches of snow should be left on the roof.
- Do not use mechanical snow removal equipment. The risk of damaging the roof membrane or other rooftop items outweighs the advantage of speed.
- Do not use sharp tools, such as picks, to remove snow. Use plastic rather than metal shovels.
- Remove drifted snow first at building elevation changes, parapets, and around equipment.
- Once drifted snow has been removed, start remaining snow removal from the center portion of the roof.
- Remove snow in the direction of primary structural members. This will prevent unbalanced snow loading.
- Do not stockpile snow on the roof.
- Dispose of removed snow in designated areas on the ground.
- Keep snow away from building exits, fire escapes, drain downspouts, ventilation openings, and equipment.
- If possible, remove snow starting at the ridge and moving toward the eave for gable and sloped roofs.
- In some cases a long-handled non-metallic snow rake can be used from the ground, thereby reducing the risk. Metal snow rakes can damage roofing material and pose an electrocution risk and should be avoided.
- Upon completion of snow removal, the roofing material should be inspected for any signs of damage. Additionally, a quick inspection of the structural system may be prudent after particularly large snow events.

If you have any additional questions on this topic or other mitigation topics, contact the FEMA Building Science Helpline at FEMA-Buildingsciencehelp@fema.dhs.gov or 866-927-2104.

You may also subscribe to the FEMA Building Science e-mail list serve, which is updated with publication releases and FEMA Building Science activities.

Subscribe at https://public.govdelivery.com/accounts/USDHSFEMA/subscriber/new?topic_id=USDHSFEMA_193

Visit the Building Science Branch of the Risk Reduction Division at FEMA's Federal Insurance and Mitigation Administration at http://www.fema.gov/building-science.

Please scan this QR code to visit the FEMA Building Science web page.

APPENDIX F
MITIGATION ACTION STATUS WORKSHEET

Mitigation Action Progress Report Form

Progress Report Period	From Date:	To Date:
Action/Project Title		
Responsible Agency		
Contact Name		
Contact Phone/Email		
Project Status	❑ Project completed ❑ Project canceled ❑ Project on schedule ❑ Anticipated completion date:_____ ❑ Project delayed Explain _____	

Summary of Project Progress for this Report Period

1. What was accomplished for this project during this reporting period?

_____

_____

2. What obstacles, problems, or delays did the project encounter?

_____

_____

3. If uncompleted, is the project still relevant? Should the project be changed or revised?

_____

_____

4. Other comments

_____

_____

Plan Update Evaluation Worksheet

Plan Section	Considerations	Explanation
Planning Process	Should new jurisdictions and/or districts be invited to participate in future plan updates?	
	Have any internal or external agencies been invaluable to the mitigation strategy?	
	Can any procedures (e.g., meeting announcements, plan updates) be done differently or more efficiently?	
	Has the Planning Team undertaken any public outreach activities?	
	How can public participation be improved?	
	Have there been any changes in public support and/or decision- maker priorities related to hazard mitigation?	
Capability Assessment	Have jurisdictions adopted new policies, plans, regulations, or reports that could be incorporated into this plan?	
	Are there different or additional administrative, human, technical, and financial resources available for mitigation planning?	
	Are there different or new education and outreach programs and resources available for mitigation activities?	
	Has NFIP participation changed in the participating jurisdictions?	
Risk Assessment	Has a natural and/or technical or human-caused disaster occurred?	
	Should the list of hazards addressed in the plan be modified?	
	Are there new data sources and/or additional maps and studies available? If so, what are they and what have they revealed? Should the information be incorporated into future plan updates?	
	Do any new critical facilities or infrastructure need to be added to the asset lists?	
	Have any changes in development trends occurred that could create additional risks?	
	Are there repetitive losses and/or severe repetitive losses to document?	

Worksheet 7.2
Plan Update Evaluation Worksheet

Plan Section	Considerations	Explanation
Mitigation Strategy	Is the mitigation strategy being implemented as anticipated? Were the cost and timeline estimates accurate?	
	Should new mitigation actions be added to the Action Plan? Should existing mitigation actions be revised or eliminated from the plan?	
	Are there new obstacles that were not anticipated in the plan that will need to be considered in the next plan update?	
	Are there new funding sources to consider?	
	Have elements of the plan been incorporated into other planning mechanisms?	
Plan Maintenance Procedures	Was the plan monitored and evaluated as anticipated?	
	What are needed improvements to the procedures?	