Hazard Mitigation Plan Update, 2015

A Multi-jurisdictional Plan for the former Windham Region Council of Governments (WINCOG) Towns of Columbia, Coventry, Lebanon, Mansfield, Willington, and Windham

Initial Draft prepared by the former Windham Region Council of Governments, March 2014.
Revised by the Southeastern Connecticut Council of Governments and
Capitol Region Council of Governments, May 2015.
Final September 8, 2015

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Town of Columbia
Carmen Vance, First Selectman
Jonathan Luiz, Town Administrator (Alt.)

Town of Coventry
Elizabeth Woolf, Council Chairman
John Elsesser, Town Manager (Alt.)

Town of Lebanon
Joyce Okonuk, First Selectman

Town of Mansfield
Elizabeth Paterson, Mayor
Matthew W. Hart, Town Manager (Alt.)

Town of Willington
Christina Mailhos, First Selectman

Town of Windham
Ernest Eldridge, Mayor
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Acronyms

ADT – Average Daily Traffic
CADH – Connecticut Association of District Health
CERT – Community Emergency Response Team
Class A (dam) – Low Hazard
Class AA (dam) – Negligible Hazard
Class B (dam) – Significant Hazard
Class BB (dam) – Moderate Hazard
Class C (dam) – High Hazard
CLEAR - Center for Land Use Education and Research
ConnDOT – Connecticut Department of Transportation
CREPC – Capitol Region Emergency Planning Committee
CRERPA – Connecticut River Estuary Regional Planning Agency
CRREL – Cold Region Research and Engineering Lab
DEEP - Department of Energy and Environmental Protection
DOIT – Department of Information Technology
DPH – Department of Public Health
EAP - Emergency Action Plan
ECSU – Eastern Connecticut State University
EMD – Emergency Management Director
EMS – Emergency Medical Service
EOP - Emergency Operations Plan
ERC – Emergency Response Coordinator
FEMA – Federal Emergency Management Agency
FIRM - Flood Insurance Rate Map
MMI – Modified Mercalli Intensity
NAD83 – North American Datum of 1983
NCDC – National Climatic Data Center
NCDHD – North Central District Health Department
NDDH – Northeast District Department of Health
NECCOG – Northeastern Connecticut Council of Governments
NFIP - National Flood Insurance Program
NOAA – National Oceanic and Atmospheric Administration
OEM – Office of Emergency Management
OPM – Office of Policy and Management
PDHM - Natural Hazard Mitigation Plan
PGA - Peak Ground Acceleration
RPO – Regional Planning Organization
UConn - University of Connecticut
USGS – United States Geological Survey
WCMH – Windham Community Memorial Hospital
WINCOG – Windham Region Council of Governments

Executive Summary

The Windham Region Council of Governments (WINCOG) completed its initial multi-jurisdictional hazard mitigation plan in 2006. The Town of Willington joined WINCOG after the completion of the Plan and an addendum to the plan was submitted to FEMA in 2008. WINCOG began formally updating the Plan in 2012. With the dissolution of WINCOG in 2014, the jurisdictions previously included in this plan are now members of three adjacent regional planning organizations (councils of governments). Of the former WINCOG jurisdictions, this hazard mitigation plan update is applicable only to the Towns of Columbia, Coventry, Lebanon, Mansfield, Willington, and Windham. The Towns of Chaplin, Hampton, and Scotland will be covered in the hazard mitigation plan prepared for the Northeast Connecticut Council of Governments.

The goal of this hazard mitigation plan update is to reduce the loss of life and property and economic consequences as a result of natural disasters; this is the same goal listed for each participating community in the initial plan. While much of the background data for the region is relatively unchanged, the Plan update provides more recent information with regard to the extent of hazards and impacts and an updated historical record. The hazards evaluated in detail are unchanged from the initial plan. The natural hazards discussed in detail in this update include dam failures, drought, earthquakes, hurricanes, flooding (including ice jams), severe winter storms, thunderstorms, tornadoes, and wildfires.

Annualized loss estimates have been prepared for each jurisdiction based on local loss data and information presented in the 2014 State of Connecticut Natural Hazard Mitigation Plan Update. These estimates are summarized for each community in the table below and range from $0.4 million in Columbia to $2.6 million in Windham.

Hazard	Annualized Loss Estimate by Community					
	Columbia	Coventry	Lebanon	Mansfield	Willington	Windham
Dam Failure	$337	$764	$1,000	$1,631	$371	$10,237
Drought	$1,200	$300	$1,000	$1,000	$0	$0
Earthquakes	$2,103	$4,565	$1,495	$9,743	$2,218	$11,959
Flooding (including Ice Jams)	$9,190	$20,834	$9,352	$44,472	$10,121	$11,344
Hurricanes	$371,669	$842,675	$831,475	$1,798,723	$409,377	$2,396,733
Severe Winter Storms	$19,115	$43,336	$26,000	$92,503	$21,053	$92,266
Thunderstorms	$1,997	$4,526	$1,020	$9,662	$2,199	$10,034
Tornadoes	$1,594	$3,614	$3,700	$7,713	$1,755	$18,068
Wildfires	$750	$500	$500	$9,480	$500	$9,000
Total for Community	**$407,955**	**$921,114**	**$875,542**	**$1,974,927**	**$447,594**	**$2,559,641**

* Based on the 2014 State of Connecticut Natural Hazard Mitigation Plan Update or Local Estimates

Each community reaffirmed the goal of the plan and reviewed its objectives to meet the goal. In some cases, objectives were modified to reflect current capabilities. In all cases, each community updated its list of mitigation strategies and actions ("tasks") that each community will attempt to achieve over the next five years. It is understood that not all tasks may be able

to be completed in the next five years depending on the ability to acquire grant funding, availability of local funding and staff time, and/or permission from pertinent property owners. However, at a minimum each community must participate in an annual plan maintenance process to review the stated goal, community objectives, and tasks.

Summary of Plan Revisions

The previously adopted 2005-2006 Hazard Mitigation Plan for the former Windham Region Council of Governments (WINCOG) included the entire region which consisted of the Towns of Ashford, Chaplin, Columbia, Coventry, Hampton, Lebanon, Mansfield, Scotland, and Windham, Connecticut. The Town of Ashford withdrew from WINCOG on December 28, 2006 and subsequently joined the Northeastern Connecticut Council of Governments (NECCOG). Therefore, Ashford was not included in the initial draft of the Hazard Mitigation Plan Update prepared for review in March 2014. The Town of Willington joined WINCOG in 2007 and WINCOG submitted an addendum to the initial plan in 2008 to add the pertinent sections for Willington.

Beginning July 2014, WINCOG officially dissolved when the Connecticut Office of Policy and Management consolidated the number of planning regions in Connecticut under Section 16a-4c of the Connecticut General Statutes. The former WINCOG member communities became part of the Southeastern Connecticut Council of Governments (SCCOG), the Capitol Region Council of Governments (CRCOG), or NECCOG as indicated below:

- The Towns of Chaplin, Hampton, and Scotland joined NECCOG;
- The Towns of Columbia, Coventry, Mansfield, and Willington joined CRCOG; and
- The Towns of Lebanon and Windham joined SCCOG.

Based on these changes, this Hazard Mitigation Plan Update has been revised to remove textual references to Ashford, Chaplin, Hampton, and Scotland. The Hazard Mitigation Plan Update for these communities will be incorporated into the NECCOG Hazard Mitigation Plan that is in development. Please note that the latter three communities continue to be referenced on the figures within this update which reflect the former WINCOG area as of 2014.

All of the hazards that were evaluated in the 2006 plan are again evaluated herein. Many hazards do not apply or are extremely unlikely to affect the former WINCOG region and are only briefly discussed. This plan update includes updates to the planning process, a discussion of climate change, updated demographics, updated land use and development figures, an updated regional hazard risk assessment, updated town descriptions and evaluations of risk, updated mitigation strategies, and updated information on plan maintenance procedures. Finally, the plan revisions include table of contents updates as appropriate to reflect the above changes. Final page numbers in the table of contents will be updated for the final document.

I. Introduction:

A. Purpose:

Under the Flood Mitigation Program (National Flood Insurance Reform Act of 1994) the Natural Hazards Risk and Vulnerability Assessment is a required step in the development of a Hazard Mitigation Plan. Prior to writing the Hazard Mitigation Plan it is necessary to identify which hazards exist throughout the former WINCOG-member towns (see Section IIA below). The purpose of the Risk and Vulnerability Assessment is to identify those hazards and then determine which hazards would pose a threat to human life and property should they occur. This plan is developed for the overall safety of the public. Recognizing hazards prior to their occurrence and eliminating or reducing vulnerability to these risks where possible will lessen the likelihood of injury to or loss of human life and damage to or loss of property.

According to the Federal Emergency Management Agency (FEMA) March 2013 Local Mitigation Planning Handbook, "a mitigation action is a specific action, project, activity, or process taken to reduce or eliminate long-term risk to people and property from hazards and their impacts. Implementing mitigation actions helps achieve the plan's missions and goals. The actions to reduce vulnerability to threats and hazards form the core of the plan and are a key outcome of the planning process. Types of mitigation actions to reduce long-term vulnerability include local plans and regulations, structure and infrastructure projects, natural systems protection, and education and awareness programs."

B. Authority:

The Natural Hazard Mitigation Plan has been completed under the authority of the Department of Homeland Security's Robert T. Stafford Disaster Relief and Emergency Assistance Act, Section 203, 42 U.S.C 5121-5206, as amended by Section 102 of the Disaster Mitigation Act of 2000. The Department of Homeland Security's Federal Emergency Management Agency's (FEMA's) National Flood Insurance Program (NFIP) through the Department of Energy and Environmental Protection's Flood Management Program provided funding for this plan through P.L. 103-325, Sections 553 and 554. All regulations and requirements under the NFIP (44 CFR, Subchapter B) have been followed during this process.

C. Planning Process:

Initial Planning Process

The chief elected officials in the region designated WINCOG's Regional Emergency Planning Workgroup to act as an advisory board for the preparation of the initial plan. The Workgroup consists of at least one representative from each town, and includes a mix of emergency management directors, town engineers, fire marshals/chiefs, first selectmen

and other representatives from public and private organizations. They provide a forum for municipalities to share ideas throughout the development of the initial plan. The committee contributed in gathering historical accounts of natural disaster impacts, determining critical areas of concern, providing existing mitigation strategies, reviewing and providing revisions for draft copies of the risk and vulnerability assessment, and determining mitigation strategies for each municipality. Meetings held by this committee and key correspondence are documented in Appendix II.

The Workgroup members, along with additional representatives from the towns as appointed to assist with developing the plan, were largely responsible for coordinating the planning efforts in their respective municipalities, which included data collection, identifying existing mitigation strategies, and developing proposed mitigation strategies. The town-specific sections were developed through a series of personal interviews, e-mail exchanges, and/or meetings among the various municipal departments.

Plan Update Process

The plan update process commenced in 2012. WINCOG met with each community to perform data collection for the plan update, including identifying new risks and vulnerabilities and updating strategies and actions. In addition, each meeting of the Board of the Windham Region Council of Governments and of WINCOG's Regional Emergency Planning Workgroup included opportunities for public comment, and many of these meetings included agenda items relating to the Natural Hazard Mitigation Plan Update. In particular, these meetings provided a forum for discussion of the plan update specific to hazards and issues that were shared across municipal boundaries. The meetings of both groups were open to the public and the agendas are posted on WINCOG's website, distributed to town clerks to be posted, offered to the media to be announced at their discretion, and sent to the Board members. With the dissolution of WINCOG in 2014, meeting notes from these local meetings are no longer available. However, meetings and correspondence related to the plan update are summarized in Appendix II beginning on page 6.

During the plan update process, each community reaffirmed the goal of the natural hazard mitigation plan, which is to reduce the loss of life and property and economic consequences as a result of natural disasters. All communities also reaffirmed its list of objectives to meet this goal, although some communities added and/or deleted objectives. These changes are explained in Section III under the section for each community.

Chief elected officials, town managers, local emergency management directors, town planners, town engineers, public works directors and other staff of the nine member towns had several opportunities to review and assist in developing this plan update. In addition, WINCOG offered the opportunity for the public and other stakeholders to comment on the updated plan. The public comment period was held beginning in November 2013 by hosting the updated plan on the WINCOG website and municipal websites and holding

public hearings. A public information session was scheduled in each town either as a stand-alone meeting or as part of a Board of Selectman or Town Council Meeting. Information sheets and the town section of the plan were handed out at each meeting. Some towns also posted the drafts on their web sites, and a draft of Part I had been continuously available to view on the WINCOG web site.

As of 2015, documentation of the website posting is no longer available for WINCOG and for some of the pertinent communities, but are referenced where available below. Minutes (where available) are attached in Appendix II.

- The section of the updated plan pertinent to the Town of Columbia was placed on the Town of Columbia website in November 2013. The Board of Selectmen reviewed the plan at their December 17, 2013 regular meeting and issued comments to town staff. No public comments were received at the meeting.

- The section of the updated plan pertinent to the Town of Coventry was placed on the Town of Coventry website[1][2][3] for public review and comment in November 2013. A public meeting to review the plan was held on December 12, 2013 for 90 minutes. No public comments were received at the meeting.

- The section of the updated plan pertinent to the Town of Lebanon was placed on the Town of Lebanon website[4] for public review and comment in November 2013. A public meeting to review the plan was held on March 4, 2014 for 45 minutes. No public comments were received at the meeting.

- The section of the updated plan pertinent to the Town of Mansfield was placed on the Town of Mansfield website[5] for public review and comment on November 12, 2013. A public meeting was held in Mansfield as part of the Mansfield Town Council meeting of November 25, 2013. Two members of the public provided comments to the plan and several of the suggestions were incorporated into various objectives.

- The section of the updated plan pertinent to the Town of Willington was placed on the Town of Willington website[6] for public review and comment in December 2013. A public meeting was held in Willington as part of the Willington Board of Selectmen meeting of December 13, 2013. No public comments were received at the meeting.

[1] http://www.coventryct.org/AgendaCenter/ViewFile/Item/549?fileID=723
[2] http://www.coventryct.org/AgendaCenter/ViewFile/Item/549?fileID=724
[3] http://www.coventryct.org/AgendaCenter/ViewFile/Item/549?fileID=725
[4] http://www.lebanontownhall.org/resources/hazard_mitigation_meeting_3.pdf
[5] http://www.mansfieldct.gov/filestorage/1904/4724/20131125_natural_hazards_mitigation.pdf
[6] http://willingtonct.virtualtownhall.net/Public_Documents/WillingtonCT_Webdocs/Hazard

- The section of the updated plan pertinent to the Town of Windham was placed on the Town of Windham's website for public review and comment in November 2013. A public meeting to review the draft plan was held on February 20, 2014 for two hours. Although minutes are not available, it is assumed that public comments were received given the duration of the meeting.

WINCOG reportedly incorporated public and municipal comments into the final draft plan update that was submitted for FEMA for review in 2014.

When FEMA has given its "approval pending adoption", a draft of the completed plan will be distributed to each participating community for adoption. The plan will be adopted separately by each town's governing body. Each municipality will manage the plan adoption process in accordance with its standards, rules and practices.

At the completion of the adoption process, official signed resolutions will replace the draft templates provided in Appendix V and the final plan will be forwarded to FEMA for final approval.

D. Data Collection and Analysis:

WINCOG performed the data collection and analysis for all the participating municipalities to reduce duplication of efforts and to provide a common template for identifying and evaluating mitigation strategies. Looking at historical occurrences of each hazard can provide valuable information in assessing potential future risk.

Sources of historical data used in developing this plan include:

- Documentation kept by organizations including, but not limited to: Department of Energy and Environmental Protection (DEEP), Connecticut Department of Transportation (ConnDOT), Office of Emergency Management (OEM), Federal Emergency Management Agency (FEMA), National Oceanic and Atmospheric Administration (NOAA), National Climatic Data Center (NCDC), and United States Geological Survey (USGS). *(In particular, significant input was obtained on disaster declarations from the Office of Emergency Management, on ScourWatch bridges from the Connecticut Department of Transportation (ConnDOT), on Flood Insurance Studies from the Federal Emergency Management Agency (FEMA), on dams throughout the region from the Dam Safety section at the DEEP, and on flooding throughout the region from the Flood Management section at the DEEP.)*;

- Interviews with individuals in each town, including (variously), the following: historians, emergency management directors, town engineers, fire marshals/chiefs, chief elected officials and town managers.

References used are listed on pages 203-226; individuals interviewed are listed on page 222; and historical weather disaster data is listed in Appendix I.

To assess a particular town's risk and vulnerability, staff gathered information on the particular features of the town, including:

- The location of the town, its position within the region, the land cover, and areas of development help to determine potential loss in the event of a disaster;
- The history of specific events that have affected the town; and
- An estimate of the type and number of structures within the community.

With this information, staff assessed the vulnerability of the town to each hazard and looked at potential impacts on residents and local economy that might result from a hazard event.

WINCOG staff used geographic information system software in the analysis, specifically ESRI ArcMap 8.3 and HAZUS-MH 5.0. HAZUS-MH is loss estimation software developed by FEMA. After careful review by WINCOG staff and the towns the results of this software were deemed too inaccurate to be implemented in the initial plan, however the data accompanying HAZUS-MH, provided the building blocks for the list and maps of critical areas of concern.

Loss estimates presented in this plan update were not *directly* generated by HAZUS-MH, although some loss estimates presented in this plan were derived from the Connecticut Natural Hazard Mitigation Plan (2014) and therefore indirectly represent HAZUS-MH estimates. Refer to the individual hazard profiles for more information.

Public participation was important to this Assessment process. Staff interviewed individuals from each of the towns in the region to help determine the impact of various historical events. Meetings, open to the public, were held monthly with WINCOG's Regional Emergency Planning Workgroup as outlined in Section I.C. above. An in-depth review of the planning process can be seen in Appendix II. Opportunities for the public to review the plan update process also occurred as outlined in Section I.C. above.

E. Overview:

This Plan was developed in collaboration with the region's municipalities and the Connecticut Department of Energy and Environmental Protection (CT DEEP). WINCOG coordinated its planning efforts with the Regional Emergency Planning Workgroup. These individuals in turn, coordinated the planning efforts in their respective municipalities. In addition members of the public were provided opportunities to provide input during the development of the Plan.

The Risk and Vulnerability Assessment looks at the historical and potential impacts of the following hazards throughout the region: dam failures, droughts, earthquakes, floods, hurricanes, ice jams, severe winter weather, thunderstorms, tornadoes and wind damage and wildfires. Assessment begins with a general description of the study area, its history, geology, climate, land cover, transportation, demographics and emergency operations management in the region. Each hazard is then examined on a regional and/or town level, as appropriate. Through this process the potential risk of a given natural hazard occurring and the vulnerability of the area affected is determined. Hazards that are examined on a regional level are as follows: droughts, earthquakes, hurricanes, ice jams, severe winter weather, thunderstorms, tornadoes and wind damage and wildfires. Flooding and dam failures occur throughout the region but have more localized impacts, and will be looked at on a town by town basis. Once the Risk and Vulnerability Assessment has been completed possible mitigation strategies are determined. These mitigation strategies guide future efforts to reduce the loss of life and property as a result of natural disasters and attempt to break the expensive cycle of repeated damage and reconstruction.

II. Regional Description:

A. Overview of the Former WINCOG Region:

General Description and History

The former Windham Planning Region's state-designated regional planning organization (RPO) was WINCOG. WINCOG's nine member towns - Chaplin, Columbia, Coventry, Hampton, Lebanon, Mansfield, Scotland, Willington, and Windham (see Figure 1), encompassed 286 square miles in the heart of eastern Connecticut. The term "former WINCOG Region" will be frequently used to denote the study area.

Note that the previous hazard mitigation plan included the Town of Ashford but did not include the Town of Willington. The Town of Ashford split from WINCOG in late 2006 and joined the Northeastern Connecticut Council of Governments and therefore is not included in this plan update. The Town of Willington joined WINCOG in 2007 after the initial hazard mitigation plan had been prepared. An addendum to the initial hazard mitigation plan was sent June 13, 2008 to FEMA containing pertinent sections related to the Town of Willington along with a signed resolution adopting the WINCOG plan. As such, the Town of Willington is included in this plan update with status consistent with the other towns.

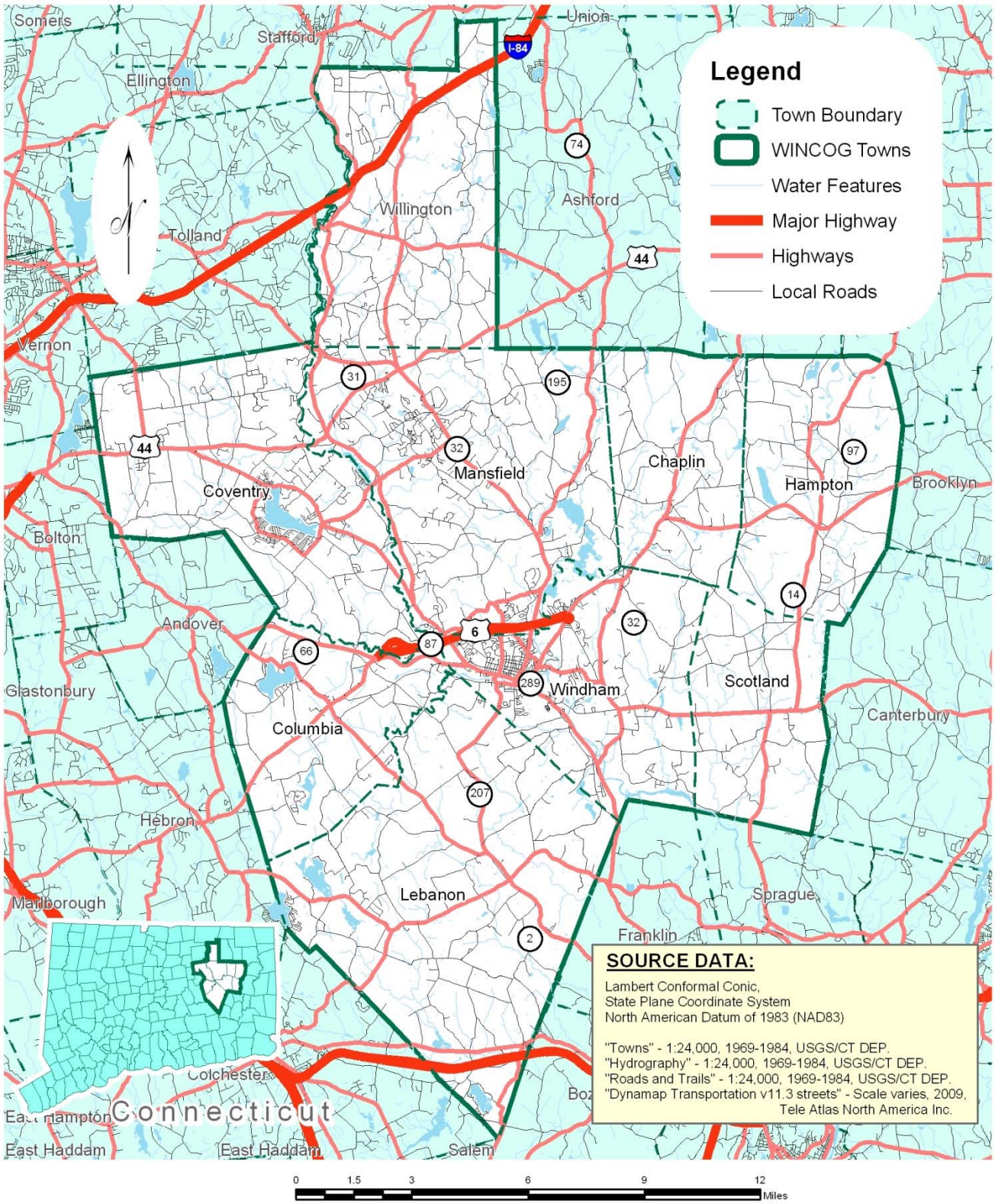
In 2014 the WINCOG regional planning organization became defunct when planning regions in Connecticut were reorganized by the Connecticut Office of Policy and Management. This occurred after the initial FEMA review of the draft updated plan. The Towns of Columbia, Coventry, Mansfield, and Willington subsequently became members of the Capitol Region Council of Governments (CRCOG). The Towns of Lebanon and Windham became members of the Southeastern Connecticut Council of Governments (SCCOG). These six former WINCOG communities are represented in this plan update.

The remaining three former WINCOG communities joined the Northeastern Connecticut Council of Governments (NECCOG). NECCOG is currently preparing its initial multi-jurisdictional hazard mitigation plan and has indicated that it will include plan updates for these three communities within that initial plan. Therefore, text references to Chaplin, Hampton, and Scotland have been removed from this plan update, although these former WINCOG communities continue to be referenced on figures herein.

The former WINCOG Region is very rural, classified as predominantly undeveloped forestland. The urban concentrations in the region are located in the Willimantic area of Windham including the area in the southeastern corner of Mansfield, immediately north of Willimantic, and the Storrs area of Mansfield (home to the University of Connecticut).

Figure 1

Base Map of the WINCOG Region



Scale: 1:240,000

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Prepared for: The Windham Region Council of Governments Hazard Mitigation Plan.

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Geology

The rocks, faults and sediment that make up Connecticut's landscape were arranged over a long history of geological events. The state now exhibits three natural separations, the Western and Eastern Uplands (also known as Highlands) and the Central Valley located between the Uplands. The former WINCOG Region is part of the Eastern Uplands and is made up of what is termed Iapetos (Oceanic) Terrane[**]. The Iapetos Terrane is pushed-up portions of the Iapetos Ocean (the ocean prior to the Atlantic Ocean).

Connecticut is made up of a variety of terranes that pushed together to form the 'super continent', Pangaea. As Pangaea broke apart, rift valleys formed and folding caused North-South (N-S) weakness. The earth's crust failed in Connecticut along this weakness. Faulting then tilted the rocks downward to the east. During the Ice Age glaciers helped to further influence the landscape by putting emphasis on the topography, while still maintaining the N-S trend.

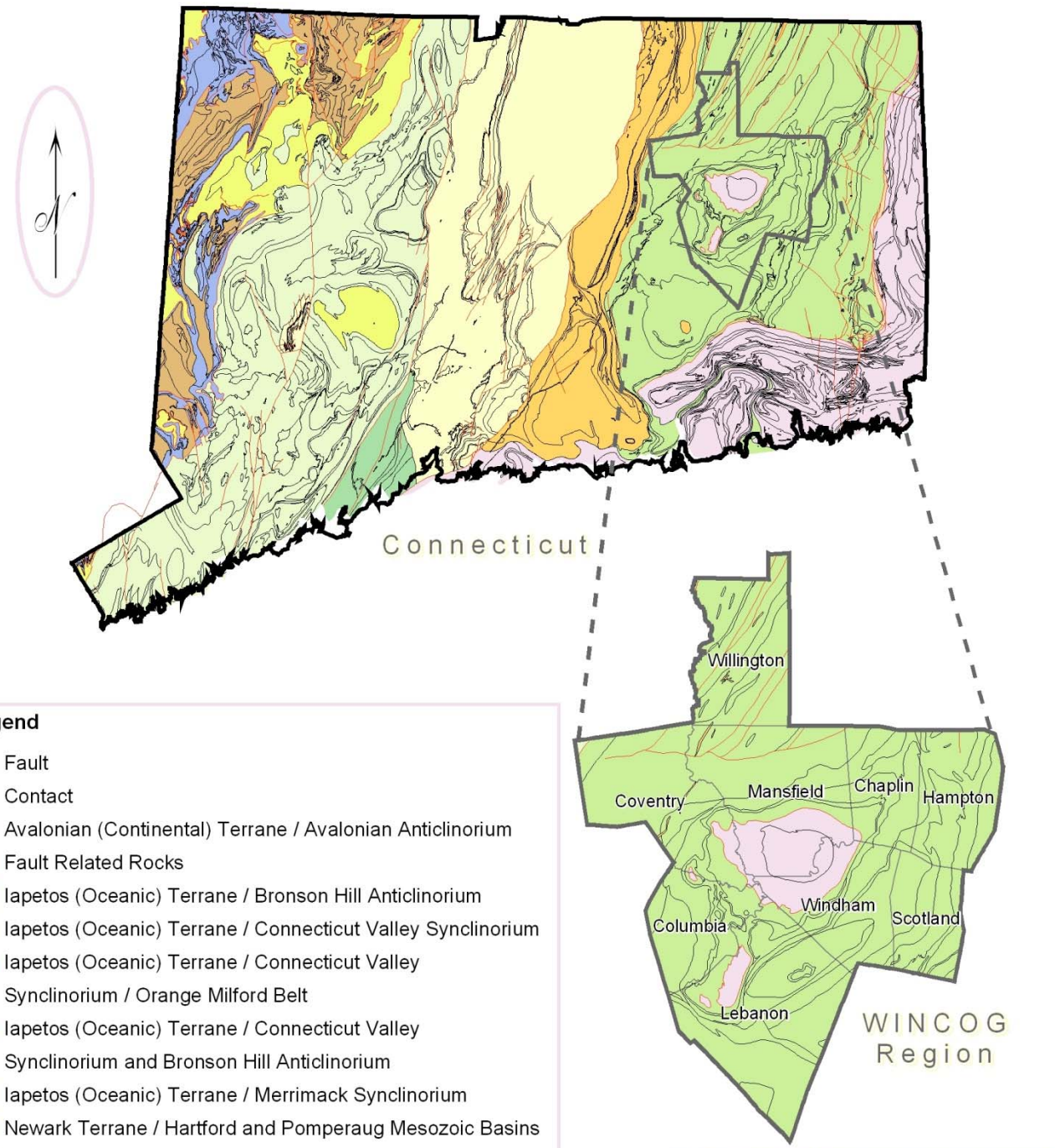
The Geological Bedrock Map shows the break-down of the terranes, along with the N-S trends of the rock units and faults (see Figure 2). The topography of the former WINCOG Region has been shaped and molded over time. Elevation change throughout the area is shown in Figure 3. An unnamed hill in the north-eastern corner of Willington is the high point of the region with an elevation of almost 1060 feet. The low point in the region is less than 100 feet in elevation and is located in the southeast corner of Windham along the Shetucket River see Figure 3).

Understanding the soil-make up, as well as the geology, helps to recognize natural hazards that may be of concern in an area (see Figure 4). Landslides, land subsidence and earthquakes are all influenced by geology and soil make-up. A landslide occurs when a section of land at a higher elevation, such as a mountainside or cliff, breaks off the greater mass and descends suddenly. Land subsidence occurs in areas where land is partially held up by water and actually collapses onto itself when large amounts of water are withdrawn. Earthquakes occur as the ground moves along fault lines causing the Earth's crust to shift and shake.

[**] A terrane is a crustal block or fragment that preserves a distinctive geologic history that is different from the surrounding areas and that is usually bounded by faults.

Geological Bedrock Map

Figure 2



Legend

- Fault
- Contact
- Avalonian (Continental) Terrane / Avalonian Anticlinorium
- Fault Related Rocks
- Iapetos (Oceanic) Terrane / Bronson Hill Anticlinorium
- Iapetos (Oceanic) Terrane / Connecticut Valley Synclinorium
- Iapetos (Oceanic) Terrane / Connecticut Valley Synclinorium / Orange Milford Belt
- Iapetos (Oceanic) Terrane / Connecticut Valley Synclinorium and Bronson Hill Anticlinorium
- Iapetos (Oceanic) Terrane / Merrimack Synclinorium
- Newark Terrane / Hartford and Pomperaug Mesozoic Basins
- Proto-North American (Continental) Terrane / Ordovician and Cambrian Shelf Sequence
- Proto-North American (Continental) Terrane / Proterozoic Massifs - "Grenville"
- Proto-North American (Continental) Terrane / Taconic Allochthons (Displaced Iapetos Terrane)

SOURCE DATA:

Lambert Conformal Conic,
State Plane Coordinate System
North American Datum of 1983 (NAD83)

"Bedrock Geology" - 1:50,000, 1985, USGS/CT DEP.
"Towns" - 1:24,000, 1969-1984, USGS/CT DEP.
"Counties" - 1:250,000, 1986, CT DEP.

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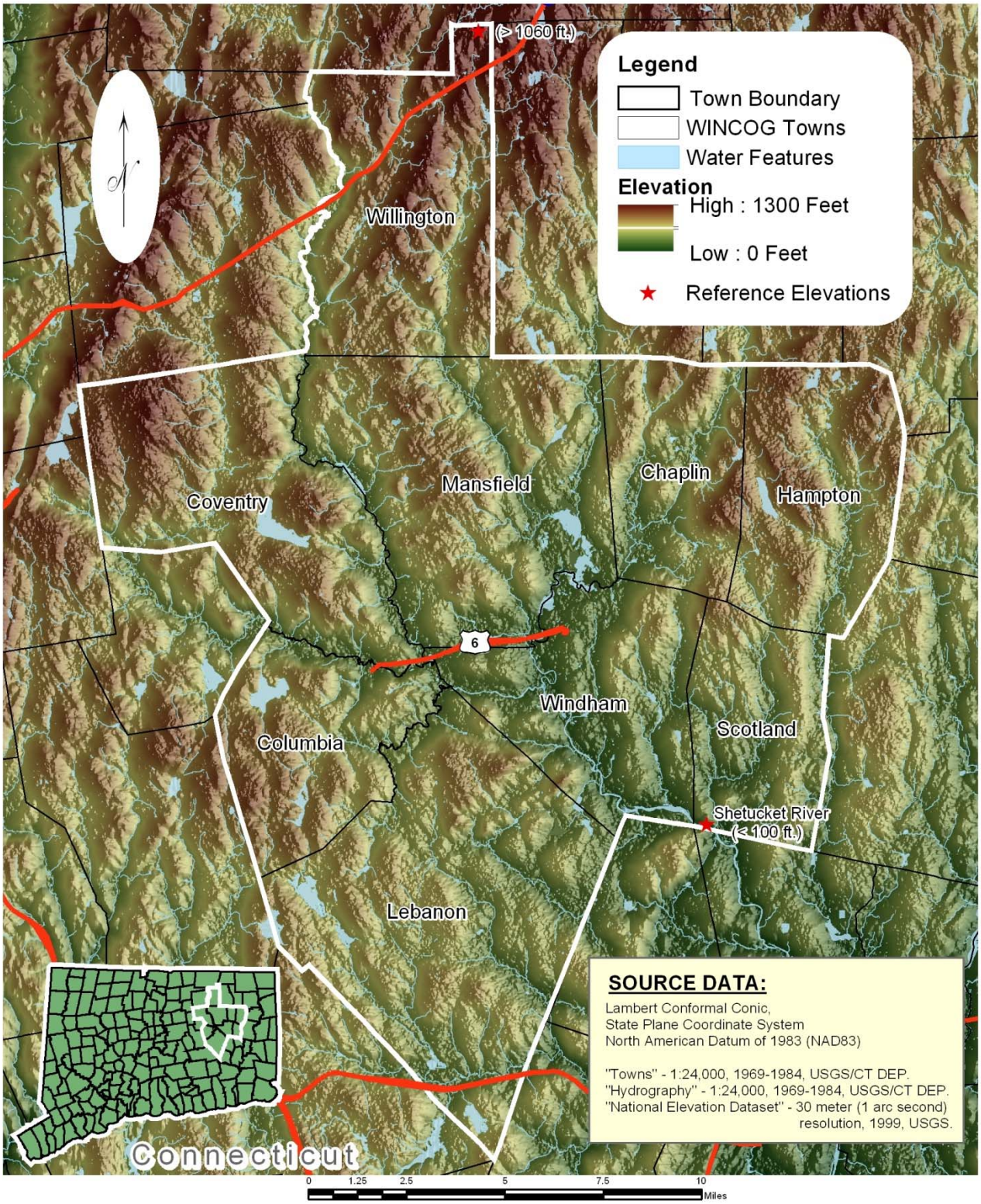
WINCOG Region Topography

Figure 3



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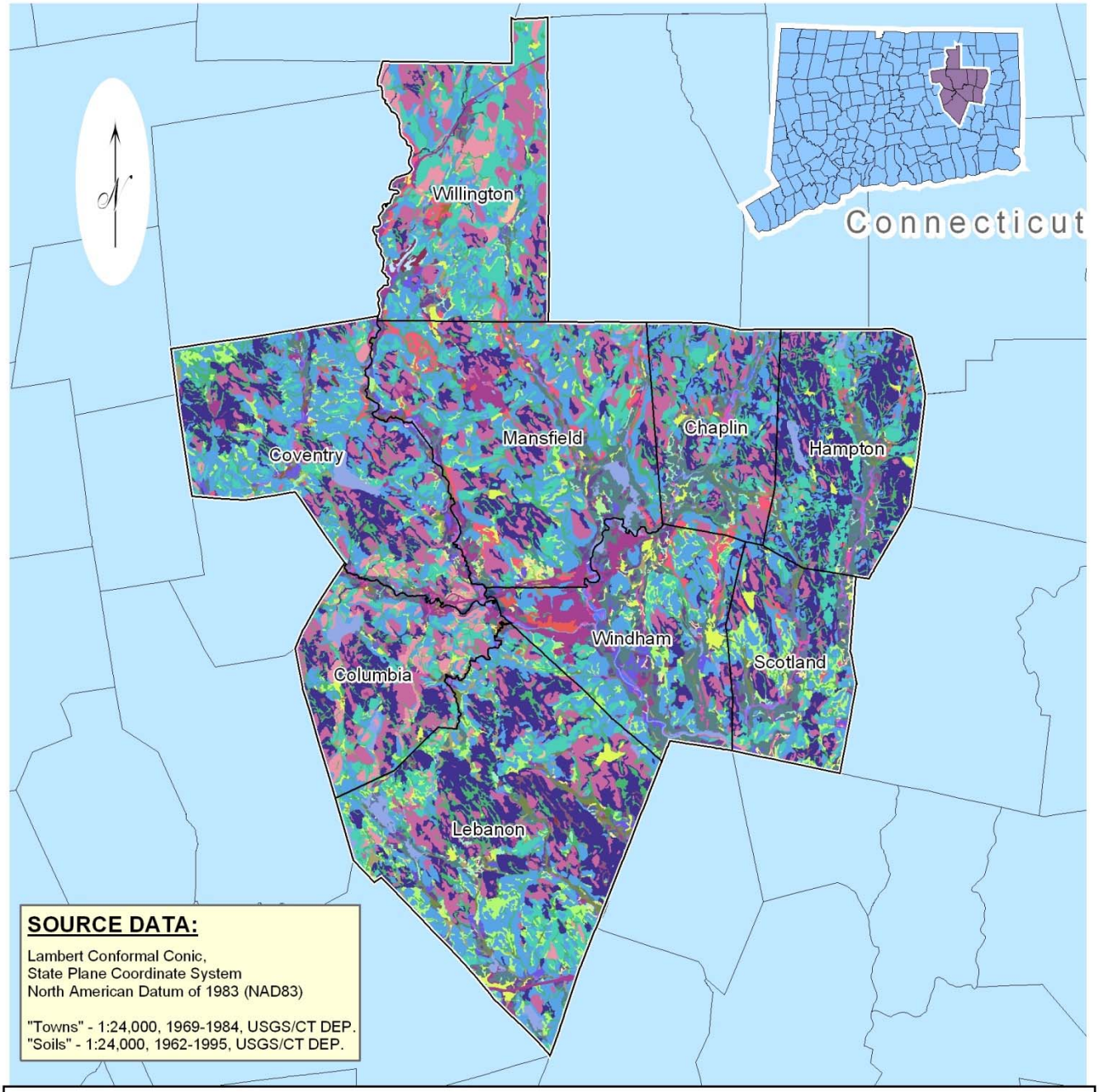
WINCOG Region Soil Map

Figure 4



Scale: 1:280,000

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In the State of Connecticut all three of these hazards occur; however only earthquakes are a real concern in the region. Connecticut's lack of elevation and overall vegetation make landslides uncommon. When landslides do occur it is on a small scale and more common in areas where vegetation has been disrupted, such as at a construction site. Connecticut experiences some problems with land subsidence in areas where there have been underground mines, such as in Cheshire, but this is not a big problem in this region. Earthquakes on the other hand have an extensive history in the state and in the region. Several faults cut through the region, resulting in earthquake-vulnerable areas. Most earthquakes in the state have been small in scale, but some have been known to hit the state with great intensity. Earthquakes are the greatest geologically-related hazard in the region.

Climate and Climate Change

The climate in the former WINCOG Region is consistent with Connecticut's overall, warm summers and cold winters. Record temperatures in the region range from just over 100 degrees Fahrenheit to close to 40 degrees below zero. The summer months average highs in the upper seventies to low eighties, while the winter months average lows in the upper teens to lower twenties. Average precipitation per month in the region is quite consistent year round, ranging from 3.0 inches in some areas to over 4.7 inches in others. During most months all areas of the region average over 4.0 inches of rain, making long periods of drought and widespread flooding uncommon occurrences. On average the region receives just over 51.0 inches of precipitation over the course of a year. Annually Connecticut experiences roughly 120 days of measurable precipitation with an average of 20 to 30 of these days being from thunderstorm activity.

Though distributed through the year, precipitation threatens the region from several different sources. Thunderstorms pour short-duration rains during the summer months, the hurricane season threatens damaging winds and flooding throughout the region from June 1 to December 1, and "nor'easters" generating forceful winds threaten the region with moderate to extreme snowstorms from November 1 to April 1. Though the climate in the region is fairly moderate, severe weather can threaten the region throughout the year.

According to the 2014 Connecticut Natural Hazard Mitigation Plan Update, "climate change is both a present threat and an onsetting disaster" that "acts as an amplifier of existing hazards." Extreme weather events appear to be becoming more frequent over recent years and there is no indication that this trend will not continue. Higher hurricane wind speeds and increased rainfall intensity are expected to increase the impact of wind damage and flooding on the former WINCOG communities. In addition, more intense heat waves may mean droughts and wildfires could be intensified if not made more frequent. The impact of climate change on each hazard is discussed in appropriate sections of this plan update.

Land Cover

The former WINCOG Region is classified largely as a rural area. According to the University of Connecticut's Center for Land use Education and Research's (CLEAR's) Land Cover Greater Connecticut data, only 10.9% of the land area in the region is developed (see Figure 5). The region is predominantly forested, with approximately 58.5% deciduous forest, 5.1% coniferous forest and 3.5% forested wetlands. Other land cover in the region includes: agricultural and other grasses (13.0%), water (2.4%), turf and grass (4.6%), barren land (1.0%), non-forested wetlands (0.5%) and utility rights-of-way (0.5%) (see Table 1).

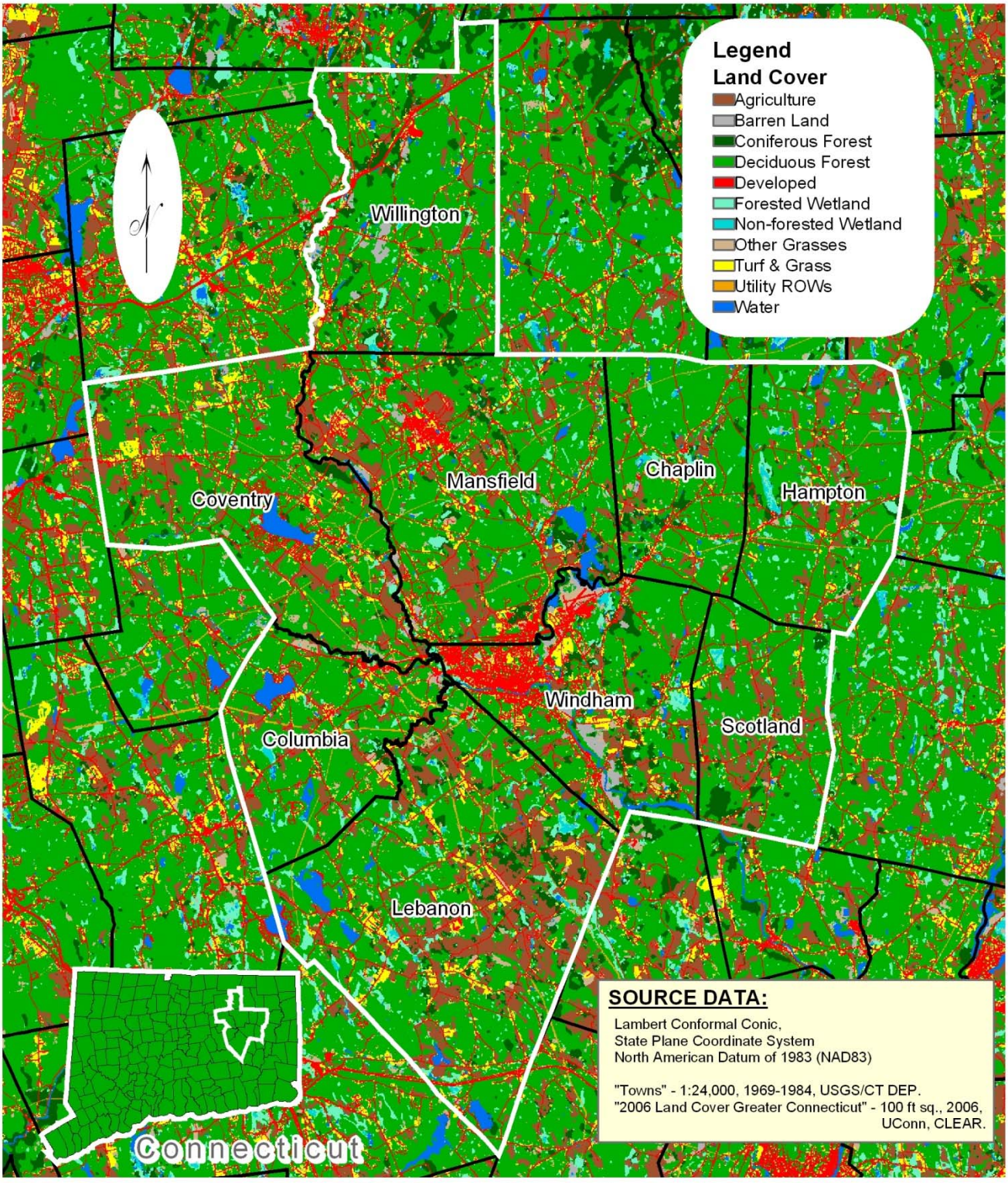
Table 1
2006 Land Cover Breakdown for the WINCOG Region

	Developed		Turf & Grass		Agricultural & Other Grasses		Deciduous Forest		Coniferous Forest		Water		Non-forested Wetland		Forested Wetland		Barren		Utility Right-of-way		Total Town Acreage
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	
Chaplin	971	7.7%	343	2.7%	785	6.2%	9,199	73.2%	508	4.0%	141	1.1%	95	0.8%	388	3.1%	66	0.5%	73	0.6%	12,569
Columbia	1,399	10.0%	622	4.4%	1,476	10.5%	8,878	63.3%	270	1.9%	527	3.8%	101	0.7%	488	3.5%	61	0.4%	195	1.4%	14,017
Coventry	2,795	11.4%	1,429	5.8%	3,298	13.5%	14,814	60.4%	773	3.2%	639	2.6%	22	0.1%	421	1.7%	131	0.5%	185	0.8%	24,507
Hampton	1,166	7.2%	423	2.6%	1,824	11.2%	11,051	67.9%	493	3.0%	236	1.4%	173	1.1%	787	4.8%	54	0.3%	70	0.4%	16,277
Lebanon	2,822	8.0%	1,845	5.2%	7,681	21.8%	17,330	49.1%	2,200	6.2%	932	2.6%	271	0.8%	1,849	5.2%	119	0.3%	252	0.7%	35,301
Mansfield	4,185	14.3%	1,401	4.8%	3,483	11.9%	16,436	56.3%	1,375	4.7%	856	2.9%	82	0.3%	895	3.1%	311	1.1%	150	0.5%	29,174
Scotland	708	5.9%	306	2.6%	2,142	17.9%	7,663	63.9%	630	5.3%	61	0.5%	56	0.5%	397	3.3%	34	0.3%	0	0.0%	11,997
Willington	2,203	10.3%	788	3.7%	1,222	5.7%	14,097	65.7%	1,694	7.9%	359	1.7%	83	0.4%	646	3.0%	368	1.7%	5	0.0%	21,465
Windham	3,658	20.6%	1,287	7.2%	1,949	11.0%	7,546	42.5%	1,325	7.5%	685	3.9%	98	0.6%	483	2.7%	739	4.2%	3	0.0%	17,773
Total WINCOG Region	19,907	10.9%	8,444	4.6%	23,860	13.0%	107,014	58.5%	9,268	5.1%	4,436	2.4%	981	0.5%	6,354	3.5%	1,883	1.0%	933	0.5%	183,080

Source: 2006 Land Cover Greater Connecticut, University of Connecticut, CLEAR; Resolution at 100 ft^2.
Data Complied and Prepared by the Windham Region Council of Governments, 2012.

WINCOG Region Land Cover Map

Figure 5



Scale: 1:240,000

October 2012

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Though the region is mainly rural, great damage could be expected in a disaster that affects the region's largely developed areas. Windham is the region's most "built-up" town at 20.6% developed. While much of Windham is very rural, the town has an urban concentration in the Willimantic area. Mansfield is the second most developed area at 14.3%. This town is also largely rural with development concentrated in the Storrs area (the vicinity of the University of Connecticut) and on the town's south- eastern border with the Town of Windham, just north of Willimantic. The degrees of development for the other towns in the region are as follows: Coventry 11.4%, Willington 10.3%, Columbia 10.0%, and Lebanon 8.0%. The extent of development in the region may be minimal, but over the years the area has experienced costly damage from numerous natural disasters.

Transportation

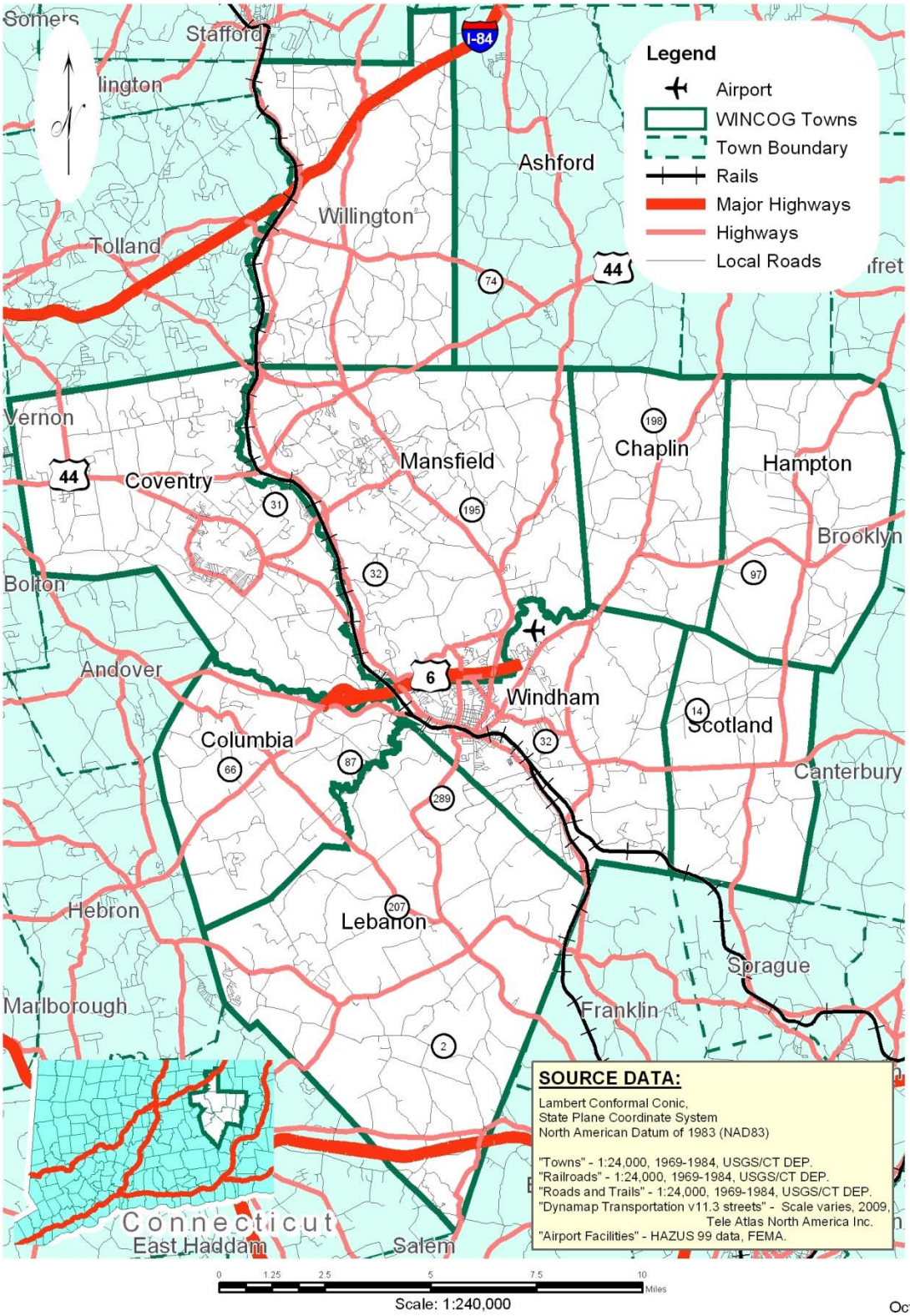
Transportation infrastructure in the region includes an interstate highway (I-84), two U.S. routes (Route 44 and Route 6), several state highways, numerous local roads, an airport and two railways (see Figure 6). All forms of transportation through the region are at risk during a disaster. In the event of a major storm, flooding of roads throughout the region may severely slow evacuation efforts. During natural disasters, airports and railways risk extensive damage as well.

The Windham Airport is located roughly in the center of the region, in the Town of Windham near its border with Mansfield. This facility would be the only airport in the region that would be at risk of being damaged. There are a few small runways and heliports through the region as well, but these are mainly out-of-use locations situated in open areas with no real property to be damaged.

The former WINCOG Region is also served by the New England Central Railroad. Running parallel to Route 32, the New England Central Railroad splits the region from the north-western corner of Mansfield down to the south-eastern corner of Windham. In the center of Windham the New England Central Railroad branches off into an unused segment of the old Providence and Worcester Railroad. This segment once ran from the southeast section of Windham to the town of Sprague connecting Willimantic with Baltic.

Figure 6

WINCOG Region Transportation Map



Scale: 1:240,000

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Demographics

According to the 2000 and 2010 Census the population in the planning region increased 13.9% over the decade, from 72,918 (2000) to 83,080 (2010) persons. The population densities and percent change from 2000 to 2010 for each town in the hazard mitigation planning region is as follows:

	Land Area	2000 Population		2010 Population		Change in Population	
	mi^2	Count	Per mi^2	Count	Per mi^2	Count	%
Columbia	21.4	04,971	232.3	05,485	256.3	514	10.3%
Coventry	37.7	11,504	305.1	12,435	329.8	0931	8.1%
Lebanon	54.1	06,907	127.7	07,308	135.1	0401	5.8%
Mansfield	44.5	20,720	465.6	26,543	596.5	5,823	28.1%
Willington	33.3	05,959	178.9	06,041	181.4	0341	5.7%
Windham	27.1	22,857	843.4	25,268	932.4	2,411	10.5%
Six-Town Planning Region	218.1	72,918	334.3	83,080	380.9	10,162	13.9%

With a 28.1% change in population, Mansfield has experienced the highest percent population growth in the region. Also, with an increase of 5,823 persons, Mansfield experienced the highest population increase. All towns within the planning region experienced population growth from 2000 to 2010.

Land Use and Developmental Trends

The former WINCOG Region is primarily rural and characterized by undeveloped forestland and low-density development. Urban concentrations are located within the Town of Windham in the district of Willimantic (home of Eastern Connecticut State University) and within the Town of Mansfield in the district of Storrs (home of the University of Connecticut). These core areas have densities ranging from 2,000 – 10,000 people per square mile. In most of the region the population density is low (70-350 people per square mile), though denser residential communities border lakes in Coventry, Columbia and Lebanon. In 2000 the regional population density was 334.3 persons per square mile. A growth in population brought the 2010 regional population density to 380.9 persons per square mile.

An increase in population across the region led to an increase in land being developed. According to the Center for Land Use Education and Research (CLEAR) at the University of Connecticut, 3,600 acres of land was developed between 1985 and 2006. More dramatically, about 6,000 acres of forestland was lost during the same period of time. Approximately 10.9% of the total area of the former WINCOG Region was developed in 2006, up from 8.9% in 1985. Concurrently, forest area dropped from 67.3% in 1985 to 64.0% in 2006.

These generalized land cover figures are collected from satellites and are known to underestimate low-density development, especially in forested areas where development is sparse or isolated, such is the case in much of the former WINCOG Region. Even with these shortcomings the data can be used to show development trends. This trend shows that population and development are increasing in the region, a trend which we expect to continue. A comparison of 1985 and 2006 land cover data for the entire former WINCOG Region can be seen in Table 2; this table includes jurisdictions that are not in this hazard mitigation planning region and is for information purposes only.

Table 2
1985-2006 Land Cover Comparison for the WINCOG Region

	Total Acreage	Developed						Forest						Agriculture & Other Grasses					
		1985			2006			1985			2006			1985			2006		
		acres	miles^2	%	acres	miles^2	%	acres	miles^2	%	acres	miles^2	%	acres	miles^2	%	acres	miles^2	%
Chaplin	12,569	803	1.25	6.4%	971	1.52	7.7%	10,104	15.79	80.4%	9,780	15.28	77.8%	722	1.13	5.7%	785	1.23	6.2%
Columbia	14,017	1,070	1.67	7.6%	1,399	2.19	10.0%	9,826	15.35	70.1%	9,343	14.60	66.7%	1,514	2.37	10.8%	1,476	2.31	10.5%
Coventry	24,507	2,255	3.52	9.2%	2,795	4.37	11.4%	16,688	26.08	68.1%	15,772	24.64	64.4%	3,345	5.23	13.6%	3,298	5.15	13.5%
Hampton	16,277	1,037	1.62	6.4%	1,166	1.82	7.2%	11,841	18.50	72.7%	11,614	18.15	71.4%	1,805	2.82	11.1%	1,824	2.85	11.2%
Lebanon	35,301	2,410	3.77	6.8%	2,822	4.41	8.0%	20,596	32.18	58.3%	19,782	30.91	56.0%	7,951	12.42	22.5%	7,681	12.00	21.8%
Mansfield	29,174	3,349	5.23	11.5%	4,185	6.54	14.3%	19,098	29.84	65.5%	17,961	28.06	61.6%	3,557	5.56	12.2%	3,483	5.44	11.9%
Scotland	11,997	641	1.00	5.3%	708	1.11	5.9%	8,495	13.27	70.8%	8,293	12.96	69.1%	2,067	3.23	17.2%	2,142	3.35	17.9%
Willington	21,465	1,775	2.77	8.3%	2,203	3.44	10.3%	16,523	25.82	77.0%	15,796	24.68	73.6%	1,301	2.03	6.1%	1,222	1.91	5.7%
Windham	17,773	2,966	4.63	16.7%	3,658	5.72	20.6%	10,030	15.67	56.4%	8,874	13.87	49.9%	1,999	3.12	11.2%	1,949	3.05	11.0%
WINCOG Region	183,080	16,306	25.48	8.9%	19,907	31.10	10.9%	123,201	192.50	67.3%	117,215	183.15	64.0%	24,261	37.91	13.3%	23,860	37.28	13.0%

	Total Acreage	Water & Wetlands						Turf & Grass						Other					
		1985			2006			1985			2006			1985			2006		
		acres	miles^2	%	acres	miles^2	%	acres	miles^2	%	acres	miles^2	%	acres	miles^2	%	acres	miles^2	%
Chaplin	12,569	690	1.08	5.5%	624	0.98	5.0%	228	0.36	1.8%	343	0.54	2.7%	21	0.03	0.2%	66	0.10	0.5%
Columbia	14,017	1,159	1.81	8.3%	1,116	1.74	8.0%	369	0.58	2.6%	622	0.97	4.4%	81	0.13	0.6%	61	0.10	0.4%
Coventry	24,507	1,146	1.79	4.7%	1,082	1.69	4.4%	975	1.52	4.0%	1,429	2.23	5.8%	96	0.15	0.4%	131	0.20	0.5%
Hampton	16,277	1,272	1.99	7.8%	1,196	1.87	7.3%	310	0.48	1.9%	423	0.66	2.6%	13	0.02	0.1%	54	0.08	0.3%
Lebanon	35,301	3,224	5.04	9.1%	3,052	4.77	8.6%	1,101	1.72	3.1%	1,845	2.88	5.2%	18	0.03	0.1%	119	0.19	0.3%
Mansfield	29,174	2,044	3.19	7.0%	1,833	2.86	6.3%	974	1.52	3.3%	1,401	2.19	4.8%	154	0.24	0.5%	311	0.49	1.1%
Scotland	11,997	550	0.86	4.6%	514	0.80	4.3%	237	0.37	2.0%	306	0.48	2.6%	8	0.01	0.1%	34	0.05	0.3%
Willington	21,465	1,157	1.81	5.4%	1,088	1.70	5.1%	510	0.80	2.4%	788	1.23	3.7%	202	0.32	0.9%	368	0.58	1.7%
Windham	17,773	1,380	2.16	7.8%	1,266	1.98	7.1%	1,060	1.66	6.0%	1,287	2.01	7.2%	336	0.53	1.9%	739	1.15	4.2%
WINCOG Region	183,080	12,622	19.72	6.9%	11,771	18.39	6.4%	5,764	9.01	3.1%	8,444	13.19	4.6%	929	1.45	0.5%	1,883	2.94	1.0%

Source: 1985 and 2006 Land Cover, University of Connecticut, CLEAR; Resolution at 100 ft^2
Data Complied and Prepared by the Windham Region Council of Governments, 2012

B. Identification of Regional Hazards: Risk, Vulnerability and Existing Mitigation Tools:

The natural hazards addressed in the initial Plan were selected based upon their overall frequencies and potential impacts. WINCOG staff reviewed several Federal Emergency Management Agency (FEMA) guidebooks on writing a Pre-Disaster Mitigation Plan and corresponded with the Connecticut State National Flood Insurance Program (NFIP) Coordinator, Diane Ifkovic, to develop a list of natural hazards for consideration by the Regional Emergency Planning Workgroup. The list of natural hazards was derived from a planning worksheet found in the *State and Local Mitigation Planning how-to guide: Understanding Your Risks, identifying hazards and estimating losses*, Section 1-2.

Several hazards that affect the State of Connecticut hit on such a large scale that they would affect all nine towns in the region similarly: droughts, earthquakes, hurricanes, severe winter weather, and some thunderstorms. Some natural hazards hit on a smaller scale, but a town's positioning in the region would make no difference to its susceptibility: tornadoes and wind damage and wildfires. These hazards as well as ice jams are examined on a regional level in this section of the document because the probability of an occurrence is uniform throughout the region. Though ice jams will not affect all areas in the region the same, they could potentially occur anywhere in the region where there is a waterway. An ice jam could then cause flood damage in areas other than where the jam originates.

Because dam failure hazards and flooding damage are specific to each town, these hazards are looked at by town in Section III of this document. There is only one severe repetitive loss (SRL) property in the region and it was mitigated so SRL was not examined in the initial plan. Updated information regarding repetitive loss properties is provided within each town assessment in this plan update.

The State of Connecticut has received eight disaster declarations since the initial plan was developed as presented in the table below. Many of these declarations included one or more of the former WINCOG communities. Severe winter storms, hurricanes and tropical storms, and nor'easters contributed to the disaster declarations.

Disaster Number	Event Date	Incident Description	Counties Designated	Federal Aid Programs
4213	Jan. 26-28, 2015	Severe Winter Storm and Snowstorm	New London, Tolland, Windham	Public Assistance
4106	Feb. 8-12, 2013	Severe Winter Storm and Snowstorm "Nemo"	New London, Tolland, Windham	Public Assistance
4087	Oct. 27-Nov. 8, 2012	Hurricane Sandy	New London, Tolland, Windham	Public Assistance, Individual Assistance (New London only)
4046	Oct. 29-30, 2011	Severe Storm "Alfred"	Tolland, Windham	Public Assistance
4023	Aug. 27-Sep. 1, 2011	Tropical Storm Irene	New London, Tolland, Windham	Individual Assistance and Public Assistance
1958	Jan. 11-12, 2011	Snowstorm	New London, Tolland	Public Assistance
1904	Mar. 12-May 17, 2010	Severe Storms and Flooding	New London	Public Assistance
1700	Apr. 15-27, 2007	Severe Storms and Flooding	New London, Windham	Public Assistance and Individual Assistance

The 2014 Connecticut Natural Hazard Mitigation Plan Update includes a risk assessment of thunderstorm related hazards (wind, hail, lightning); tropical cyclones (hurricanes and tropical storms); tornadoes; winter-related hazards (blizzards, freezing rain, ice storm, nor'easters, sleet, snow, and winter storms); flood-related hazards (riverine, coastal, flash, and shallow flooding); sea level rise; dam failure; wildland fires, drought related hazards; and earthquakes. The only hazards that are in the State Plan Update that are not in this

Plan Update are those related to coastal hazards (coastal flooding and sea level rise) because the former WINCOG community is made up of inland communities that are not affected by these hazards.

Avalanches, coastal erosion, coastal storms, expansive soils, extreme heat, land subsidence, landslides, tsunamis, and volcanoes are not a concern in the region and were not examined in depth in the initial plan. Nevertheless, brief descriptions are provided below.

Avalanches

Risks, Vulnerability & Existing Mitigation Tools:

An avalanche is a sudden movement of a large mass of snow or ice down a slope commonly exceeding 30 degrees. Snow avalanches have not occurred in the State of Connecticut in modern times. Due to the lack of historical occurrences, avalanches will not be discussed in this plan.

Coastal Erosion and Sea Level Rise

Risks, Vulnerability & Existing Mitigation Tools:

The former WINCOG Region contains all inland towns. Due to the lack of coastal property, coastal erosion is not a factor in the region and will not be discussed in this plan.

Coastal Storms

Risks, Vulnerability & Existing Mitigation Tools:

The former WINCOG Region contains all inland towns. Due to the lack of coastal property, coastal storms are not a factor in the region and will not be discussed in this plan.

Dam Failures

Risks, Vulnerability & Existing Mitigation Tools:

The Dam Safety Section of the DEEP helps to promote structurally sound dams to help reduce, and where possible eliminate, potential hazards. Because of the possible severity of damages caused by a dam failure, the Commissioner of the DEEP or his representative may inspect or investigate any dam at any time.

Because of the inevitable risk of disasters such as hurricanes, flooding, ice jams and tornadoes (any of which may exploit weakness in these structures or cause the failure of even a well-built dam), emergency procedures are put in place for dams deemed the greatest risks.

Important dam safety program changes are underway in Connecticut. Public Act No. 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.

Emergency Operations Plans (EOPs) or Emergency Action Plans (EAPs) are used in the event of a breach to reduce damage and loss of life by having a set plan of response for the event. All Class C (high hazard) dams and several Class B (significant hazard) dams have these EOPs/EAPs. These plans are kept on hand by the maintainers of the dam and the personnel in the Dam Safety Section of the DEEP, and are to be followed during an emergency. These plans include vital information such as: contact individuals, procedures of response, inundation areas (areas to be affected), and structural and impoundment information (size of the structure, water being impounded). Guidelines for dam EOPs were published by DEEP in 2012, creating a uniform approach for development of EOPs.

Effective October 1, 2013, the owner of any high or significant hazard dam (Class B and Class C) must develop and implement an Emergency Action Plan (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. The regulations established 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.

As dam owners develop EAPs using the new guidance, DEEP anticipates that the quality of EAPs will improve, which will ultimately help reduce vulnerabilities to dam failures. Additional information on the risk and vulnerability of dam failures will be looked at on a town level and may be found in the town assessment section of this plan.

The CT DEEP also administers the Flood and Erosion Control Board program, which can provide noncompetitive state funding for repair of municipality-owned dams. Funding is limited by the State Bond Commission. State statute Section 25-84 allows municipalities to form Flood and Erosion Control Boards, but municipalities must take action to create the board within the context of the local government such as by revising the municipal charter.

In many cases (particularly for small towns), a Town's Flood and Erosion Control Board is the Board of Selectmen.

Drought

Risks (Extent):

Though Connecticut has a relatively even distribution of precipitation throughout the year, both agricultural and meteorological droughts periodically occur. An agriculture drought is determined when the hydration needs of crops are not being sustained by the soil. A meteorological drought is caused by a lack of precipitation. In a meteorological drought the presence of rainfall becomes scarce, causing streams, reservoirs and groundwater to suffer. When the supply of water cannot meet the demands of the community, water utilities can be forced to set restrictions on water usage. Wildfires are another concern during times of drought. Although Connecticut does not experience wildfires to the extent seen in the west, small underbrush fires as well as ground fires are potential hazards to be aware of during periods of drought.

Both types of drought have historically affected the state. Serious meteorological droughts were recorded from June 1929 through July 1932. The 1957 drought was both an agricultural and meteorological drought for the state; however, its largest impact was on crops. In the 1960's Connecticut experienced record meteorological droughts causing water shortages throughout the state. Exceptional precipitation in the 1970's caused misjudgment in water allocations by some water suppliers. This over-distribution of water supplies, combined with below normal rainfall, led to water shortages in 1980 and 1981. In 1987, 2002, 2007-2008, and 2012, Connecticut also experienced drought conditions. Drought is relatively infrequent in Connecticut. When it does occur however, it can be hazardous.

Vulnerability (Location, Impact) & Mitigation Tools:

The region displays an equal vulnerability overall because of the scale and unpredictability of droughts. The 2014 Connecticut Natural Hazard Mitigation Plan Update indicates that Connecticut has a medium-high probability of future drought events. The State of Connecticut maintains a website at http://www.ct.gov/waterstatus that provides links to streamflow, groundwater, precipitation, the Palmer Drought Index, the Crop Moisture Index, the Daily Forest Fire Danger Report provided by the Connecticut DEEP, and statewide reservoir capacity data. As such, State officials are well-positioned to track the occurrence of droughts in Connecticut and assist local communities.

The Forestry Division at the DEEP keeps watch over areas exhibiting below normal precipitation, because of their increased risk of fires in times of drought. As a planning mitigation effort, developed after the 2002 drought that affected the state, the National Drought Mitigation Center through an Interagency Drought Work Group wrote the

"Connecticut Drought Preparedness and Response Plan". The purpose of this plan is to help assess and reduce the impact a drought has over an area by conserving essential water use during water shortages. These two mitigation practices may make the difference in the severity of a period of drought across the region.

Earthquakes

Risks (Extent):

Earthquakes occur as the ground moves along fault lines causing the Earth's crust to shift and shake. Faults, caused by stress, are cracks which cut rock layers in the earth's crust. These cracks allow the blocks of rock on either side of them to move separately and create a disruption in the otherwise horizontal rock time line. The probability of an earthquake along a fault is generally determined by how recently the fault last moved. When determining if an earthquake is a hazard in an area, faults active as far back as the Late Quaternary (10,000 – 700,000 years before present) are of most concern.

The faults within the WINCOG Region are mainly Devonian (417-354 million years ago) or Ordovician (490-443 million years ago) in age, but this doesn't discount the possibility of them being a threat. Some earthquakes occur in areas where no faults are directly associated with these events. New London and Windham Counties are considered to have a low earthquake hazard ranking according to the 2014 Connecticut Natural Hazard Mitigation Plan Update, and Tolland is considered to have a medium-low earthquake hazard ranking.

Earthquake occurrences are classified based on their magnitude and intensity. Magnitude is frequently measured by the Richter scale which classifies earthquakes based on instrumental calculations. Intensity is frequently measured by the Modified Mercalli scale which classifies earthquakes based on observable information such as ground movement and property damage. Table 3 gives a fair conversion for the Richter and Modified Mercalli scales.

Earthquakes have occurred in all parts of Connecticut. Over the last 400 years there have been more than 125 in the state with magnitudes of 3.0 or greater on the Richter scale. The oldest seismic activity recorded in the United States dates back to 1568 in Moodus, Connecticut. According to the 2014 Connecticut Natural Hazard Mitigation Plan Update, Connecticut experiences less than one earthquake event per year and "may be categorized as having a low or moderate risk for an earthquake greater than or equal to 3.5 occurring in the future and a moderate risk of an earthquake less than 3.0 occurring in the future."

Earthquake Magnitude and Intensity Scale — Table 3

Magnitude and Intensity measure different characteristics of earthquakes. Magnitude measures the energy released at the source of the earthquake. Magnitude is determined from measurements on seismographs. Intensity measures the strength of shaking produced by the earthquake at a certain location. Intensity is determined from effects on people, human structures, and the natural environment.

The following table gives intensities that are typically observed at locations near the epicenter of earthquakes of different magnitudes.

Magnitude (Richter)	Intensity (Mercalli)		Description
0.0 - 3.0	I	I.	Not felt except by a very few under especially favorable conditions.
3.0 – 3.9	II – III	II.	Felt only by a few persons at rest, especially on upper floors of buildings.
		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. Vibrations similar to the passing of a truck. Duration estimated.
4.0 – 4.9	IV – V	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, windows broken. Unstable objects overturned. Pendulum clocks may stop.
5.0 – 5.9	VI – VII	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.
6.0 – 6.9	VII – X	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.
7.0 +	VIII +	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 distorted. Objects thrown into the air.

Source: U.S. Department of the Interior, U.S. Geological Survey, Magnitude/Intensity Comparison. 2002.

The U.S. Geological Survey's (USGS's) National Seismic Hazard Maps measure the risk of an earthquake of a given severity occurring in an area by the area's peak ground acceleration (PGA). PGA is a measure of horizontal change in movement on the earth's surface relative to the rate of acceleration due to gravity (%g) (980 cm/sec/sec). Figure 7 shows the PGA for the former WINCOG Region. The PGA can be converted to the Modified Mercalli Intensity scale, which is a commonly known earthquake intensity scale. This area has a 10% chance in the next 50 years of an earthquake with a PGA of 3-4 (%g) hitting the region. A PGA of 3-4 (%g) can be converted to an intensity of IV to V on the Modified Mercalli scale. At this intensity ground shaking will be perceived as light to moderate, and damage (if any) may be very light. The area also has a 5% chance in the next 50 years of an earthquake with a PGA of 6-7 (%g) and a 2% chance in the next 50 years of an earthquake with a PGA of 12-14 (%g).

Vulnerability (Location, Impact):

The unpredictability of where these events will occur and the variety in their radii of destruction results in an overall assessment of vulnerability that is uniform across the region. Severe earthquakes hit the region infrequently, but they can occur. In contrast to the geology on the west coast, the hard solid bedrock in New England amplifies the area affected by these events.

Weak earthquakes threaten Connecticut yearly, but because of their minimal magnitude and the lack of damage they cause, building codes in Connecticut don't require all structures to meet earthquake standards. When a damaging earthquake does hit, towns are at risk of greater damage because of less stable constructions. Most at risk are buildings without reinforced masonry, which are built on unstable soil, such as on a landfill.

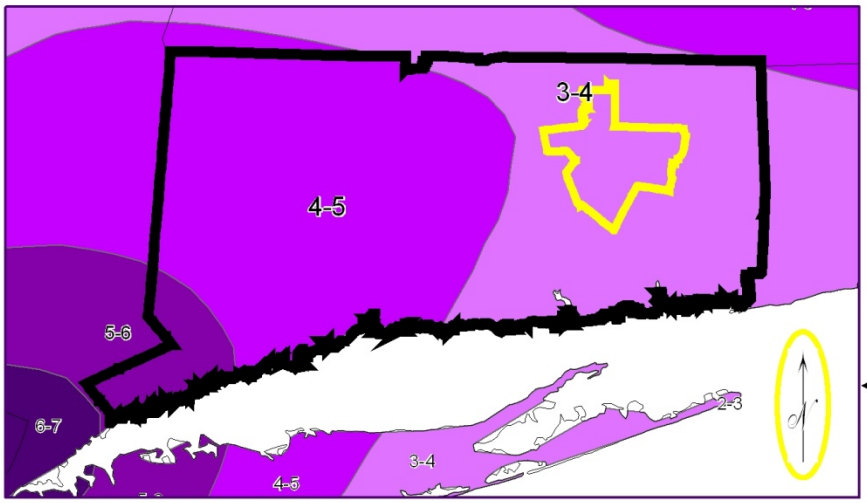
Connecticut has not experienced a magnitude 3.5 earthquake or greater over the last 30 years according to the 2014 Connecticut Natural Hazard Mitigation Plan Update. Though an event at this magnitude would be felt, property damage is not likely to occur with an event under magnitude 5.0. The most severe earthquakes Connecticut experiences are magnitude 6.0 events, occurring approximately once every 300 years. Such a disaster could cause considerable damage to even substantial buildings, while poorly built structures could suffer much damage with events of less magnitude.

At the State level, Connecticut DOT has indicated that one of its long-term goals is to design and retrofit earthquake resistant roads and bridges. The Connecticut Building Codes include design criteria for buildings specific to each municipality as adopted by the Building Officials and Code Administrators (BOCA). These include the seismic coefficients for building design in the former WINCOG communities. All towns have adopted these codes for new construction, and they are enforced by local Building Officials.

Figure 7

Earthquake Risk Map

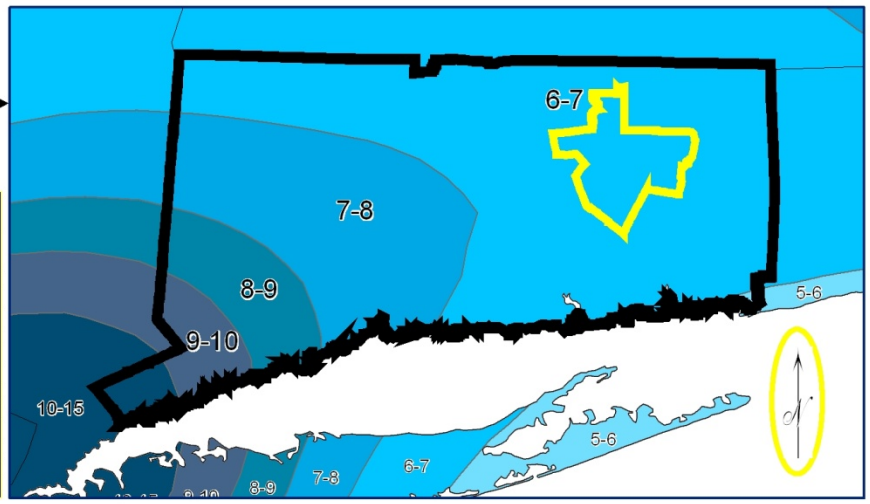
Peak Ground Acceleration (%g)



Peak Ground Acceleration (PGA) is a measure of the strength of ground movements. The PGA measures the rate in change of motion relative to the established rate of acceleration due to gravity (g) (980 cm/sec/sec). PGA with % probability of exceedance in 50 years is a common earthquake measurement that shows three things: the geographic area affected, the probability of an earthquake of each given level of severity (% chance in 50-years), and the severity (the PGA).

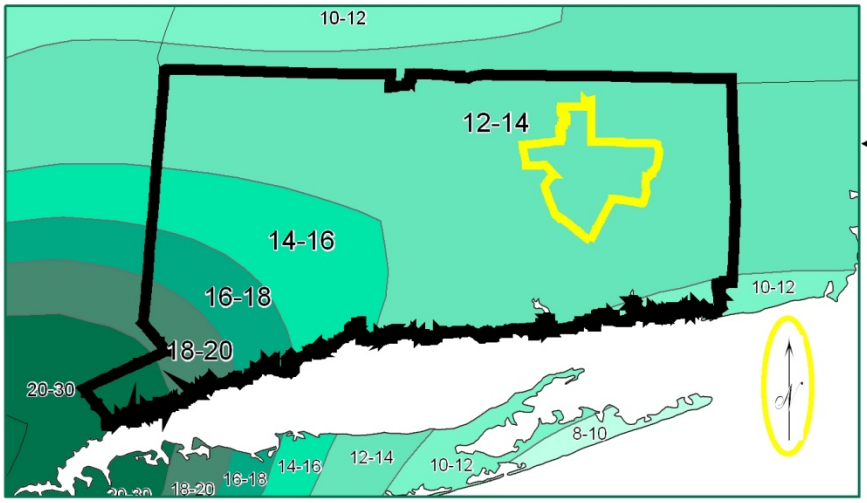
Peak Ground Acceleration (%g) Expected at 10% Probability of Exceedance in 50 years.

Peak Ground Acceleration (%g) Expected at 5% Probability of Exceedance in 50 years.



Modified Mercalli Intensity (MMI) and Peak Ground Acceleration (PGA) Equivalents.

MMI	Acceleration (%g) (PGA)	Perceived Shaking	Potential Damage
I	< 0.17	Not Felt	None
II	0.17 - 1.4	Weak	None
III	0.17 - 1.4	Weak	None
IV	1.4 - 3.9	Light	None
V	3.9 - 9.2	Moderate	Very Light
VI	9.2 - 18	Strong	Light
VII	18 - 34	Very Strong	Moderate
VIII	34 - 65	Severe	Moderate to Heavy
IX	65 - 124	Violent	Heavy
X	> 124	Extreme	Very Heavy
XI	> 124	Extreme	Very Heavy
XII	> 124	Extreme	Very Heavy



Peak Ground Acceleration (%g) Expected at 2% Probability of Exceedance in 50 years.

SOURCE DATA:

Lambert Conformal Conic,
State Plane Coordinate System
North American Datum of 1983 (NAD83)

"Towns" - 1:24,000, 1969-1984, USGS/CT DEP.
"Counties" - 1:250,000, 1986, CT DEP.
"National Seismic Hazard Maps" - 1996, USGS.
- eqmaps.cr.usgs.gov/website/nshmp/viewer.htm
"Understanding Your Risks" - 2001, FEMA, Ch. 2, p. 2-15 and 3-21.

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Due to the infrequent nature of damaging earthquakes, land use policies in most communities in Connecticut do not directly address earthquake hazards. Mitigation efforts for structures will be assessed while keeping in mind the lengthy reoccurrence interval for damaging events.

Expansive Soils

Risks, Vulnerability & Existing Mitigation Tools:

Expansive soils occur in areas where the "soils shrink when dry and swell when wet". These "high shrink" soils are not found in the State of Connecticut and therefore will not be discussed in this plan.

Extreme Heat (heat wave)

Risks, Vulnerability & Existing Mitigation Tools:

The definition of extreme heat can vary by location. Extreme heat as defined by FEMA is an event where temperatures hover 10 degrees or more above the average high temperature for the region and last for several weeks. The unofficial definition of a heat wave for the State of Connecticut as defined by the DEEP is an event where temperatures exceed 90 degrees Fahrenheit for a minimum of three consecutive days. In the summer of 1999, according to the NCDC, Connecticut had a string of 3-5 consecutive days over 100 degrees, making it the most severe recorded heat wave. In the last ten years NOAA has only one recorded heat related fatality in the state. Due to the limited extent that extreme heat has historically affected individuals in Connecticut, this issue will not be discussed in any further detail in this plan.

Hurricanes

Risks (Extent, Location):

In the North Atlantic substantial tropical storms with winds over 74 miles per hour (119 kilometers per hour or 64 knots) are termed hurricanes. These events threaten moderate to complete damage from harsh winds and flooding rains along the Atlantic coast annually from June 1 through December 1. Hurricanes originate close to the equator in low pressure areas, strengthen over the ocean as they travel in a northwest, north or northeast direction toward land and subsequently deteriorate as they travel inland. Anticipated property damage and casualties are determined based on the Saffir-Simpson Hurricane Scale, which measures the intensity of hurricanes corresponding to their destructive wind speeds (see Table 4).

THE SAFFIR-SIMPSON HURRICANE SCALE

Table 4

The Saffir-Simpson Hurricane Scale is a 1-5 rating based on the hurricane's present intensity. This is used to give an estimate of the potential property damage and flooding expected along the coast from a hurricane landfall. Wind speed is the determining factor in the scale, as storm surge values are highly dependent on the slope of the continental shelf in the landfall region. Note that all winds are using the U.S. 1-minute average.

Category One Hurricane:

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

Category Two Hurricane:

Winds 96-110 mph (83-95 kt or 154-177 kph). Storm surge generally 6-8 feet above normal. Some roofing material, door, and window damage of buildings. Considerable damage to shrubbery and trees with some trees blown down. Considerable damage to mobile homes, poorly constructed signs, and piers. Coastal and low-lying escape routes flood 2-4 hours before arrival of the hurricane center. Small craft in unprotected anchorages break moorings.

Category Three Hurricane:

Winds 111-130 mph (96-113 kt or 178-209 kph). Storm surge generally 9-12 ft above normal. Some structural damage to small residences and utility buildings with a minor amount of curtainwall failures. Damage to shrubbery and trees with foliage blown off trees and large tress blown down. Mobile homes and poorly constructed signs are destroyed. Low-lying escape routes are cut by rising water 3-5 hours before arrival of the hurricane center. Flooding near the coast destroys smaller structures with larger structures damaged by battering of floating debris. Terrain continuously lower than 5 ft above mean sea level may be flooded inland 8 miles (13 km) or more. Evacuation of low-lying residences with several blocks of the shoreline may be required.

Category Four Hurricane:

Winds 131-155 mph (114-135 kt or 210-249 kph). Storm surge generally 13-18 ft above normal. More extensive curtainwall failures with some complete roof structure failures on small residences. Shrubs, trees, and all signs are blown down. Complete destruction of mobile homes. Extensive damage to doors and windows. Low-lying escape routes may be cut by rising water 3-5 hours before arrival of the hurricane center. Major damage to lower floors of structures near the shore. Terrain lower than 10 ft above sea level may be flooded requiring massive evacuation of residential areas as far inland as 6 miles (10 km).

Category Five Hurricane:

Winds greater than 155 mph (135 kt or 249 kph). Storm surge generally greater than 18 ft above normal. Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. All shrubs, trees, and signs blown down. Complete destruction of mobile homes. Severe and extensive window and door damage. Low-lying escape routes are cut by rising water 3-5 hours before arrival of the hurricane center. Major damage to lower floors of all structures located less than 15 ft above sea level and within 500 yards of the shoreline. Massive evacuation of residential areas on low ground within 5-10 miles (8-16 km) of the shoreline may be required.

Source: *Connecticut Hazard Mitigation Section 322 Plan*. Connecticut Department of Environmental Protection, 2004

Connecticut has suffered damages caused by hurricanes measuring up to Category III on the Saffir-Simpson Hurricane Scale (see Figure 8). The Hurricane of 1938 was recorded as a Category III event. On September 21, 1938, 130 mph winds and extreme flooding contributed to the deaths of 125 persons and an estimated $53 million (1938 dollars) in damages across the state. Heavy structural damages and agricultural losses were also sustained.

September 14-15, 1944, Connecticut was widely devastated by yet another Category III hurricane. The Hurricane of 1944 brought with it the deaths of seven persons and damages ranging from $3-5 million (1944 dollars) across the state. Compared to the 1938 hurricane, the Hurricane of 1944 was much less damaging to individuals and property. Damage and destruction was more limited in 1944 because of both additional warning time and a lack of rebuilding in damage-prone areas after the 1938 hurricane.

Direct and indirect hurricane events in the 1950s inflicted an array of damages across the state. Hurricane Carol hit Connecticut on August 31, 1954, causing property damage over $53 million (1954 dollars). August 12-19, 1955, the outskirts of Hurricanes Connie and Diane led to flooding, loss of power and loss of communication networks across the state, as well as the deaths of 70 persons and injuries to some 4,700 persons. From October 15 to 17 that same year, more rain brought with it the flooding and the deaths of 23 persons. Total damages in Connecticut from the August and October events in 1955 were estimated at one billion dollars (1955 dollars).

The 1960's and 1970's brought minor damage to the state from hurricanes "Donna", Agnes and Belle. Donna wreaked havoc on Florida and North Carolina before hitting Connecticut on September 12, 1960, as a Category III hurricane. Agnes caused damage and flooding in Connecticut on June 22-25, 1972, after making landfall as a Category I hurricane. Category I hurricane Belle on August 10, 1976, caused minor damages and the deaths of five persons.

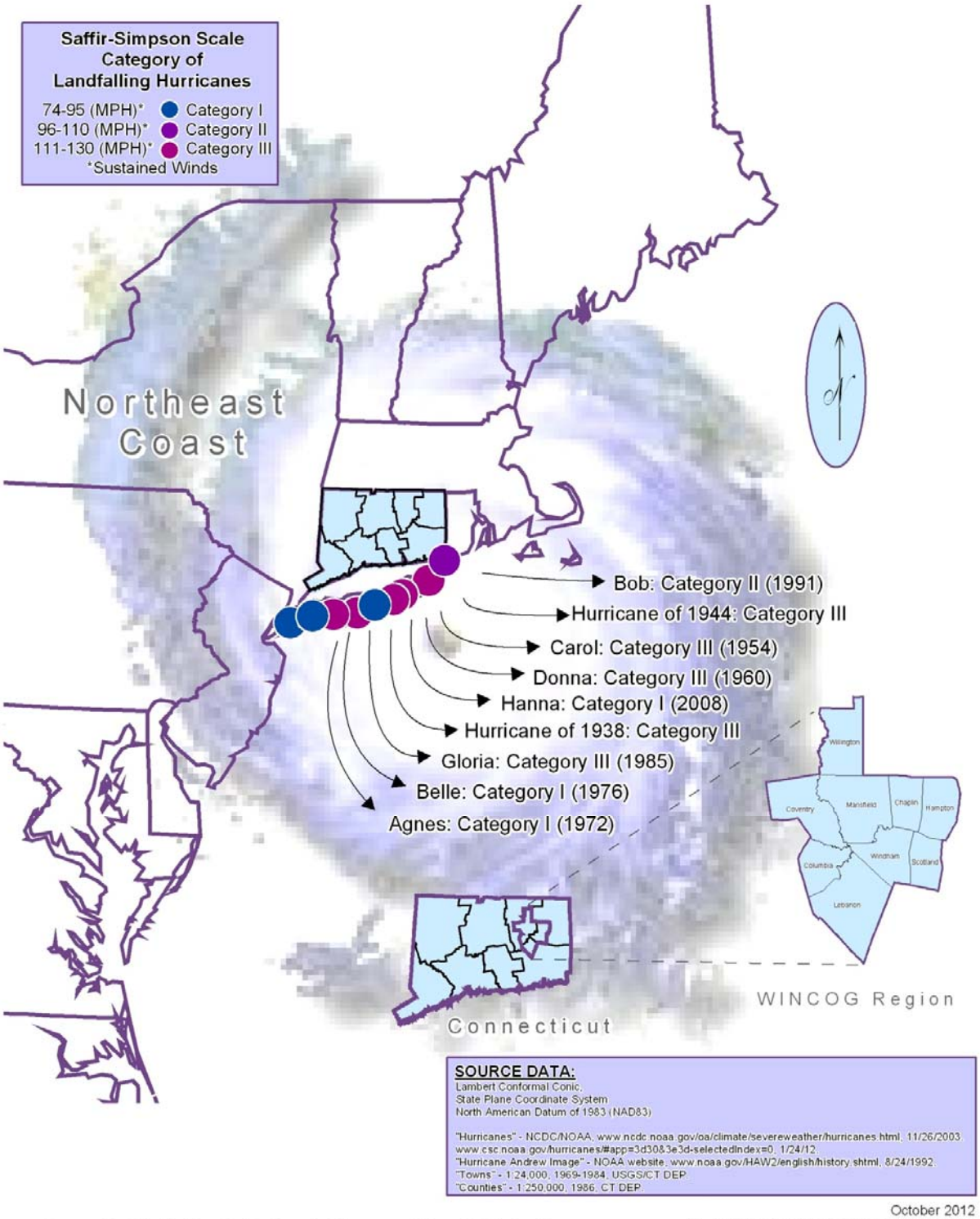
The last Category III hurricane to hit Connecticut was on September 27, 1985. Hurricane Gloria brought very little rain, but forceful winds downed thousands of trees, caused minor damages to structures and caused power outages throughout the state.

Hurricanes Bob and Grace hit Connecticut in 1991. On August 19, 1991 Bob caused minor flooding and moderate damage to trees in the state. On October 30 that same year, Connecticut sustained minor damages from the outskirts of hurricane Grace.

In August 2011, Hurricane Irene (then a tropical storm) struck Connecticut and left 500,000 customers without power for an extended time. According to the 2014 Connecticut Natural Hazard Mitigation Plan Update, "2-3 percent of trees within 50 feet of the centerline of state roads were felled by the storm" and the storm caused over $10 million in fiscal impacts to State infrastructure.

Hurricanes in Connecticut From 1901 - 2011

Figure 8



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The 2014 Connecticut Natural Hazard Mitigation Plan Update states that: "Hurricanes have the greatest destructive potential of all natural disasters in Connecticut, due to the potential combination of high winds, heavy rain, and flooding which can accompany this hazard." Hurricanes are a frequent yet unpredictable occurrence in the state. Moderate to heavy damages can be expected roughly once every ten years, however knowing when, where, at what intensity and for how long a hurricane will wreak havoc is hard to determine. However, the 2014 Connecticut Natural Hazard Mitigation Plan Update estimates that the return period for a hurricane to strike eastern Connecticut is 17, 39, and 70 years for Category I, II, and III hurricanes, respectively.

Vulnerability (Impact) and Mitigation Tools:

Damage from a hurricane is great no matter what category event occurs. High winds, flooding and periodic tornadoes cause most of the damage and destruction from these storms. Because of the region's inland position, the storm surges which accompany hurricanes are not a concern for the area. Vulnerable areas throughout the region include flood-prone areas and unstable constructions such as manufactured homes and buildings with weak foundations. Flood-prone areas are specific by town and are areas of concern during hurricanes. Town vulnerability to flooding will be consistent with information provided later in the town assessment section of this plan. Tornadoes and wind damage can be looked at as a separate natural hazard, and vulnerable areas for these hazards will also be looked at in greater depth in the town assessment section of this plan.

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, and subsequently amended to adopt the 2009 International Residential Code effective February 28, 2014. The code specifies the design wind speed for construction in all the Connecticut municipalities. All of the former WINCOG communities have adopted the Connecticut Building Code as its building code.

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

<u>Ice Jams</u>

Risks (Location, Extent):

Ice jams form as freezing temperatures rise and frozen rivers are sent into a rapid thaw, such as during a mid-winter warm-up, early spring or during a period of heavy rain. Ice-covered water begins to rise causing the ice coating to break apart and flow in large chunks downstream. As these chunks encounter narrow passages or other obstructions, the ice

mounds form an ice jam. When ice jams restrict the flow of water, flooding may occur. Ice jams forming near bridges and dams can compromise these structures, making them at risk of failure and thus of causing further damages.

The climate in the former WINCOG Region brings the threat of ice jams to the Hop River, Shetucket River, and especially the Willimantic River. The Hop River has experienced ice jams to some degree in Columbia (March 5, 1934, February 27, 1945 and February 20, 1948); the Shetucket River has experienced ice jams in Willimantic (March 7, 1920, December 26, 1945 and February 4, 1970); and the Willimantic River has also experienced ice jams in Columbia (March 12, 1936) and in South Coventry (December 26, 1945). According to Appendix 2 of the 2014 Connecticut Natural Hazard Mitigation Plan Update the Willimantic River in Mansfield is susceptible to ice jams as well. A severe ice jam can cause major flooding damage to an area, and the risk of such an event is present in the region.

Vulnerability (Impact) and Mitigation Efforts:

The biggest hazard during an ice jam is flooding to businesses and homes along rivers and streams in flood risk zones. Flood vulnerability is specific by town and will be examined later in the town assessment section of this plan.

The Connecticut DEEP monitors the occurrence of ice jams throughout the state. According to the 2014 Natural Hazard Mitigation Plan Update, ice jams are relatively infrequent. Ice jam flooding has not occurred since 2010.

Land Subsidence

Risks, Vulnerability & Existing Mitigation Tools:

Land subsidence occurs in areas where land is partially held up by water and actually collapses onto itself when large amounts of water are withdrawn. Connecticut experiences some problems with land subsidence in areas where there have been underground mines, such as in Cheshire, but this is not a problem in this region and therefore will not be discussed in this plan.

Landslide

Risks, Vulnerability & Existing Mitigation Tools:

A landslide occurs when a section of land at a higher elevation, such as a mountainside or cliff, breaks off the greater mass and descends suddenly. Connecticut's lack of elevation and overall vegetation make landslides uncommon. When they do occur, it is on a small scale and more common in areas where vegetation has been disrupted, such as at a construction site. Except where man has intervened, landslides have not occurred in the

State of Connecticut in modern time. Due to the lack of natural historic occurrences in modern times, landslides will not be discussed in any further detail in this plan.

Severe Winter Storms

Risks (Extent):

The three different forms of severe winter storms which hit Connecticut are blizzards, ice storms and nor'easters. Blizzards are winter storms which bring with them sustained 35 mile per hour winds or greater, heavy snow which lasts for at least an hour, and temperatures of 20 degrees Fahrenheit or below. During severe blizzards, a minimum of 45 mile per hour winds are required with ten degree Fahrenheit or colder temperatures. Ice storms bring rain which freezes on contact with surfaces that are below 32 degrees Fahrenheit. Major ice storms require 28 degree Fahrenheit or colder temperatures for over 12 hours, accumulating over a ½ inch of rain. Nor'easters are very large storm systems which travel in a counterclockwise cyclone motion and exhibit strong northeast winds which can meet and exceed that of a hurricane force. All three storms can be very destructive and very deadly.

Severe Nor'easters occur one to two times annually, while winter storms in general occur several times a year in New England, typically between November 1 and April 1. These winter storms threaten to inflict injuries and casualties to persons and animals; devastate trees and vegetation; damage infrastructures; cause power outages; hinder transportation with traffic jams, accidents and gridlocks throughout affected areas; and, when extreme, can ultimately shut down the state.

Connecticut has an extensive history of winter storms as far back as recorded time. The Blizzard of 1888 (March 11-14, 1888) brought over 50 inches of snow to some areas in Connecticut and is frequently documented as the most notable winter storm of all time. Ice storm "Felix" (December 10-13, 1973) was considered Connecticut's most severe ice storm according to the 2014 Connecticut Natural Hazard Mitigation Plan Update. This disaster contributed to the deaths of two persons as well as widespread power outages across the state. The Nor'easter of 1992 (December 12-13, 1992) was devastating as well during its several day duration. In Connecticut alone 50,000 homes lost power, over six thousand homes were damaged and 26 were completely destroyed causing damages in the state of over $4.3 million (1992 dollars). With winds reaching 55 miles per hour and snow accumulating up to four feet in parts of the state, this storm led to the deaths of three persons in Connecticut. Other notable winter storms have occurred in 1934, 1978, 1983, 1993, 1996, 2001, 2003 and 2004.

Most recently, four storms were severe enough to warrant federal disaster declarations. An October nor'easter in 2011 dropped 6 - 10 inches of wet snow on foliated trees, breaking branches and downing trees and wires, and resulting in widespread power outages that lasted up to 10 days. The winter of 2011-2012 was also very severe, with over 70 inches of

snowpack occurring in some parts of Connecticut. A severe winter storm in January 2013 and a severe winter storm in January 2015 also caused significant disruption.

Vulnerability (Location, Impact) and Mitigation Efforts:

Winter storms of varying scopes threaten all towns within the former WINCOG Region numerous times a year. Though snowfall accumulations increase slightly across the area with averages of just under 40 inches at the southern tip to almost 60 inches in the northwest corner, the region experiences a uniform vulnerability overall. Partially because of their long duration of twelve hours to three days, winter storms are capable of causing more damage than hurricanes, which tend to subside after just six to twelve hours of devastation.

The region's inland position may provide a buffer from storm surges which pound the coast, but mixed precipitation with freezing temperatures alone pose a severe hazard in the area. Slippery snow- and ice-covered roads, with or without reduced visibility from falling precipitation, contribute to transportation accidents, which cause the majority of deaths during winter storms. Traffic jams, accidents and gridlocks slow transportation hindering cleanup efforts and emergency response personnel. A large enough storm event may require the closing down of the state to avoid further accidents and to allow for snow removal.

During winter weather, power outages are another common disruption. Because they force individuals to use alternative heat and light sources such as portable heaters, gas stoves and candles, power outages during these events increase the risk of fires. Fires during severe winter storms create more of a hazard then during other times of the year because of the threat of freezing water sources.

Severe winter storms can bring a variety of damages to the whole region as they threaten life and property. Early warning systems help to determine the track of winter storm systems and how much of what type of precipitation can be expected. To some extent, meteorologists are capable of predicting the severity of an event and where it will hit. Knowing what to expect, in turn, helps schools and businesses decide when to close, helps individuals decide when it's best to stay off the roads, and helps towns decide when to plan for snow removal efforts.

The amended Connecticut Building Code specifies that a pressure of 40 pounds per square foot (psf) be used as the base "ground snow load" for computing snow loading for different types of roofs. The International Building code specifies the same pressure for habitable attics and sleeping areas, and specifies a minimum pressure of 35 psf for all other areas.

Thunderstorms

Risks (Extent):

Thunderstorms hit Connecticut repeatedly each year, sometimes causing damage from fires caused by lightning, direct lightning strikes, hail, tornadoes, powerful straight-line winds, and heavy rains that produce flash flooding. Thunderstorms may not be a major disaster by themselves, but they have been known to cause major disasters and therefore are a concern in the region.

Vulnerability (Location, Impact):

Every town in the region experiences several thunderstorms each year. These events can become serious when they cause another natural disaster, such as flooding, fires or tornadoes. Warning systems have been put in place to help alert individuals of flooding, the possibility of a tornado and when driving conditions will become hazardous. We have no way of determining exactly where lightning will strike or when and where a tornado will occur; this limits possible mitigation efforts to reduce damage caused by these hazards. Flooding is specific by town and will be examined in the town assessment section of this plan.

Tornado/Wind Damage

Risks (Extent):

A tornado is a forceful windstorm recognized best by its rotating funnel-shape clouds which descend from the sky. These whirlwinds are often produced by thunderstorms and hurricanes and occur most frequently between March and August, although they can occur all year around. Flash flooding, high wind velocity, large, lightening, and blown debris can often accompany these events. Though tornadoes usually touch ground for less than 20 minutes, they have been known to stay grounded over two hours with destruction ranging from light to complete obliteration.

The historical Fujita Scale (see Table 5) and the now utilized Enhanced Fujita Scale (see table below for comparison) measure the severity rating of a tornado as is determined by the property damages and casualties it causes. Though tornadoes are more centralized than hurricanes the destruction they cause may be much more severe.

THE FUJITA TORNADO SCALE — Table 5

The Fujita Tornado Scale is a six-category scale to classify U.S. tornadoes into six intensity categories, named F0-F5. These categories are based upon the estimated maximum winds occurring within the funnel. The Fujita Tornado Scale (or the "F Scale") has subsequently become the definitive scale for estimating wind speeds within tornadoes based upon the damage done to buildings and structures. Though the Fujita scale itself ranges up to F12, the strongest tornadoes max out in the F5 range (261 to 318 mph).

F0 Category Tornado

Gale Tornado. Winds 40-72 mph (35-62 kt). Light Damage: Some damage to chimneys; breaks twigs and branches off tress; pushes over shallow-rooted trees; damages signboards; some windows broken; hurricane wind speed begins at 73 mph.

F1 Category Tornado

Moderate Tornado. Winds 73-112 mph (63-97 kt). Moderate damage: Peels surfaces off roofs; mobile homes pushed off foundations or overturned; outbuildings demolished; moving autos pushed off the roads; trees snapped or broken.

F2 Category Tornado

Significant Tornado. Winds 113-157 mph (98-136 kt). Considerable damage: Roofs torn off frame houses; mobile homes demolished; frame houses with weak foundations lifted and moved; boxcars pushed over; large trees snapped or uprooted; light-object missiles generated.

F3 Category Tornado

Severe Tornado. Winds 158-206 mph (137-179 kt). Severe damage: Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forests uprooted; heavy cars lifted off the ground and thrown; weak pavement blown off roads.

F4 Category Tornado

Devastating Tornado. Winds 207-260 mph (180-226 kt). Devastating damage: Well constructed homes leveled; structures with weak foundations blown off some distance; cars thrown and disintegrated; large missiles generated; trees in forest uprooted and carried some distance away.

F5 Category Tornado

Incredible Tornado. Winds 261-318 mph (227-276 kt). Incredible damage: Strong frame houses lifted off foundations and carried considerable distance to disintegrate; automobile-sized missiles fly through the air in excess of 300 ft (100 m); trees debarked; incredible phenomena will occur.

F6-F12 Category Tornadoes

Winds greater than 319 mph (>277 kt). The maximum wind speeds of tornadoes are not expected to reach the F6 wind speeds.

Source: National Climatic Data Center, McCown, Sam. The Fujita Tornado Scale. 2001. 9 Mar. 2004.

Enhanced Fujita (EF) 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

According to the 2014 Connecticut Natural Hazard Mitigation Plan Update Connecticut can expect approximately two tornadoes annually, with an F3 or greater occurrence once every ten years. Throughout the state from 1950 to 2012, 109 tornadoes were recorded with intensities up to F4 on the Fujita Scale.

Parts of the former WINCOG Region are in Tolland, Windham and New London Counties. From 1950 to 2012 a total of 17 tornadoes hit these three counties, with the greatest intensity being an intensity F3 tornado in Tolland County. An F3 tornado can lift cars, overturn trains and tear the walls and roofs off well-constructed homes, in addition to causing damage as exhibited by an intensity F2 tornado.

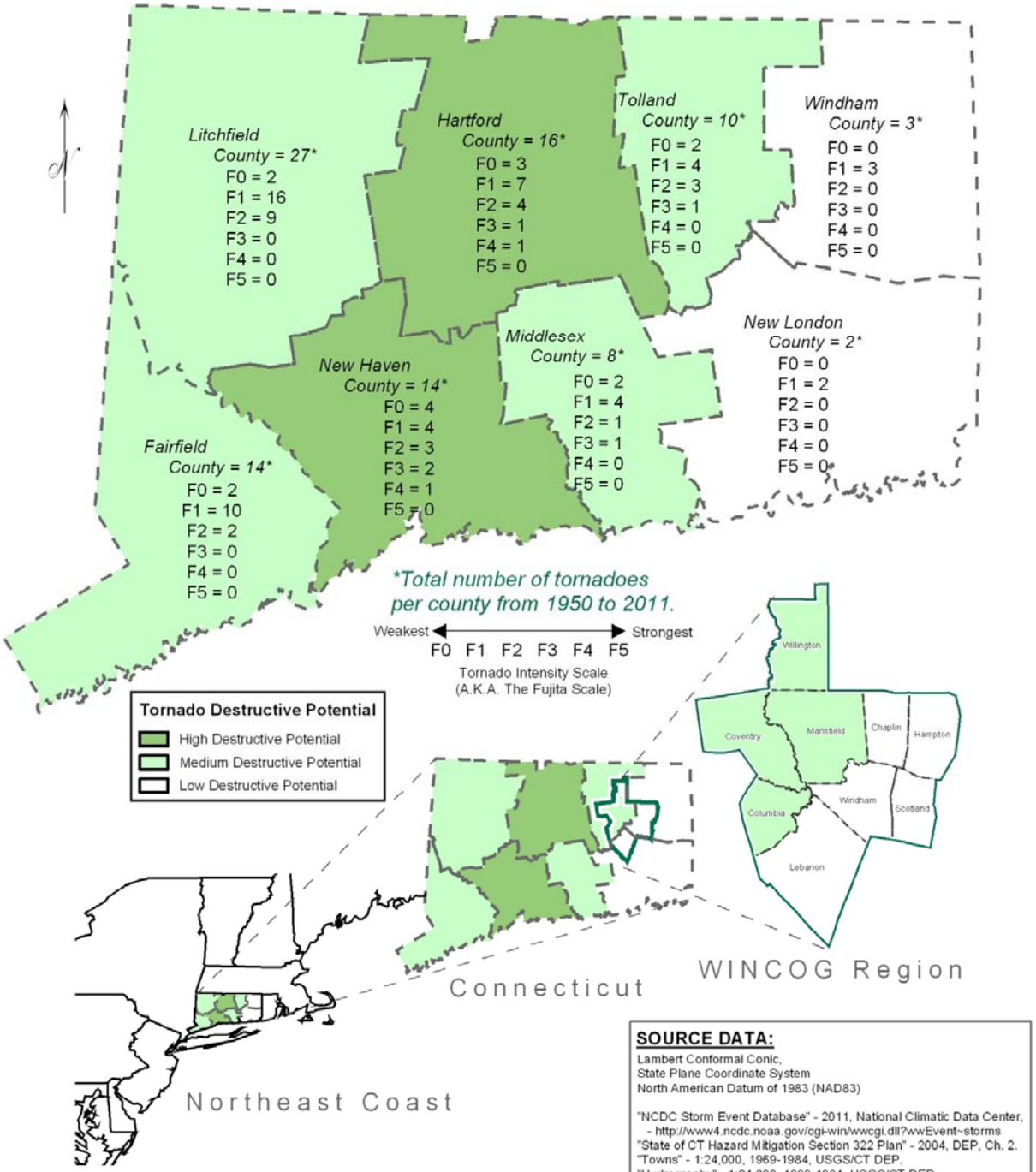
Tolland County has also experienced four F2 tornadoes. At this intensity, damage can include the demolition of manufactured homes, lifting of houses with weak foundations and the overturning of boxcars. All three counties have experienced F1 tornadoes, which are capable of snapping trees, pushing automobiles, damaging roofs and even pushing manufactured homes off their foundations. Because of inconsistency of exactly where a tornado will hit in a given county it is important to recognize these events as an overall threat to the entire region.

Vulnerability (Location, Impact) and Mitigation Efforts:

The former WINCOG Region is fairly vulnerable overall because of the unpredictability of where a tornado will hit. Figure 9 shows by county the historic distribution of tornadoes based on the Fujita Scale, and is color-coded to reflect the tornado destructive potential based on a formula obtained from the DEEP. This formula takes the total number of occurrences multiplied by the population in the county to determine a vulnerability number. This number is converted to a group of low, medium or high tornado destructive potential ratings. Six of the towns in the region are in either the New London or Windham County, which both have low destructive potential ratings. These towns have the potential of gale to moderate tornadoes. Three towns in the region are in Tolland County, which has a medium destructive potential rating. These towns have the potential of gale to severe tornadoes.

Figure 9

Tornadoes in Connecticut By County From 1950 - 2011



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During any tornado event the areas of greatest concern are those most prone to damage, such as manufactured home parks and buildings with weak foundations. These structures would be greatly impacted by a moderate category F1 tornado, which is possible in any of the towns. These structures will be taken into consideration and reviewed further for potential mitigation opportunities.

According to the 2014 Connecticut Natural Hazard Mitigation Plan Update, the occurrence of tornadoes in Connecticut is not considered frequent enough to justify the construction of tornado shelters at this time. Instead, the state has provided NOAA weather radios to all public schools and to many municipalities for use in local government buildings. These radios provide immediate notification of a weather watch or warning such that the community can advise students or residents to take appropriate precautions.

Tsunami

Risks, Vulnerability & Existing Mitigation Tools:

Tsunamis occur very rarely in Connecticut. If one were to hit, it would most likely be comparable to the inundation of a Category 3 or 4 hurricane. Areas affected are primarily along the coast, less than 25 feet above sea level and within one mile of the shoreline. With all the towns in the former WINCOG Region being inland and not near the inundation area of a Category 3 or 4 hurricane, Tsunamis are not a threat in the former WINCOG Region and will not be discussed in this plan.

Volcano

Risks, Vulnerability & Existing Mitigation Tools:

A volcano is a mountain that contains gases and molten rock in it's hollow inside. When pressure becomes overwhelming, the inner mixture bursts out. Volcanoes have not occurred in the State of Connecticut in modern time. Due to the lack of historical occurrences, volcanoes will not be discussed in this plan.

Wildfire Hazards

Risks (Extent):

Wildfires may not be experienced to the extent seen in the western U.S., as large scale forest fires are atypical in the state; smaller fires do pose a threat. Human negligence, however, causes the majority of fires. Long periods of drought as well as lightening are the primary natural causes of fires in the region. The wildfire season is from March to late November in New England, with most occurring in April and May, before new vegetation covers the ground. With the regions large wooded land cover, parks and old pastures, small underbrush fires as well as ground fires are real concerns.

Vulnerability (Location, Impact) & Mitigation Tools:

Wildfires can occur anywhere and at any time. The extensive thick forested land cover of the region makes the area a prime place for a wildfire. In many areas buildings are constructed very near to the forest borders, creating vulnerability throughout. Streams and lakes create natural breaks likely to stop the spread of a fire.

The likelihood of a severe wildfire developing is lessened in the region by the vast network of water features. However, during a long period of drought these natural breaks may evaporate, thus increasing the vulnerability to this hazard.

The Forestry Division at the DEEP keeps close watch over areas with below normal precipitation and 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.

The Connecticut DEEP has recently changed its Open Burning Program. It now requires individuals to be nominated and designated by the Chief Executive Officer in each municipality that allows open burning to take an online training course and exam to become certified as an "Open Burning Official." Permit template forms were also revised that provides permit requirements so that the applicant/permittee is made aware of the requirements prior to, during and after the burning activity. The regulated activity is then overseen by the local official.

In addition, the National Weather Service 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.

III. Town Descriptions and Assessments:

A. Overview:

As noted in Section I.E. above (Overview), each of the former WINCOG towns was reviewed to assess town-specific risks and vulnerabilities, and potential impacts on its residents, property and economy. Vulnerable areas in a town may include:

- Areas with concentrations of population;
- Commercial development/economic impact areas;
- Cultural/historical facilities;
- Dams;
- Elderly and special needs housing;
- Emergency operations facilities including police and fire stations and the highway garage;
- Excavation sites susceptible to landslides;
- Hazardous materials storage;
- Large open spaces susceptible to wildfire;
- Medical facilities including any hospice or animal hospitals;
- Religious facilities;
- Repetitive loss properties;
- Schools;
- Scour bridges;
- Energy infrastructure such as gas and electrical transmission lines;
- Communications facilities;
- Transportation facilities;
- Water and sewer facilities including pump stations and wells;
- Other areas as identified by the local community.

Since flood damage and dam failures are specific to each town and vulnerable areas are determined by their location in relation to these hazards, these two events are examined in this section at a town level. Flood zone classifications were broken down by 100-year and 500-year flood-prone areas. The more complex classification of dams used to show dam hazard potential is shown in Table 6. To help determine areas of concern and critical facilities for each area, former WINCOG staff interviewed key individuals from each of the towns.

CLASSIFICATION OF DAMS — Table 6

The Commissioner of DEEP shall assign each dam to one of five classes according to its hazard potential. Such classification shall be determined by the Commissioner during the initial periodic inspection.

Class AA - a negligible hazard potential dam which, if it were to fail, would result in the following:

- no measurable damage to roadways;
- no measurable damage to land and structures;
- negligible economic loss.

Class A - a low hazard potential dam which, if it were to fail, would result in any of the following:

- damage to agricultural land;
- damage to unimproved roadways (less than 100 ADT);
- minimal economic loss.

Class BB - a moderate hazard potential dam which, if it were to fail, would result in any of the following:

- damage to normally unoccupied storage structures;
- damage to low volume roadways (less than 500 ADT);
- moderate economic loss.

Class B - a significant hazard potential dam which, if it were to fail, would result in any of the following:

- possible loss of life;
- minor damage to habitable structure, residences, hospitals, convalescent homes, schools, etc.;
- damage to or interruption of the use of service or utilities;
- damage to primary roadways (less than 1500 ADT) and railroads;
- significant economic loss.

Class C - a high hazard potential dam which, if it were to fail, would result in any of the following:

- probable loss of life;
- major damage to habitable structures, residences, hospitals, convalescent homes, schools, etc.;
- damage to main highways (great than 1500 ADT);
- great economic loss.

Source: *Regulation of the Department of Environmental Protection Concerning Dam Safety Regulations.* Hartford, CT DEP, 2004.

This document has been prepared with the understanding that a single hazard effect may be caused by multiple hazard events. For example, flooding may occur as a result of frequent heavy rains, a hurricane, or a winter storm. Thus, Tables 7 and 8 provide summaries of the hazard events and hazard effects that impact the former WINCOG communities 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.

Table 7
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
Thunderstorms	2	3	1	6
Earthquakes	3	1	2	6
Tornadoes	1	1	3	5
Drought	3	1	1	5
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 8
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	2	2	7
Hurricane Winds	3	1	3	7
Falling Trees/Branches	2	3	2	7
Riverine Flooding	2	3	2	7
Ice	3	2	2	7
Thunderstorm and Tornado Winds	2	2	2	6
Flooding from Dam Failure	1	1	4	6
Shaking	3	1	2	6
Flooding from Poor Drainage	1	3	1	5
Lightning	1	3	1	5
Hail	2	2	1	5
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%

Based on the rankings in Tables 7 and 8, information regarding structures and populations at risk, hazard information in the historic record, and the available loss estimates, each hazard is provided an overall qualitative summary rank of risk. This is provided by community as some communities may feel lesser effects from certain hazards than others. The breakdown of the summary rankings is as follows:

- High: High risk hazards typically affect the entire community and have repeated impacts year to year, or are less frequent but highly damaging events.
- Moderate: Moderate risk hazards typically affect all or portions of the community and have repeated impacts from year to year that are not particularly damaging.
- Low: Low risk hazards typically affect only a limited area of a community and are generally infrequent.

It is important to note that FEMA's Flood Insurance Rate Maps (FIRMs) were used to extract the majority of the risk and vulnerability information. As of this plan FEMA has not completed digital FIRMs (Q3 format) for the towns in Windham County. Because of this limitation, the former WINCOG towns in Windham County were digitized by hand using the ArcView software. During the scanning and geo-referencing stage of this process several errors are commonly encountered. The digitizing itself was done carefully, but with so many chances for errors to be introduced into the final product, we recommend that these maps not be used to determine specific critical facilities in the floodplain. Also the data provided in Q3 format is rather outdated; the original studies were conducted mainly in the late seventies and early eighties. At that time much of the study area was approximated, with fine detail not taken into account. Revised FIRMs and Q3 data for the towns not originally digitized would greatly enhance the functionality and reliability of these maps.

Additional information for this section was made available through the ScourWatch system at the State of Connecticut Department of Transportation (ConnDOT), the Flood Insurance Studies (FISs) at the Federal Emergency Management Agency (FEMA), and individuals in the Dam Safety and Flood Management Sections at the Department of Energy and Environmental Protection (DEEP).

B. Ranking of Strategies and Actions

To prioritize recommended mitigation actions, 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.

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:

STAPLEE Criteria	Benefit (Pro)	Cost (Con)
Social	Is the proposed strategy socially acceptable to the community?	Are there any equity issues involved that would mean that one segment of the community 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	Will the proposed strategy work? Will it reduce losses in the long term with minimal secondary impacts?	Is the action technically feasible? Will it create more problems than it will solve? Does it solve the problem or only a symptom?
Administrative	Does the project make it easier for the community to administrate future mitigation or emergency response actions?	Does the 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	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.)?	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	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?	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	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?	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? What proposed actions should be considered but be tabled for implementation until outside sources of funding are available?
Environmental	Will this action beneficially affect the environment (land, water, endangered species)?	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 (multiplied by two) in the final sum of scores.

- The total benefit score and cost score for each mitigation strategy was summed to determine each strategy's final STAPLEE score.

An evaluation matrix with the total scores from each strategy can be found in Appendix IV. The highest scoring is determined to be of more importance economically, socially, environmentally, and politically and, hence, is prioritized over those with lower scoring. Scoring is translated into rankings of “High”, “Medium”, or “Low” relative to range of scores for that community. The mitigation strategy is divided into objectives and tasks at the end of each community section with the priority of each task clearly identified.

C. Mitigation Funding Sources

Funding sources for proposed strategies and actions are listed on the STAPLEE table in Appendix IV. These include the following:

- Municipal operating and capital budgets;
- Eversource (formerly Connecticut Light & Power) for informational materials;
- Connecticut Department of Transportation Local Bridge Program;
- FEMA’s Emergency Operation Center (EOC) grant program (not currently active);
- FEMA’s Hazard Mitigation Assistance (HMA) grant program;
- The Public Utility Regulatory Authority Microgrid Grant and Loam program;
- Connecticut’s Small Town Economic Assistance Program (STEAP) (available to all of the former WINCOG communities except Windham).

Local officials and regional councils of government representing the former WINCOG communities are very knowledgeable about these funding sources except for the FEMA programs. More information regarding the FEMA grant programs can be found online:

- HMA: https://www.fema.gov/hazard-mitigation-assistance
- EOC: https://www.fema.gov/fy-2011-emergency-operations-center-grant-program

Columbia Mitigation:

Scope/Overview

The Risk and Vulnerability Assessment portion of this plan looked at the historical and potential impacts of the following hazards throughout the region: dam failures, droughts, earthquakes, floods, hurricanes, ice jams, severe winter weather, thunderstorms, tornadoes and wind damage, and wildfires. A review of the historical occurrences of each hazard provided valuable information used in assessing potential future risk. A review of each community's resources provided the basis for an analysis of the community's vulnerability to each hazard – the extent to which the community might suffer loss of human life, injuries, and/or property damage.

With an understanding of its risk and vulnerability to natural disasters, the community can take steps prior to such an event to reduce its impacts (loss of property and life). The Connecticut Department of Energy and Environmental Protection (DEEP) has provided guidance in the form of a comprehensive list of possible mitigation measures for each hazard (see Appendix III). In the context of the community's risk and vulnerability assessment, only some of these measures will be cost-effective. The purpose of the Natural Hazard Mitigation Plan (NHMP) is to identify reasonable and appropriate mitigation measures for each hazard.

Certain mitigation practices are beneficial for any disaster, and the following measures are recommended for all communities:

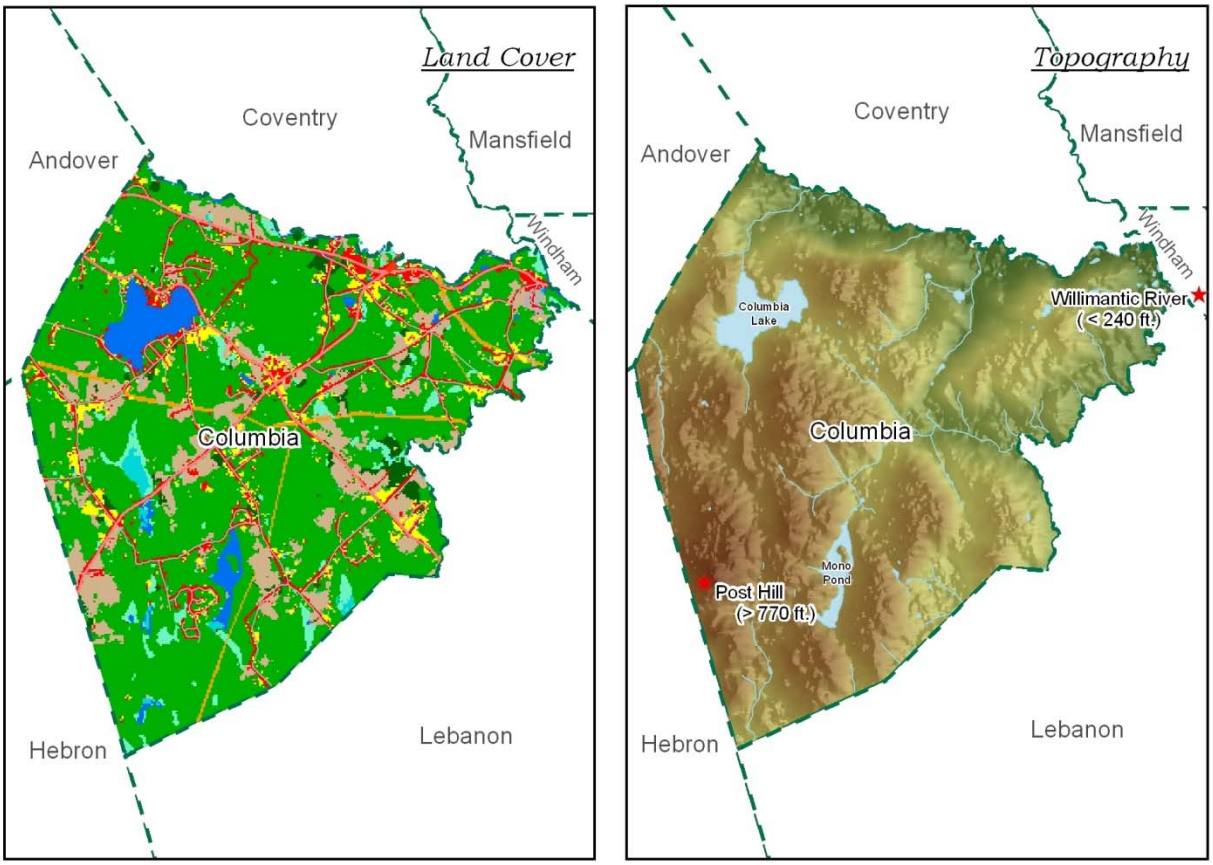
- Encourage all buildings to be improved to meet current building codes. Changes in building codes apply only to new constructions and renovations.
- Educate the public about disaster preparedness and the benefits of mitigation measures. Increasing the public's awareness of possible consequences of natural disasters and how they might better prepare to safeguard their lives and property is an important part of every community's mitigation plan.

General Town Description

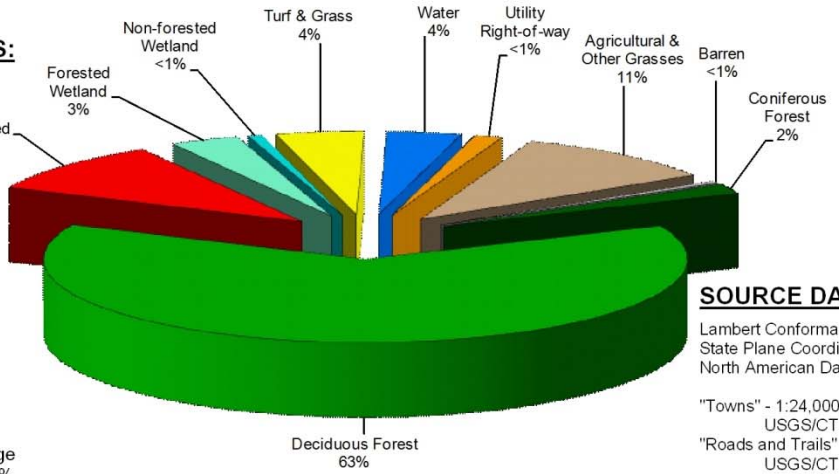
Columbia is located in Tolland County in eastern Connecticut and lies in the southwest section of the former WINCOG Region. Columbia has a total area of 21.9 square miles (13,995 acres) and is bounded on the east by Windham, on the southeast by Lebanon, on the north by Coventry, and on the west by Andover and Hebron. The 2010 Census population count was 5,485 persons, a 10.3% increase from 2000 (4,971). Mainly rural with some agriculture, Columbia is about 10% developed (Figure 14), an increase of 0.4% from the figure reported in the initial plan. The recent influx of population and residential development increases the town's overall vulnerability to natural hazards. However, new buildings are constructed to more recent building codes (and generally away from floodplains) and are considered to be less vulnerable to natural hazards than older buildings.

Figure 14

Town of Columbia Overview



Columbia Land Cover Breakdown



QUICK TOWN STATS:

Town Area -
22 sq. miles
(14,017 acres)

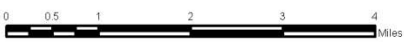
Water body area -
527 acres

Water bodies > 10 acres -
Columbia Lake
Mono Pond

Elevation -
Maximum = >770 ft.
Minimum = < 240 ft.

Population -

2000	2010	Change
4,971	5,485	10.3%



Scale: 1:132,000

SOURCE DATA:

Lambert Conformal Conic,
State Plane Coordinate System
North American Datum of 1983 (NAD83)

"Towns" - 1:24,000, 1969-1984, USGS/CT DEP.
"Roads and Trails" - 1:24,000, 1969-1984, USGS/CT DEP.
"Hydrography" - 1:24,000, 1969-1984, USGS/CT DEP.
"National Elevation Dataset" - 30 meter (1 arc second).
"2006 Land Cover Greater Connecticut" - 100 ft sq., 2006, UConn, CLEAR.

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The Columbia Lake and Mono Pond areas are home to concentrations of the town's population. Although some of this population is seasonal, a growing portion of residents live there year-round. Critical Facilities and cultural resources in Columbia include (see Figure 15):

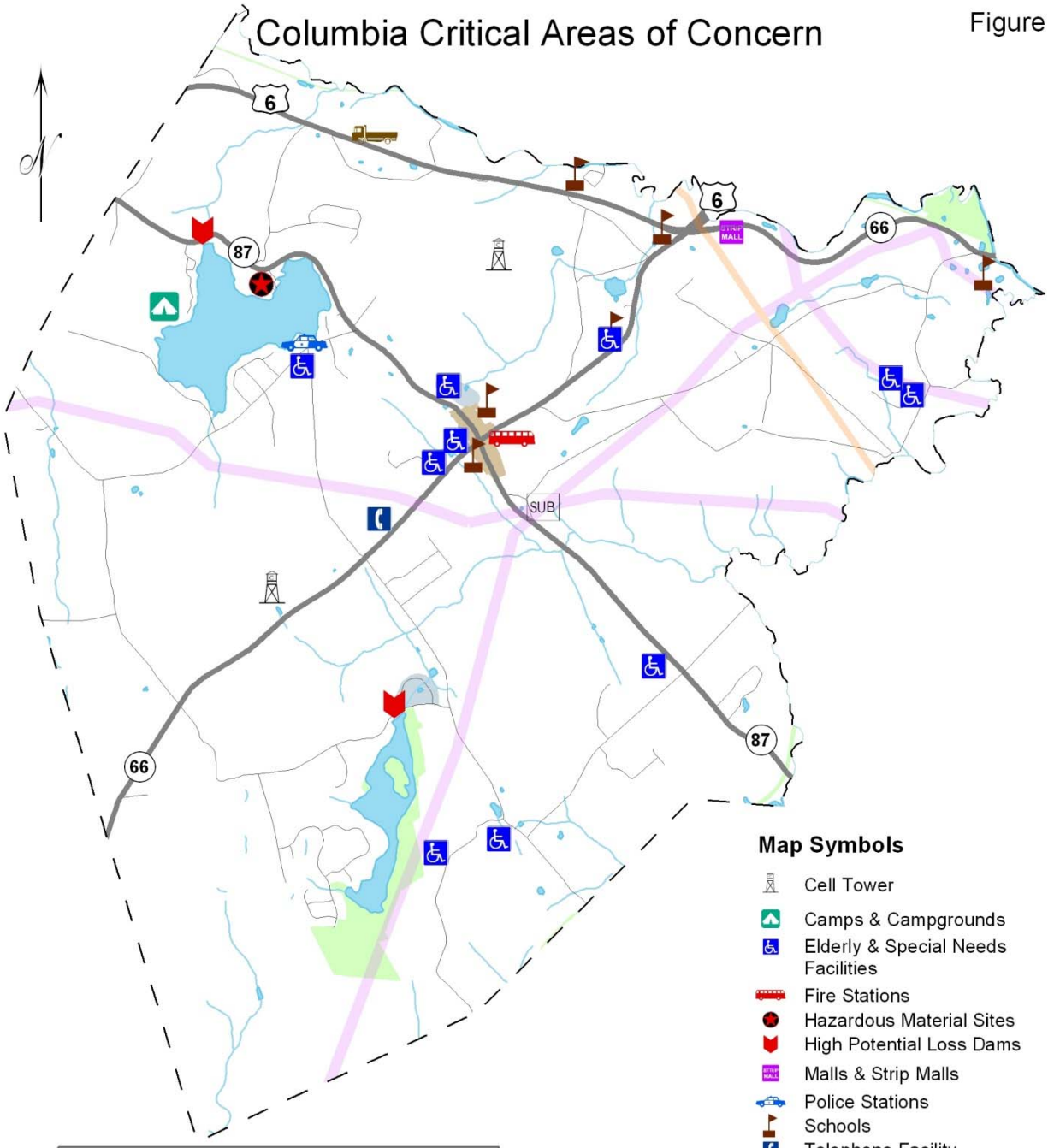
- One fire department located off Route 66;
- One resident trooper's office located on Beach Road;
- 6 schools: two preschools located off Route 66, one preschool located off Route 6; one preschool located on Commerce Drive; one elementary school off Route 66, one high-school program near the intersection of Route 6 and Route 66;
- Three elderly facilities located in the center of town off Route 66;
- One National Register historic district located near the intersection of Route 66 and 87 that includes the original building where Dartmouth College was founded;
- Seven group homes for individuals with special needs dispersed throughout town;
- A summer camp for youth on Columbia Lake;
- A commercial area along Route 6;
- One strip mall along Route 66 (toward Willimantic);
- One telephone switch station off Route 66;
- Two cell towers;
- One electrical substation off Route 87;
- A defense sub-contractor facility off Route 66;
- One hazardous material site on Lakeview Park West; and
- Two high potential loss dams.

Other areas of concern in Columbia include flood-prone areas, areas with high population concentrations and areas with seasonal population increases. A portion of Hop River Road is closed yearly at some point because of high water events including ice jams.

Largely forested, Columbia is made up of approximately 63% deciduous forest, 2% coniferous forest and 3% forested wetlands. Other land cover in the town includes: agricultural and other grasses (11%), developed (10%), water (4%), turf and grass (4%), utility rights-of-way (<1%), barren land (<1%) and non-forested wetlands (<1%). The approximate 467 acres of the town occupied by water bodies include Columbia Lake and Mono Pond. Columbia's elevation ranges from about 240 feet in the north/northeast section of town at the Willimantic River to about 770 feet at the peak of Post Hill in the southwest section. In addition to all the natural hazards described previously in this plan on a regional level, Columbia is also at risk of damage caused by flooding and dam failures.

Figure 15

Columbia Critical Areas of Concern



Map Symbols

- Cell Tower
- Camps & Campgrounds
- Elderly & Special Needs Facilities
- Fire Stations
- Hazardous Material Sites
- High Potential Loss Dams
- Malls & Strip Malls
- Police Stations
- Schools
- Telephone Facility
- Town Garage
- Substation
- Gas Main
- Electrical Transmission
- Water Service Area
- Historic Districts
- State Land

SOURCE DATA:

Lambert Conformal Conic,
State Plane Coordinate System
North American Datum of 1983 (NAD83)

"Towns" - 1:24,000, 1969-1984, USGS/CT DEP.
"Roads and Trails" - 1:24,000, 1969-1984, USGS/CT DEP.
"Hydrography" - 1:24,000, 1969-1984, USGS/CT DEP.
"State Land" - 1:24,000, 1994 - Present, CT DEEP.
"Population Concentrations" - Block groups, 2010, Census.
Critical Areas Provided by Town Representitives.

0 0.5 1 2 3 4 Miles

Scale: 1:60,000

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Authorities in the Town of Columbia who play advisory, supervisory, or direct roles in hazard mitigation for the Town include:

Authorities	Role			Hazard Mitigated
	Advisory	Supervisory	Direct	
Ad-Hoc Committee on Zoning and Preservation of Columbia Lake	X			Flooding
Board of Selectmen		X		All
Building Official	X		X	All except drought
Conservation and Agriculture Commission	X			Flooding, drought
Department of Public Works	X	X	X	All except drought
Emergency Management Director	X	X	X	All
Fire Department			X	Wildfire
Fire Marshall and Open Burn Official	X		X	Wildfire
First Selectman, who acts as the chief executive officer of the Town		X		All
Inland Wetlands and Watercourses Agent	X		X	Flooding
Inland Wetlands Commission	X			Flooding
Lake Management Advisory Commission	X			Flooding
Open Space Committee	X			Flooding, Wildfire
Planning and Zoning Commission	X		X	Flooding
Tree Warden	X		X	All except drought
Town Administrator		X		All
Town Meeting	X		X	All
Town Planner	X			All
Zoning Board of Appeals			X	Flooding
Zoning Enforcement Officer	X		X	Flooding

Evaluation of Risks & Vulnerability

Dam Failure

Risks & Vulnerability:

Dam failure risk and vulnerability is discussed on a regional level in, Section II.B. The overall risk of Columbia to dam failure is considered to be low.

Risk (Extent)

There are 11 dams in Columbia ranging from Hazard Class AA (negligible hazard) to Hazard Class C (high hazard). Five dams in the town are classified as negligible or low hazard (Class AA or A); failure of any of these dams would hardly be of concern. Three dams are classified as moderate hazard (Class BB) and failure would cause some damage, but no major disruptions. The failure of the dam classified as significant hazard (Class B) could cause serious damage. The failure of the Class C dam could cause catastrophic damage.

Vulnerability (Location, Impact)

The failure of any Class B or Class C dam brings damages, economic loss and the potential for loss of life. The Town of Columbia has one Class B and one Class C dam that would fit into this category. These dams being classified as significant or high hazards mean that in the event of their failure, besides the definite loss of property and economic losses, the loss of life is possible. One of these dams is on Columbia Lake, the other dam is on the north end of Mono Pond. Figure 16 shows the placement of dams in the town plus one Class A dam which is within 100 feet of the town's border.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides loss estimates by county for dam failure in Table 2-54. The period of record for these loss estimates is 136 years (1877 through 2013). Based on the data provided in Table 2-54 of the State Plan, the annualized loss for Tolland County for dam failure is $9,385.

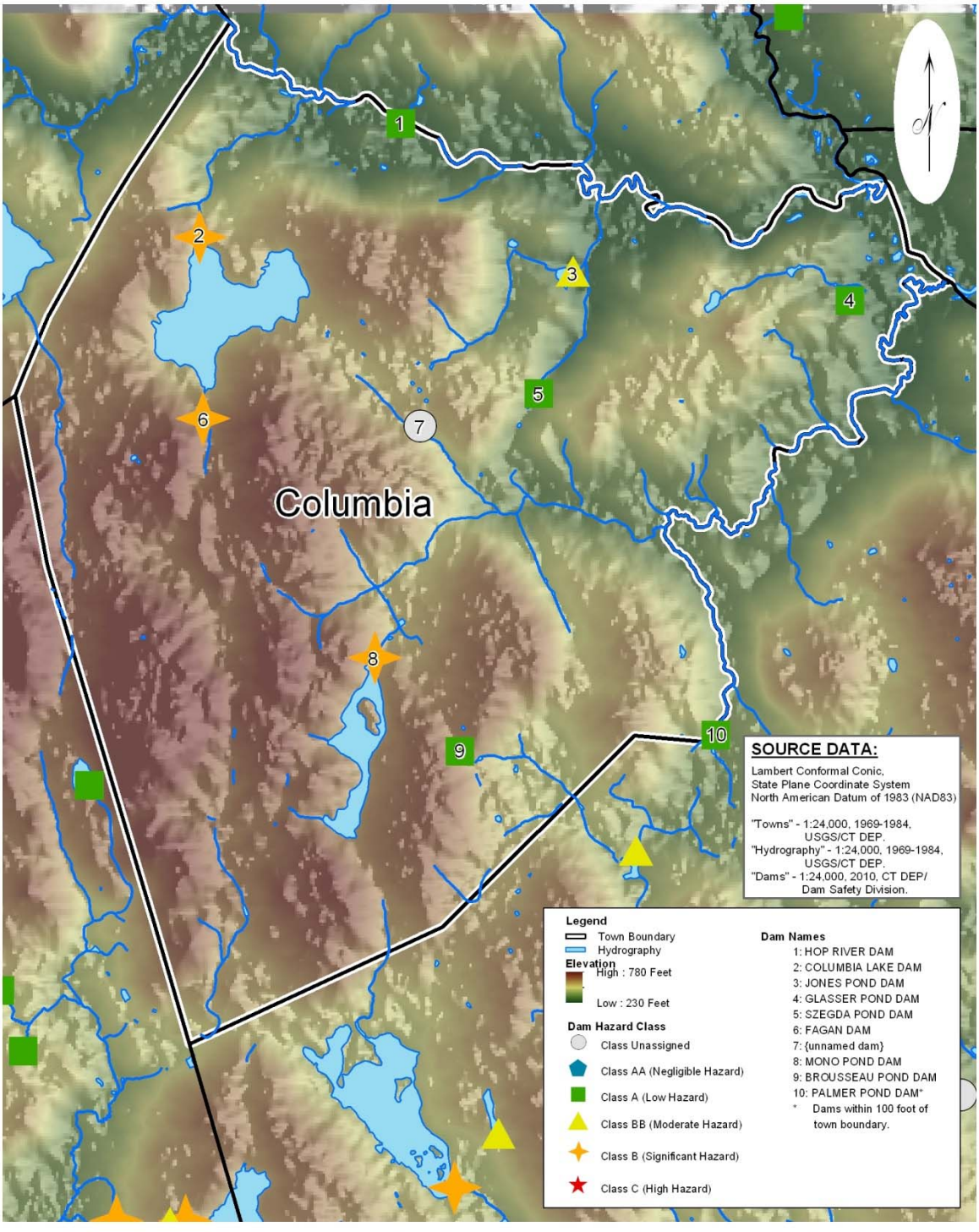
The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Columbia. Based on the 2010 Census data in Section II.A., Columbia has approximately 3.6% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Columbia for dam failure is estimated at $337.

Note that this estimate does not take into account site specific details or particular dam failure damages that may have affected the Town of Columbia in the historic record. For example, the Connecticut DEP (now DEEP) estimated the damage to the Columbia Lake Dam from the June 1982 flood to be $20,000. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to dam failure.

Town staff indicate that there has not been any damage to municipal and private structures and infrastructure due to dam failure in recent memory. This is consistent with the relatively minimal annualized loss estimate based on information in the 2014 State Plan.

Town of Columbia Dams

Figure 16



Scale: 1:66,000

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FOR ADVISORY PURPOSES ONLY

Mitigation Efforts

Current state mitigation measures are described on a regional level in Section II.B of the Natural Hazards Mitigation Plan. Among these mitigation measures are periodic dam inspections. Periodic inspections help to determine if dams are structurally sound. If a dam's structural integrity is questioned, recommendations made to ensure the safety of the structure may include:

- Any emergency measures or actions, if required to assure the immediate safety of the structure;
- Remedial measures and actions related to design, construction, operation, maintenance and inspection of the structure; additional detailed studies, investigations and analyses; or
- Recommendations for routine maintenance and inspection by the owner.

Eight privately owned dams are in Columbia, as is one State-owned dam (Mono Pond Dam). Private owners of dams are generally reluctant to make repairs, which tend to be costly. In these instances, needed repairs may not be done in a timely manner. State-owned dams are typically maintained in good condition.

Whether it is a structurally sound dam or a weak dam, Emergency Operation Plans (EOPs)/Emergency Action Plans (EAPs) are very important mitigation measures. A detailed discussion of these plans is provided in Section II.B. The DEEP works with owners of dams at greatest risk to make certain EOPs are in place and up-to-date. Hurricanes, flooding, ice jams and tornadoes may breach even a well-built dam, given a destructive enough event. Having a plan that lays out how to respond to a disaster, prior to the disaster occurring, is a very important tool in reducing loss of property and life. Mitigation measures for flooding (see below), which is a risk commonly associated with a dam failure, should also be encouraged.

While the state is assuming less responsibility for routine inspection of dams, DEEP will continue recommending measures to lessen the risk of dam failure, and the municipality can take the following mitigation actions:

- For municipally-owned dams, make sure that EOPs/EAPs are in place and current, and implement recommendations resulting from state inspections; and

- For privately-owned dams, encourage each dam owner to have an EOP/EAP in place and current, and implement recommendations resulting from inspections; monitor compliance as possible.

The Town of Columbia has limited policies, programs, and resources dedicated to dam failure since most of these efforts are performed at the State level. The Town of Columbia

owns two dams (Columbia Lake Dam and Fagan Dam). Of these, the Columbia Lake Dam is a Class C (high hazard) and the Fagan Dam is a Class BB (moderate hazard). The Town of Columbia expends approximately $500-$700 per year to maintain, monitor, and conduct planning for town-owned dams. The recent Columbia Lake Dam renovation cost $200,000. The Town of Columbia is currently updating the EOP/EAP for the Columbia Lake Dam, but does not have an EOP/EAP for the Fagan Dam as it is only a moderate hazard dam.

The Town of Columbia's ability to mitigate dam failure is considered to be good for town-owned dams but limited for privately owned dams. Overall, the Town of Columbia's capability to mitigate for dam failure and prevent loss of life and property have increased since the initial hazard mitigation plan was adopted, mainly as a result of recent statewide legislative actions described above and in Section II.B. Over the next few years, it is expected that dam safety programs will continue to strengthen in Connecticut.

Drought

Risk & Vulnerability:

Drought risk and vulnerability is discussed in Section II.B. The overall risk of Columbia to drought is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides loss estimates by county for drought in Table 2-69. However, no damages are reported. Therefore, the estimated annualized loss for drought in Columbia would also be $0 based on the state plan. The number of annualized events for Tolland County is reported at 0.05, which suggests that some level of damage should be occurring.

The Town of Columbia reports that very limited losses may have occurred due to drought in the last 10 years. No reductions of employment or lost revenue is known. However, some losses of product have reportedly been incurred by hay farmers, although quantitative information is not available.

Some of the Town's fire ponds and dry hydrants have been impacted by recent droughts. The droughts have caused water levels to recede to levels too low to provide a useful volume of water for firefighting in some areas. Fortunately, the fire department was able to utilize water from more drought-resistant sources, although details on the additional cost of this effort are not available.

Residents in the Town of Columbia rely on private water supplies or small private Community water systems. As such, the Town does not have water conservation ordinances. The recent droughts affected several residents who needed to drill new water supply wells. A new bedrock water supply well typically costs around $6,000. A recent

estimate of drought-related damage to private water supply in the Town of Columbia is therefore $24,000 assuming four new wells were drilled. Based on the number of annualized events presented in Table 2-69 of the State Plan, this value provides an annualized loss estimate of approximately $1,200. This value is believed reasonable given the historic record.

Mitigation Efforts

As with any rural community that depends on aquifers and local well systems, Columbia's vulnerability to drought increases with population growth and the accompanying increased demands for water. Good land use planning and helping the community to understand the importance of water conservation can reduce the threat of drought.

The "Connecticut Drought Preparedness and Response Plan" (see Section II.B is one statewide mitigation effort already in place. Other specific measures that should be considered include:

- Completing a town-wide groundwater study, including recharge into existing aquifers to develop recommendations for future land use patterns;
- Implementing site design techniques and criteria such as strict regulation of vegetative buffers for stream and river corridors, rain gardens for site drainage, and prohibition of wetlands alteration;
- Studying effectiveness of conservation measures; and
- Implementing water conservation awareness programs.

The Town of Columbia monitors water levels at its dry hydrants during droughts. When a source becomes limited or unavailable, this information is distributed as appropriate such that tankers can be used during a fire to move water from another location. The Town does not perform any other drought mitigation measures.

Overall, the Town of Columbia's capability to mitigate for drought and prevent loss of life and property is limited and generally unchanged since the initial hazard mitigation plan was adopted, mainly because drought planning and response occurs at the State level and local public water supply is limited.

<u>Earthquake</u>

Risk & Vulnerability:

Earthquake risk and vulnerability is discussed in Section II.B. The overall risk of Columbia to earthquakes is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides a range of annualized loss estimates by county for earthquakes in Figure 2-66. Based on the data provided in Figure 2-66 of the State Plan, the annualized loss for Tolland County lies between zero and $56,050. To be conservative, the maximum county-wide annualized loss value of $56,050 is utilized herein.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Columbia. Based on the 2010 Census data in Section II.A., Columbia has approximately 3.6% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Columbia for earthquakes is estimated at $2,103.

Note that this estimate does not take into account site specific details or particular earthquake damages that may have affected the Town of Columbia in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to earthquakes.

The Town of Columbia does not recall any municipal or private damages or losses due to recent earthquakes. Emergency calls due to recent earthquakes were not received by emergency staff. The annualized loss estimate of $2,103 based on the values in the 2014 State Plan is therefore likely high but is reasonable enough to use for planning purposes.

Mitigation Efforts

Occurrences of large earthquakes in the region are infrequent. While many mitigation measures may not be cost-effective, the community should consider the following:

- Enforcing effective building codes and local ordinances;
- Encouraging emergency facilities such as hospitals to be constructed to withstand seismic events; and
- Encouraging a low-cost earthquake rider for homeowners and businesses.

The Town does not specifically mitigate for earthquake hazards. Overall, the Town of Columbia's capability to mitigate for earthquakes and prevent loss of life and property is limited and generally unchanged since the initial hazard mitigation plan was adopted, mainly because it is not a high priority because earthquake damage is so infrequent.

<u>Flooding</u>

The overall risk of Columbia to flooding is considered to be moderate.

Risks (Location)

The Town of Columbia is at risk of flooding because of a number of streams, brooks and ponds in the town. For example, the Hop River experiences minor flooding and minor damage yearly. According to the 1982 Federal Emergency Management Agency's (FEMA's) updated Flood Insurance Study (FIS) for the town:

> "Floods in Columbia may occur during any season of the year. Spring floods are often the result of rainfall in combination with snowmelt. Floods occurring in the late summer and early fall are often caused by hurricanes moving north along the Atlantic coast. Winter floods result from occasional thaws, particularly in years of heavy snowfall.
>
> Major floods of the past 50 years have occurred during March 1936, September 1938, and August 1955. Of these floods, the 1955 flood, caused by a hurricane, resulted in the most severe runoff and property damage. The Willimantic River, at the U.S. Geological Survey gaging station (No. 01119500) upstream of State Route 31 in Mansfield, recorded a peak discharge of 24,200 cubic feet per second (cfs) on August 19, 1955. The 1955 flood was estimated to have a recurrence interval of more than 200 years (4)."

Vulnerability (Extent)

Areas studied for vulnerability, as noted in FEMA's 1982 FIS for the town, are as follows:

> "The Hop and Willimantic Rivers were studied by detailed methods for their entire lengths within the Town of Columbia. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction for the next five years, through July 1985.
>
> Columbia Lake was studied by approximate methods. Approximate methods of analysis were used to study those areas having low development potential and minimal flood hazards as identified at the initiation of the study. The scope and methods of study were proposed to and agreed upon by the FEMA (2)."

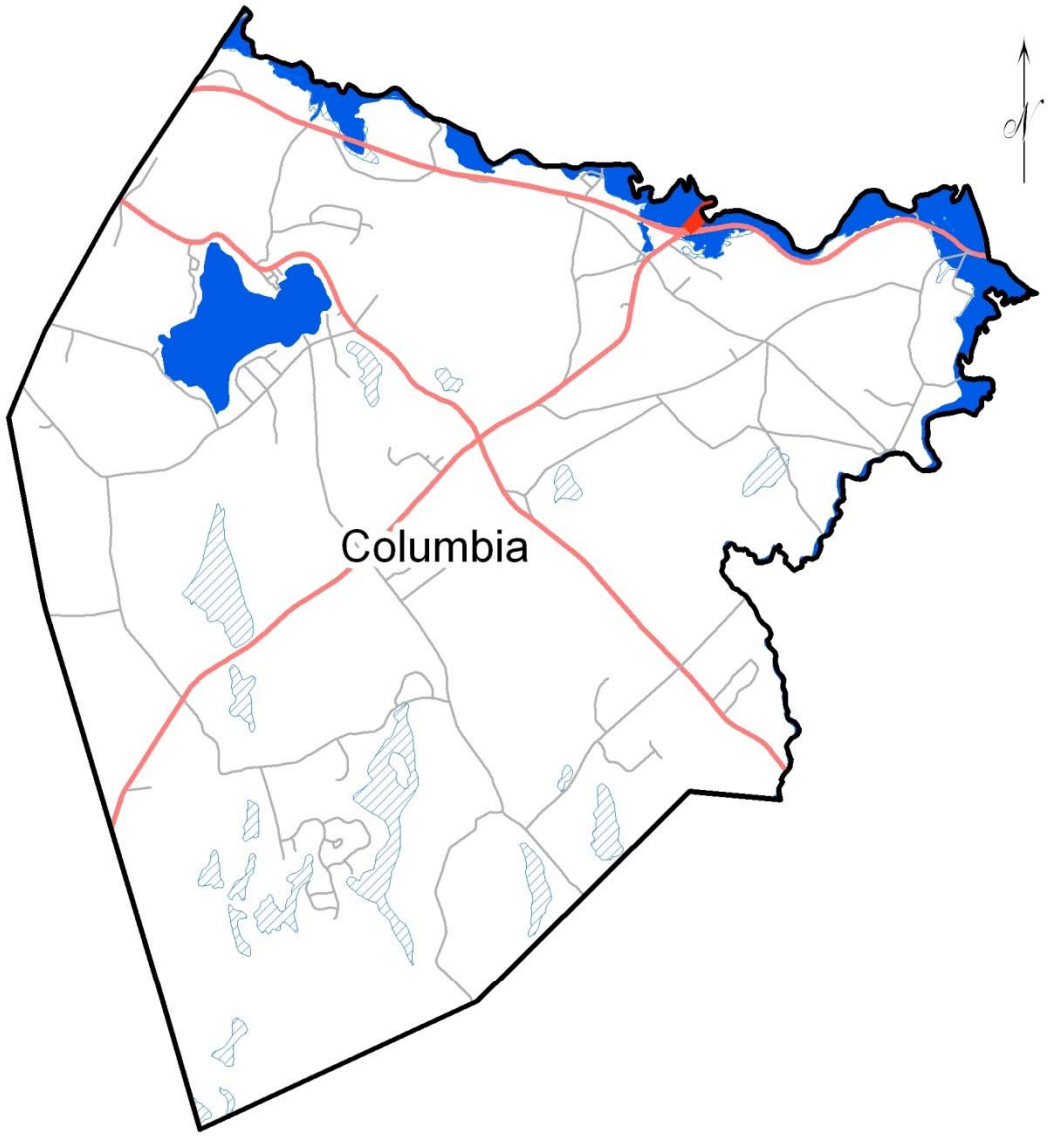
A map of the flood risk areas is provided on Figure 17.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of annualized loss by county for flooding in Table 2-44. Based on the data provided in Table 2-44 of the State Plan, the annualized loss for Tolland County based on the historic record through the National Climatic Data Center through the past 20 years is $255,828.

Flood Risk Zones of Columbia

Figure 17



Legend

- Major Highways
- Highways
- Local Roads
- 100 Year Flood Zone
- 500 Year Flood Zone

SOURCE DATA:

Lambert Conformal Conic,
State Plane Coordinate System
North American Datum of 1983 (NAD83)

"Towns" - 1:24,000, 1969-1984, USGS/CT DEP.
"Roads and Trails" - 1:24,000, 1969-1984, USGS/CT DEP.
"FEMA Flood Insurance Rate Maps (FIRM)" - scale varies, collection date varies, FEMA.
"Dynamap Transportation v11.3 streets" - Scale varies, 2009, Tele Atlas North America Inc.
"Scour Critical Town Bridges" - Conndot Bridge Safety + Evaluation, 10/10/2012.

0 0.5 1 2 3 4 Miles

Scale: 1:66,000

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The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Columbia. Based on the 2010 Census data in Section II.A., Columbia has approximately 3.6% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Columbia for flooding is estimated at $9,190.

Note that this estimate does not take into account site specific details or particular flooding damages that may have affected the Town of Columbia in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to flooding.

According to the Town of Columbia, flood damages have been relatively minor in recent years. No public assistance reimbursements were received for flooding related to the federally declared disasters in October 2005, April 2007, or October 2010. However, the Columbia Recreation Area did sustain some erosion in the park during a heavy rain event. The Town installed additional drainage to handle the future high rainfall events. The exact cost of this drainage system and erosion repair is not known but is estimated at $100,000.

According to the Connecticut DEEP, The Town of Columbia is home to one repetitive loss property. It is a non-residential property and is located in the 1% annual chance floodplain of the Hop River. The property has two reported losses with an average insurance payment of $4,200 per loss.

Based on the above, the annualized loss estimate of $9,190 based on the values in the 2014 State Plan appears reasonable and is considered suitable for planning purposes.

Mitigation Efforts

The Town of Columbia has consistently participated in the NFIP since September 16, 1982. The most recent FIRM was published on September 16, 1982. The current Town of Columbia FIS was published on March 16, 1982. The original FIS and FIRMs for flooding sources in the Town are based on work completed in July 1980. Many of the local flooding problems are consistent with the floodplains mapped by FEMA.

Section 53 of the Town of Columbia's current zoning regulations are the Town's Flood Hazard District Regulations and were most recently updated on June 1, 1989. These include, but are not limited to, the following limitations in the flood zone[χ]:

[χ] The flood zone being the flood hazard district, defined as and includes all special flood hazard areas designated as Zone A (areas of the 100-year flood), A1-30 on the Town of Columbia, Connecticut Flood Insurance Rate Maps (FIRM) (Columbia Zoning Regulations Section 53.1)

- New construction and substantial improvement of any residential structures shall have the lowest floor, including basement, elevated to or above the base flood elevation (Section 53.2.1).

- New construction and substantial improvement of non-residential structures shall be constructed in accordance with residential construction standards above, or may be flood proofed in lieu of being elevated provided that together with all attendant utilities and sanitary facilities the areas of the structure below the base flood elevation are watertight and walls substantially impermeable to the passage of water, and use structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effect of buoyancy (Section 53.2.2).

- Within the flood way designated on the Flood Boundary and Flood Way map or as may be determined in Section 53.2.6 all encroachments, including fill, new construction, substantial improvements to existing structures and other development are prohibited unless certification by a registered professional engineer is provided by the applicant demonstrating that such encroachment shall not result in any increase in flood levels during the occurrence of the 100 year flood discharge (Section 53.2.5).

- All new construction and substantial improvements shall be anchored to prevent flotation, collapse or lateral movement of the structure (Section 53.3.1).

- All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage; all new construction and substantial improvement shall be constructed using methods and practices that minimize flood damage (Section 53.3.2).

Columbia's regulations require that proposed structures meet elevation requirements and strict construction demands. Structures may be required to be constructed with certain materials, elevated, flood proofed, watertight or anchored. It must be shown that with not only proposed structures, but also with any activity in the 100-year flood plain, that encroachment will not alter the flood levels. These types of regulations help to keep structures out of areas at risk of flooding. Structures that are allowed in the flood plain must meet requirements put in place to greatly reduce the risk of damage to property and the loss of life, should a flood occur.

The degree of flood protection established by the variety of regulations in the Town meets the minimum reasonable for regulatory purposes under the NFIP. The Town plans to remain compliant with the NFIP and will continue to participate in the NFIP.

Additional mitigation measures recommended for all towns in the region include:

- Educating the public on
  - Risks of flooding,
  - Risks of building in hazard-prone areas,
  - Federal Emergency Management Agency (FEMA) floodplain maps (and making these maps easily available to the public);
- Implementing a maintenance program to clear debris from storm water drainage areas;
- Developing sediment control to prevent clogged drainage systems, such as street sweeping, curb and gutter cleaning, paving dirt roads, and planting vegetation on bare ground;
- Investigating the use of flood-prone areas as open spaces;
- Encouraging individuals in flood-prone areas to purchase flood insurance;
- Elevating structures above the 100-year flood level; and
- Considering the conservation of open space by acquisition of repetitive loss structures.

Stormwater

Stormwater runoff can significantly exacerbate flooding; therefore, managing stormwater runoff is a priority mitigation measure. Residential and commercial development increases impervious land area, reduces the infiltration of stormwater runoff into the ground, and increases the volume and velocity of stormwater runoff causing flooding. Enforcing appropriate maintenance programs for stormwater facilities will therefore help reduce the impact of these events and subsequently reduce the damage caused by flooding. A good stormwater management system promotes groundwater recharge and controls peak flows, while reducing local flooding and maintaining stream bank integrity. An example of a good stormwater management system would be one that calls for removing sediment accumulation from catch basins yearly. This may make the difference in whether or not flooding occurs. Columbia is encouraged to develop a municipal stormwater management plan. All towns within the region are also encouraged to consider the effects of proposed future development on stormwater runoff.

The Town's capabilities are considered to be effective in regards to response to flood damage, and the Town's capability to mitigate flood hazard damage is also considered effective for preventing damage to new development and substantial improvements. Overall, the Town of Columbia's capability to mitigate for flooding and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted. This is because the Town has implemented a Reverse 9-1-1 system to contact residents in cases of emergency conditions, the Town now posts is regulations on its website. Furthermore, the Town now has a more formalized inspection and upgrade program for faulty culverts and catch basins, with inspections of areas conducted annually and faulty areas added to the capital improvement list.

Hurricanes

Risk & Vulnerability:

Hurricane risk and vulnerability is discussed in Section II.B. The overall risk of Columbia to hurricanes is considered to be high.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of hurricane losses for a variety of hurricane wind events by county in Table 2-21. This data was developed using HAZUS-MH. Based on the data provided in Table 2-21 of the State Plan, the predicted annualized loss for Tolland County due to hurricane wind damage is $10,347,317.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Columbia. Based on the 2010 Census data in Section II.A., Columbia has approximately 3.6% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Columbia for hurricane wind damage is estimated at $371,699.

Note that this estimate does not take into account site specific details or particular hurricane wind damages that may have affected the Town of Columbia in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to hurricane wind damage.

The Town of Columbia received a public assistance reimbursement of $11,875.39 related to cleanup following Hurricane Irene. A total of $3,366 was paid to a tree service for post-storm cleanup. Public assistance reimbursements were not received for Hurricane Bob or Hurricane Sandy. Other notable losses were not reported to the Town, but were expected to have been incurred by property owners on some scale during these strong wind events.

Mitigation Efforts

Some of the greatest damage from hurricanes is caused by flooding, high winds and tornadoes. Mitigation measures for these events are looked at separately in the flooding and tornado/wind damage sections. Other mitigation efforts that should be considered include:

- Providing emergency shelters;
- Implementing a tree hazard management program, which would encourage responsible planting practices and minimize future storm damage to buildings, utilities, and streets;

- Practicing a tree trimming maintenance program; and
- Relandscaping with native species.

The Town contributes to regional shelter facilities and performs debris management through Public Works with the assistance of the local electrical utility when necessary. The Town's capabilities are considered to be effective with regard to mitigating hurricane damage. Overall, the Town of Columbia's capability to mitigate for hurricanes and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted, because the Town has implemented a Reverse 9-1-1 system and the State building code has been updated and locally adopted.

Ice Jams

Risk & Vulnerability:

Ice jam risk and vulnerability is discussed in Section II.B. The overall risk of Columbia to ice jams is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update indicates that ice jams have not occurred in Connecticut since 2010. Due to the infrequency of the hazard and the limited information available regarding damages, it is no longer considered a separate hazard from flooding. The potential annualized loss estimate due to ice jams in Columbia is therefore included in the annualized loss estimate for flooding presented above.

The Town of Columbia has not experienced any damage due to ice jams or ice jam flooding in recent years.

Mitigation Efforts

During ice jams the biggest concern is the risk of flooding. See mitigation measures under flooding (above).

Severe Winter Storms

Risk & Vulnerability:

Severe winter storm risk and vulnerability is discussed in Section II.B. Key risks are the relative isolation of the rural communities from emergency services; loss of electrical power to large areas from ice accumulation or high winds, and fire from improper use of alternative heating sources, candles and gas stoves. The leading cause of death is from automobile and other transportation accidents. Property damage can also occur from

frozen water pipes and falling trees or branches from ice accumulation and/or wind. The overall risk of Columbia to severe winter storms is considered to be high.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of severe winter storm losses for a variety of events by county in Table 2-35. This data was developed based on damages reported in the NCDC database. Based on the data provided in Table 2-35 of the State Plan, the predicted annualized loss for Tolland County due to severe winter storm damage is $532,131.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Columbia. Based on the 2010 Census data in Section II.A., Columbia has approximately 3.6% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Columbia for severe winter storm damage is estimated at $19,115.

Note that this estimate does not take into account site specific details or particular severe winter storm damages that may have affected the Town of Columbia in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to severe winter storm damage.

The Town of Columbia received a public assistance reimbursement of $13,503.56 related to the heavy snow in January 2011. No town buildings were known to sustain damage during this event. The public assistance reimbursement following Winter Storm "Alfred" in late October 2011 was relatively minor ($2,422.26), and some of this money ($625) was used to grind tree debris. Other notable losses were not reported to the Town, but were expected to have been incurred by property owners on some scale during these severe winter storm events.

Mitigation Efforts (see also flooding and tornado/wind damage)

Some of the greatest damage from winter storms is caused by flooding and high winds, and mitigation measures for such hazards are discussed under those headings.

It is particularly important to encourage people to stay indoors and out of harm's way when severe winter weather threatens. Such conditions increase the frequency of traffic accidents and emergency responders take longer to reach accident scenes because of vehicles unnecessarily on the roads.

Power outages can cause a number of problems, from loss of heat and the risk of frozen pipes to fire hazards. Tree-trimming programs can lessen the risk of power outages to some

extent. Putting utility wires underground can lessen the risk even further. In any event, the municipality should develop a plan to restore power as quickly as possible.

The National Weather Service's Early Warning System is an important mitigation measure for winter storms. Other hazard-specific mitigation efforts that should be considered include:

- Educating the public on
  - The risks of hypothermia,
  - The risks of carbon monoxide poisoning in motor vehicles and from portable heaters and power generators in homes,
  - The risk of fires from portable heaters and candles,
  - The importance of staying off the roads,
  - Landscaping practices that encourage the planting of species that are less susceptible to damage from ice storms to reduce the risk of damage to structures;
- Implementing a tree trimming maintenance program;
- Encouraging underground utility wires; and
- Providing emergency shelters before, during, and after the event.

The Town contributes to regional shelters and provides plowing services through Public Works. The Town's capabilities are considered to be effective in regards to response to severe winter storms, although the Town's capability to mitigate severe winter storm damage is relatively limited to town-owned facilities. Overall, the Town of Columbia's capability to mitigate for severe winter storms and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted, because the Town implemented a Reverse 9-1-1 system to notify residents of emergency conditions.

Thunderstorms

Risk & Vulnerability:

Thunderstorm risk and vulnerability is discussed in Section II.B. The overall risk of Columbia to thunderstorms is considered to be moderate.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of thunderstorm losses by county in Table 2-19. This data was developed based on damages reported in the NCDC database. Based on the data provided in Table 2-19 of the State Plan, the predicted annualized loss for Tolland County due to thunderstorm damage is $55,581.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Columbia. Based on the 2010 Census data in Section II.A., Columbia has approximately 3.6% of the population of Tolland County. Based

on this percentage, the annualized loss in the Town of Columbia for thunderstorm damage is estimated at $1,997.

Note that this estimate does not take into account site specific details or particular thunderstorm damages that may have affected the Town of Columbia in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to thunderstorm damage.

The Town of Columbia notes that the cost to respond to downed branches and wires from a severe thunderstorm varies greatly with the intensity of the storm and the area affected. The Town hires a tree service to do major cleanups for approximately $900 per day. Smaller cleanups are handled by Town staff within current budget allocations. Private losses are not typically reported to the Town, but are expected to be incurred by property owners on some scale during severe thunderstorm events.

Mitigation Efforts (see also wildfires, flooding and tornado/wind damage)

Some of the greatest damage from thunderstorms is caused by fires, flooding, high winds, and (on occasion) tornadoes. Mitigation measures for such hazards are discussed under those headings.

The National Weather Service's Early Warning System is an important mitigation measure for thunderstorms. Other hazard-specific mitigation efforts that should be considered include:

- Educating the public on how to minimize risk of injury both indoors and outdoors (more specific);
  - When to turn off gas, electricity, and water; and
  - When and how to avoid contact with water and metal.
- Clearing dead or rotting tree branches;
- Securing outdoor objects that could become projectiles; and
- Installing lightning rods.

The Town notifies the public when severe thunderstorms are to occur, and performs debris management through Public Works with the assistance of the local electrical utility when necessary. The Town's capabilities are considered to be effective in regards to response to thunderstorms, although the Town's capability to mitigate thunderstorm damage is relatively limited to town-owned facilities and right-of-ways. Overall, the Town of Columbia's capability to mitigate for thunderstorms and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted because the Town implemented a Reverse 9-1-1 system to notify residents of emergency conditions, and because the local electrical utility has performed an intensive trimming program near electrical lines following the severe storms in 2011.

Tornado/Wind Damage

Risk & Vulnerability:

Tornado/Wind Damage risk and vulnerability is discussed in Section II.B. The overall risk of Columbia to tornadoes is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of tornado losses for a variety of events by county in Table 2-30. This data was developed based on damages reported in the NCDC database. Based on the data provided in Table 2-30 of the State Plan, the predicted annualized loss for Tolland County due to tornado damage is $44,371.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Columbia. Based on the 2010 Census data in Section II.A., Columbia has approximately 3.6% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Columbia for tornado damage is estimated at $1,594.

Note that this estimate does not take into account site specific details or particular tornado damages that may have affected the Town of Columbia in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to tornado damage.

The Town of Columbia does not have any record of recent tornado, downburst, or microburst activity causing damage in town. Town staff note that similar to a severe thunderstorm, the cost to respond to a tornado, downburst, or microburst would vary greatly with the intensity of the storm and the area affected. As noted above, the Town hires a tree service to do major cleanups for approximately $900 per day. Smaller cleanups are handled by Town staff within current budget allocations.

Mitigation Efforts

While the region has a very low risk of experiencing a tornado with great destructive potential, basic measures to minimize damage from high winds can be implemented and public education efforts can help to prepare residents. Owners of older mobile homes should be particularly aware of mitigation measures that could protect their homes from damage.

The National Weather Service's Early Warning System is an important mitigation measure for tornado/wind damage events. Other hazard-specific mitigation efforts that should be considered include:

- Being aware of, and educating the public through pamphlets and web-based information on
  - The warning signs for a tornado,
  - The importance of securing outdoor objects that could become projectiles,
  - What kinds of buildings are most vulnerable to damage from tornadoes or high winds (such as manufacture housing),
  - Structural alterations to protect against wind damage,
  - When and where to seek shelter;
- Encouraging upgrading of existing buildings to meet current building codes;
- Enforcing and updating building code standards for light frame construction, especially wind resistant roofs. FEMA articles on bracing for gable trussed roofs and bracing for doors and windows are available for review. Information is also available on placement of HVAC systems and electrical utilities to resist both wind and flood damage; and
- Encouraging underground utility wires.

The Town's policies for mitigating tornado damage are response-oriented and include contributing to regional shelters and debris cleanup equipment, and notifying residents when a tornado could occur. The Town's capabilities are considered to be effective in regards to response to tornadoes. Overall, the Town of Columbia's capability to mitigate for tornadoes and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted because the Town implemented a Reverse 9-1-1 system to notify residents of emergency conditions.

Wildfire Hazards

Risk & Vulnerability:

Wildfire Hazard risk and vulnerability is discussed in Section II.B. The overall risk of Columbia to wildfires is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update does not provide loss estimates by county for wildfires except on Figure 2-52, where the reported annualized loss for the county is reported as being less than $56,040. Table 2-61 of the 2014 State Plan indicates that Tolland County experienced 387 wildfire events that burned an average of 1.53 acres per fire from 1991 to 2013. The number of annualized events is therefore 17.6, and the average acres burned in Tolland County is therefore 26.9 acres per year.

Town staff estimate that wildfires burn less than five acres of land each year in Columbia. The overall cost of property damage due to wildfires is believed to be minimal since vacant lands are typically affected. The Town spends less than $1,000 each year to fight wildfires, with most of the costs attributed to food, equipment, and provisions for the volunteer

firefighters. Based on the above, the annualized loss estimate for the Town of Columbia for wildfire damage is estimated at $750 per year.

Mitigation Efforts

Long periods of drought are one of the primary natural causes of wildfires. Mitigation measures for drought are discussed under that heading. Other mitigation efforts that should be considered include:

- Educating the public on safe fire practices;
- Using fire-resistant material when renovating, building, and retrofitting structures;
- Moving shrubs and other landscaping away from structures;
- Periodically clearing brush and dead grass from property; and
- Acquiring land susceptible to wildfires to maintain it as open space.

The Town uses a variety of regulatory, preparedness, and public information programs to mitigate the effect of wildfires, including the Open Burning Program, maintenance of dry hydrants and cisterns, and educational programs on fire safety. The Town's capabilities are considered to be effective in regards to response to wildfires. Overall, the Town of Columbia's capability to mitigate for wildfires and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted. The Town implemented a Reverse 9-1-1 system to notify residents of emergency conditions, and completed a study to determine where new dry hydrants or cisterns should be installed to improve overall fire protection capabilities, and implemented Connecticut DEEP's updated Open Burning Program (see Section II.B.)

Mitigation Strategies

The Town of Columbia has reviewed the "Risk and Vulnerability Assessment," the strengths and weaknesses of its existing mitigation strategies, and developed proposed mitigation strategies. Based upon internal resources, discussions and meetings with local officials and the general public, this section presents goals, objectives and proposed mitigation strategies. These mitigation strategies guide future efforts to reduce the loss of life and property as a result of natural disasters and attempt to break the expensive cycle of repeated damage and reconstruction. The proposed mitigation strategies are further prioritized to help guide the implementation schedule.

The goal of the Town of Columbia continues to be "to reduce the loss of life and property and economic consequences as a result of natural disasters". The Town identified six objectives in the initial plan to meet this goal:

1. To reduce the likelihood of flooding by improving existing natural and artificial drainage systems.

2. Expand activities related to emergency preparedness and improve natural hazard response capabilities.
3. Whenever practical, incorporate natural hazard mitigation strategies into existing town projects.
4. Reduce the frequency and severity of power outages and road closures as a result of wind and ice storm events.
5. To reduce the likelihood of wildfire hazards by improving water availability.
6. To reduce the likelihood of catastrophic loss as a result of dam failure.

Nine specific tasks were identified in the initial plan to meet these objectives. These tasks are discussed in more detail in the table below:

Status of Strategies and Actions for Columbia from Initial Hazard Mitigation Plan

Obj.	Task	Priority	Responsible Department*	Comment	Status
1	Town-wide inspection and upgrade of faulty culverts and catch basins	High	Public Works	Inspections conducted at least annually with faulty areas added to the capital improvement list. This is now a capability.	Completed
2	Mount a horn on the new fire department or another appropriate building that sounds in an emergency	Medium	Contracted Out	No longer deemed essential as the response system is currently functioning as designed	Deleted
2	Implement a reverse 911 or similar system to alert residents of natural phenomenon and if necessary, to natural emergencies	Medium	Town Administrator, Fire	The Everbridge reverse 9-1-1 system came online in 2010	Completed
2	Ensure that emergency shelters have adequate supplies, especially first aid supplies, to respond to natural emergencies	Medium	Town Administrator	The town supports regional shelters in neighboring towns and does not maintain its own shelter	Deleted
2	Develop a GIS application to assist town personnel in the event of an emergency or natural disaster	High	Contracted Planners	There is no longer any interest in funding and maintaining this application	Deleted
3	Publish all town ordinances and regulations on the town's website including those that mitigate natural hazards	High	Town Administrator	Regulations are now on the website.	Completed
4	Develop a long-term plan to bury power lines in existing development	Low	Contracted Out	There is no longer any interest in funding projects to bury power lines in existing developments	Deleted

Status of Strategies and Actions for Columbia from Initial Hazard Mitigation Plan

Obj.	Task	Priority	Responsible Department*	Comment	Status
5	Study locations in need of dry hydrants or cisterns near wildfire susceptible areas throughout town	Medium	Fire	A study was completed in 2012 leading to a new strategy for this Plan.	Completed
6	Update maps illustrating the inundation zone of Columbia Lake Dam	Medium	Contracted Out	The Town is working on a draft EAP for the dam which includes the inundation zone	Carried Forward, Updated

*Identifying that a task will be "Contracted Out" or will be given to "Contracted Planners" is no longer allowed by FEMA, but is provided in the above table because this is how it was worded in the initial plan. New strategies (below) will not have this identifier.

During the Plan Update process, the Town of Columbia identified two additional objectives to help meet the stated hazard mitigation planning goal:

7. To reduce the likelihood of flooding by improving bridge conditions.
8. Continue to educate the public in areas of natural disasters, mitigation activities, and preparedness.

Current mitigation strategies for the Town of Columbia are presented below. Note that Objective #2 does not have any current strategies. This objective remains applicable and will be reevaluated during the next plan update.

The STAPLEE method was used to assign priority to each strategy as discussed in Section III.B. The STAPLEE analysis scoring is presented in Appendix IV. Scores ranged from 1.5 to 7.0, with a higher STAPLEE score being representative of a higher priority project. Scores less than 4.5 were considered to be "Low" priority, while scores greater than 6.0 were considered to be "High" priority. The intermediate scores were considered to have "Medium" priority.

Based on the STAPLEE methodology, "high" priority projects mitigate the most significant natural hazards that affect the town or multiple natural hazards, are considered feasible, would be effective in avoiding or reducing future losses, seem reasonable for the size of the problem and likely benefits, have political and public support, and improve upon existing programs or support other municipal priorities. All other supporting tasks were assigned a "Medium" or "Low" priority rating based on the same criteria.

Mitigation Strategies for the Town Of Columbia:

Goal: **To reduce the loss of life and property and economic consequences as a result of natural disasters.**

Objective 1: To reduce the likelihood of flooding by improving existing natural and artificial drainage systems.

Task: Upgrade drainage on Hennequin Road, upgrading/retrofitting all culverts on the west side of Hennequin Road, from Recreation Park to Lake Road.

Who: Public Works; Timeframe: 7/2015-6/2016 Priority: Medium

Task: Encourage CT DOT to upgrade drainage system on Route 87 west of Lake Road to Curland and Vanderbilt to mitigate against icing.

Who: Town Administration Timeframe: 7/2015-6/2020 Priority: High

Task: Upgrade drainage system at Parker Bridge Road. Elevate road with cross culverts to mitigate against flooding.

Who: Public Works Timeframe: 7/2019-6/2020 Priority: Medium

Task: Replace culvert pipe and possible basin retrofit at Macht Road.

Who: Public Works Timeframe: 7/2015-6/2016 Priority: Medium

Objective 3: Whenever practical, incorporate natural hazard mitigation strategies into existing town projects.

Task: Identify location for secondary access to Island Woods Subdivision and prepare and file map of proposed street in the office of the town clerk in accordance with CT General Statute Section 8-29.

Who: EMD; DPW; Town Planner Timeframe: 7/2015-6/2018 Priority: Medium

Objective 4: Reduce the frequency and severity of power outages and road closures as a result of wind and ice storm events.

Task: Increase the amount of preventative tree maintenance.

Who: Public Works Timeframe: 7/2015-6/2020 Priority: High

Task: Encourage tree management along private roads through public education on street plantings using Eversource Energy brochures.

Who: Public Works; Eversource Energy Timeframe: 7/2015-6/2020 Priority: Medium

Objective 5: To reduce the likelihood of wildfire hazards by improving water availability.

Task: Install fire protection water cistern at Island Woods Subdivision.

Who: Town Administration; EMD; Public Works Timeframe: 7/2015-6/2017
Priority: High

Objective 6: To reduce the likelihood of catastrophic loss as a result of dam failure.

Task: Create maps illustrating the inundation zone of all high hazard dams and distribute information to property owners with inundation area and info on emergency notification system.

Who: Town Administrator; EMD, Town Planner Timeframe: 7/2017-6/2018
Priority: High

Task: Create Emergency Operations Plan for Columbia Lake Dam (in progress).

Who: Town Administrator; EMD Timeframe: 7/2015-6/2016 Priority: Medium

Objective 7 To reduce the likelihood of flooding by improving bridge conditions.

Task: Update single-lane Roses Bridge Rd/Pucker Street bridge to a double-lane bridge.

Who: Public Works Timeframe: 7/2015-6/2017 Priority: Low

Objective 8: Continue to educate the public in areas of natural disasters, mitigation activities, and preparedness.

Task: Distribute informational materials regarding emergency preparedness. Make 1,000 copies available at the senior center, events and town hall. Use Columbia Crossroads newsletter to notify residents of other resources.

Who: Town Administration; EMD Timeframe: 7/2015-6/2020 Priority: High

Coventry Mitigation:

Scope/Overview

The Risk and Vulnerability Assessment portion of this plan looked at the historical and potential impacts of the following hazards throughout the region: dam failures, droughts, earthquakes, floods, hurricanes, ice jams, severe winter weather, thunderstorms, tornadoes and wind damage, and wildfires. A review of the historical occurrences of each hazard provided valuable information used in assessing potential future risk. A review of each community's resources provided the basis for an analysis of the community's vulnerability to each hazard – the extent to which the community might suffer loss of human life, injuries, and/or property damage.

With an understanding of its risk and vulnerability to natural disasters, the community can take steps prior to such an event to reduce its impacts (loss of property and life). The Connecticut Department of Energy and Environmental Protection (DEEP) has provided guidance in the form of a comprehensive list of possible mitigation measures for each hazard (see Appendix III). In the context of the community's risk and vulnerability assessment, only some of these measures will be cost-effective. The purpose of the Natural Hazard Mitigation Plan (NHMP) is to identify reasonable and appropriate mitigation measures for each hazard.

Certain mitigation practices are beneficial for any disaster, and the following measures are recommended for all communities:

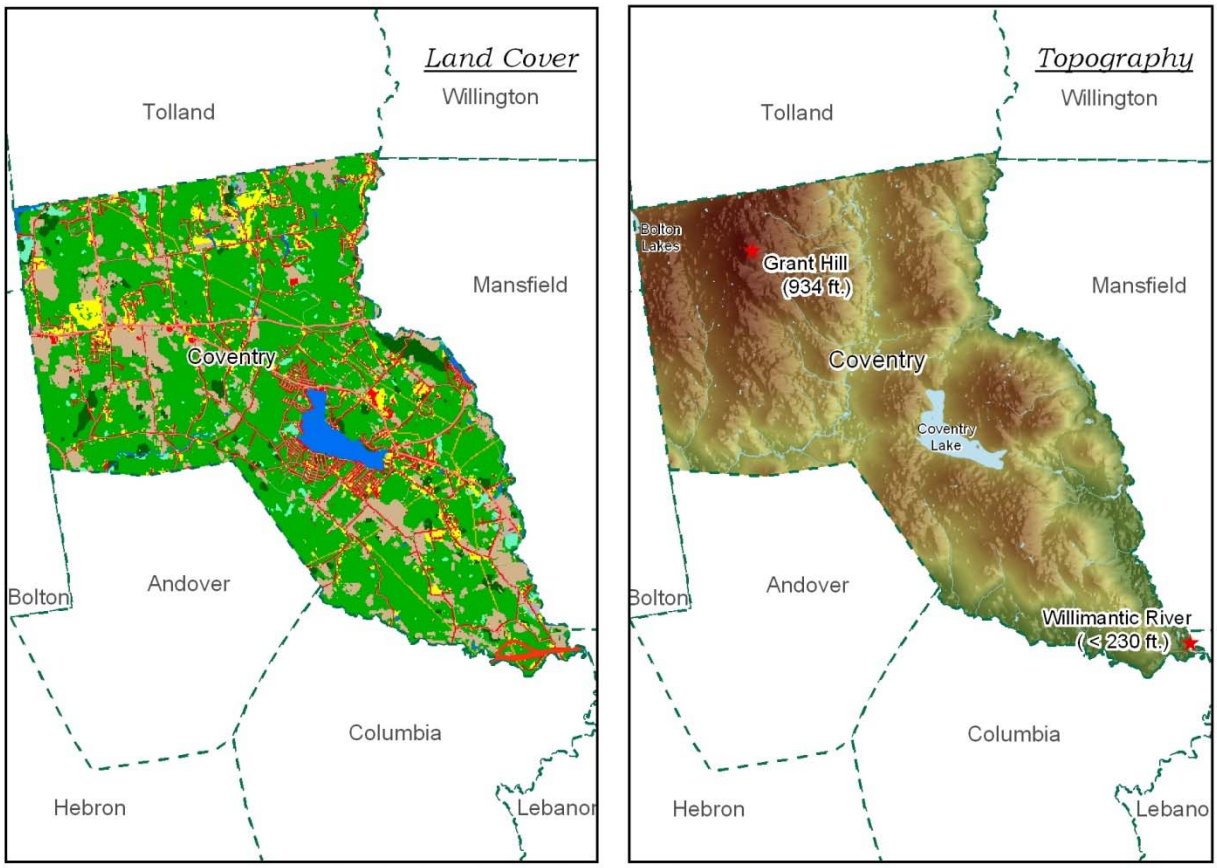
- Encourage all buildings to be improved to meet current building codes. Changes in building codes apply only to new constructions and renovations.
- Educate the public about disaster preparedness and the benefits of mitigation measures. Increasing the public's awareness of possible consequences of natural disasters and how they might better prepare to safeguard their lives and property is an important part of every community's mitigation plan.

General Town Description

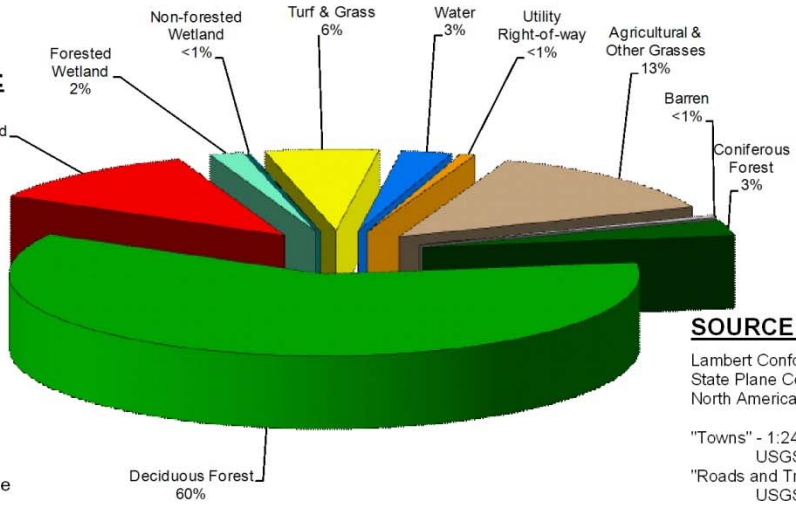
Coventry is located in Tolland County in eastern Connecticut and lies in the south central section of the former WINCOG Region. Coventry has a total area of 38.1 square miles (24,388 acres) and is bounded on the east by Mansfield, on the south by Columbia and Andover, on the north by Tolland, and on the west by Vernon and Bolton. The 2010 Census population count was 12,435 persons, an 8.1% increase from 2000 (11,504). Mainly rural with some agriculture, Coventry is about 11% developed (See Figure 18), an increase of 0.2% from the figure reported in the initial plan. The recent influx of population and residential development increases the town's overall vulnerability to natural hazards. However, new buildings are constructed to more recent building codes (and generally away from floodplains) and are considered to be less vulnerable to natural hazards than older buildings.

Town of Coventry Overview

Figure 18



Coventry Land Cover Breakdown



QUICK TOWN STATS:

Town Area -
38.1 sq. miles
(24,507 acres)

Water body area -
639 acres

Water bodies > 10 acres -
Bolton Lakes
Coventry Lake

Elevation -
Maximum = 934 ft.
Minimum = < 230 ft.

Population -

2000	2010	Change
11,504	12,435	8.1%

0 0.5 1 2 3 4 Miles

Scale: 1:192,000

SOURCE DATA:

Lambert Conformal Conic,
State Plane Coordinate System
North American Datum of 1983 (NAD83)

"Towns" - 1:24,000, 1969-1984, USGS/CT DEP.
"Roads and Trails" - 1:24,000, 1969-1984, USGS/CT DEP.
"Hydrography" - 1:24,000, 1969-1984, USGS/CT DEP.
"National Elevation Dataset" - 30 meter (1 arc second).
"2006 Land Cover Greater Connecticut" - 100 ft sq., 2006, UConn, CLEAR.

October 2012

Prepared for: The Windham Region Council of Governments Hazard Mitigation Plan.

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Coventry has concentrations of people in the vicinity of Coventry Lake and at the condominium complex off Merrow Road.

Critical Facilities and cultural resources in Coventry include (see Figure 19):

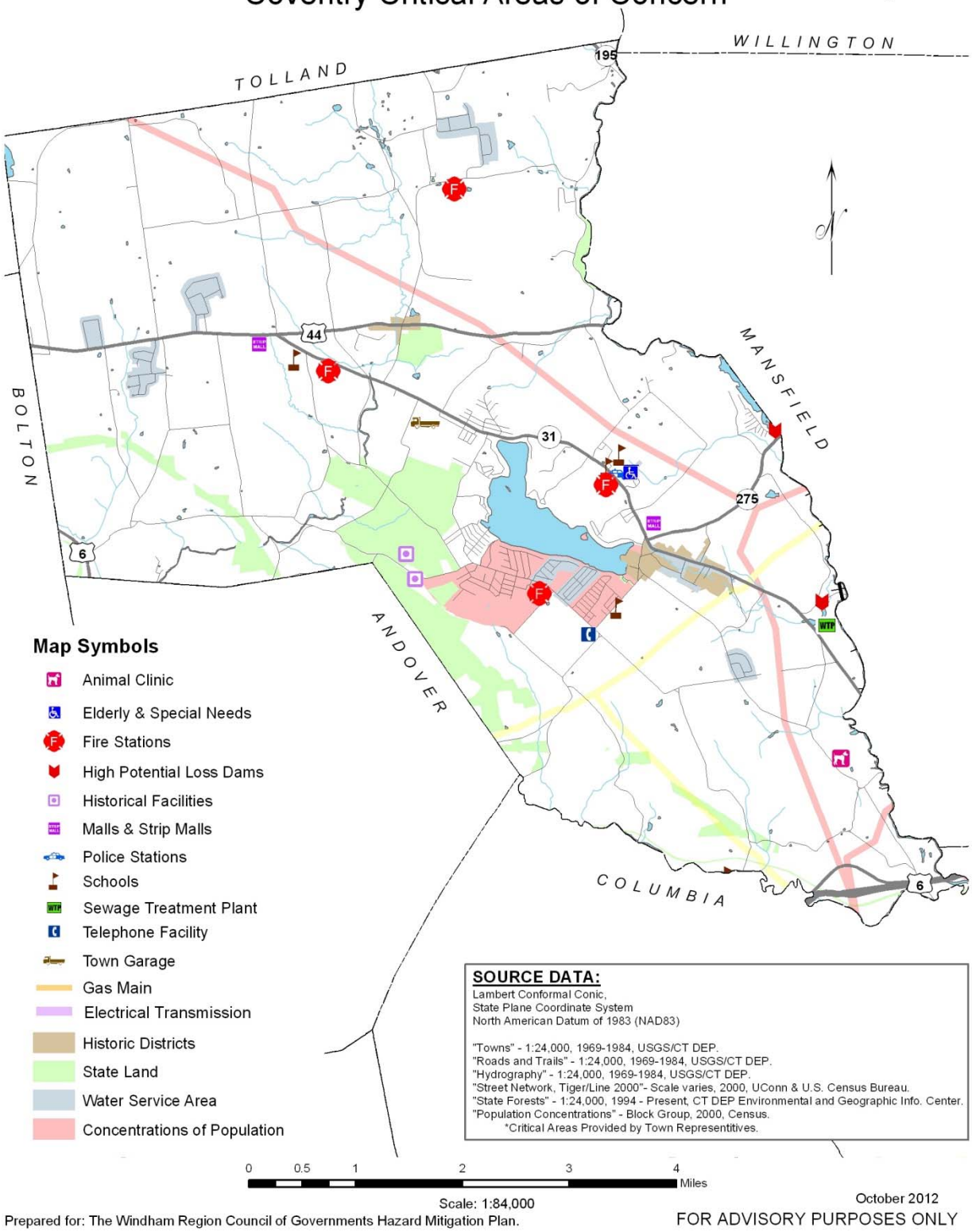
- Two fire departments each with two stations: the North Coventry Volunteer Fire Department has one station off Route 31 and one station off Merrow Road both in the northern portion of town; and the Coventry Volunteer Fire Association has one station off Judd Road and one station off Route 31 in the central portion of town;
- Four schools: one elementary school on Wright's Mill Road and a second elementary school on Cross Street, one middle school on Route, and one high school on Ripley Hill Road;
- One police department off Route 31;
- One equine hospital off Flanders Road;
- Two historical sites: the Nathan Hale Homestead off Nathan Hale Road and the Strong Porter House off South Street;
- One elderly housing community off Route 31;
- Two shopping plazas: one off Route 44 and one off Route 31;
- One telephone switch station off South Street;
- One sewage treatment plant off Route 31;
- Two pump stations and a well at Avery shore off South Street at Lake and at Lake Road off Daly Road; and
- Two high potential loss dams.

Another concern in the town is the fact that Coventry is predominantly forested with large wooded areas, including the Nathan Hale State Forest. This large, wooded area is a potential wildfire or brushfire site, but given the widespread forestation throughout the town, no one area is considered more vulnerable to this threat than another.

Largely forested, Coventry is made up of approximately 60% deciduous forest, 3% coniferous forest and 2% forested wetlands. Other land cover in the town includes: agricultural and other grasses (13%), developed (11%), turf and grass (6%), water (3%), barren land (<1%), utility rights-of-way (<1%) and non-forested wetlands (<1%). The approximate 522 acres of the town occupied by water bodies includes Upper Bolton Lake and Coventry Lake. Coventry's elevation ranges from about 230 feet in the southeast corner of town at the Willimantic River to 934 feet at the peak of Grant Hill in the north/northwest section. In addition to all the natural hazards described previously in this plan on a regional level, Coventry is also at risk of damage caused by flooding and dam failures.

Coventry Critical Areas of Concern

Figure 19



Scale: 1:84,000

October 2012

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Authorities in the Town of Coventry who play advisory, supervisory, or direct roles in hazard mitigation for the Town include:

Authorities	Role			Hazard Mitigated
	Advisory	Supervisory	Direct	
Building Code Board of Appeals			X	All except drought
Building Department	X		X	All except drought
Conservation Commission	X			Flooding
Department of Public Works	X	X	X	All except drought
Emergency Management Director	X	X	X	All
Fire Department			X	Wildfire
Fire Marshall and Open Burning Official	X		X	Wildfire
Inland Wetlands Agent / Town Engineer	X		X	Flooding
Inland Wetlands Commission	X			Flooding
Lake Advisory and Monitoring Committee	X			Flooding
Land Use Office	X			All
Local Emergency Coordinating Committee	X			All
Planning and Zoning Commission	X		X	Flooding
Tree Warden	X		X	All except drought
Town Council		X	X	All
Town Manager		X		All
Zoning Board of Appeals			X	Flooding

Evaluation of Risks & Vulnerability

Dam Failure

Risks & Vulnerability:

Dam failure risk and vulnerability is discussed on a regional level in Section II.B. The overall risk of Coventry to dam failure is considered to be low.

Risk (Extent)

There are 24 dams in Coventry ranging from Hazard Class AA (negligible hazard) to Hazard Class B (significant hazard). A total of 19 dams in the town are classified as negligible or low hazard (Class AA or Class A); failure of any of these dams would hardly be of concern. One dam is classified as moderate hazard (Class BB) and its failure would cause some damage, but no major disruptions. The failure of the significant hazard (Class B) dam could cause serious damage and is of greatest concern in the town. There are also three unassigned dams in the town, but the fact that close watch is kept over significant and high hazard dams suggests that these structures are either moderate, low, or negligible hazards.

Vulnerability (Location, Impact)

The failure of any Class B or Class C dam brings with it damages, economic loss and the potential for loss of life. Roman Pond Dam is located in the southern area of the town,

slightly east. This dam was classified as significant hazard (Class B), meaning that in the event of its failure, besides the definite loss of property and economic losses, the loss of life is possible. However, per an interview with the Coventry Public Works Director, maintenance and repair work was performed since 2010 and the dam is no longer considered a significant hazard by the Town's standards. Lake Waumgumbaug dam, identified by DEEP in 2010 as a low hazard dam, has been identified by engineers as a high hazard after the town performed significant analysis and inspection. Figure 20 shows the placement of dams in the town plus one Class A and one Class C dam which are within 100 feet of the town's border. The Class C dam, Eagleville Lake Dam, located on the eastern edge of town, has the potential of causing damage within the town if it were to fail.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides loss estimates by county for dam failure in Table 2-54. The period of record for these loss estimates is 136 years (1877 through 2013). Based on the data provided in Table 2-54 of the State Plan, the annualized loss for Tolland County for dam failure is $9,385.

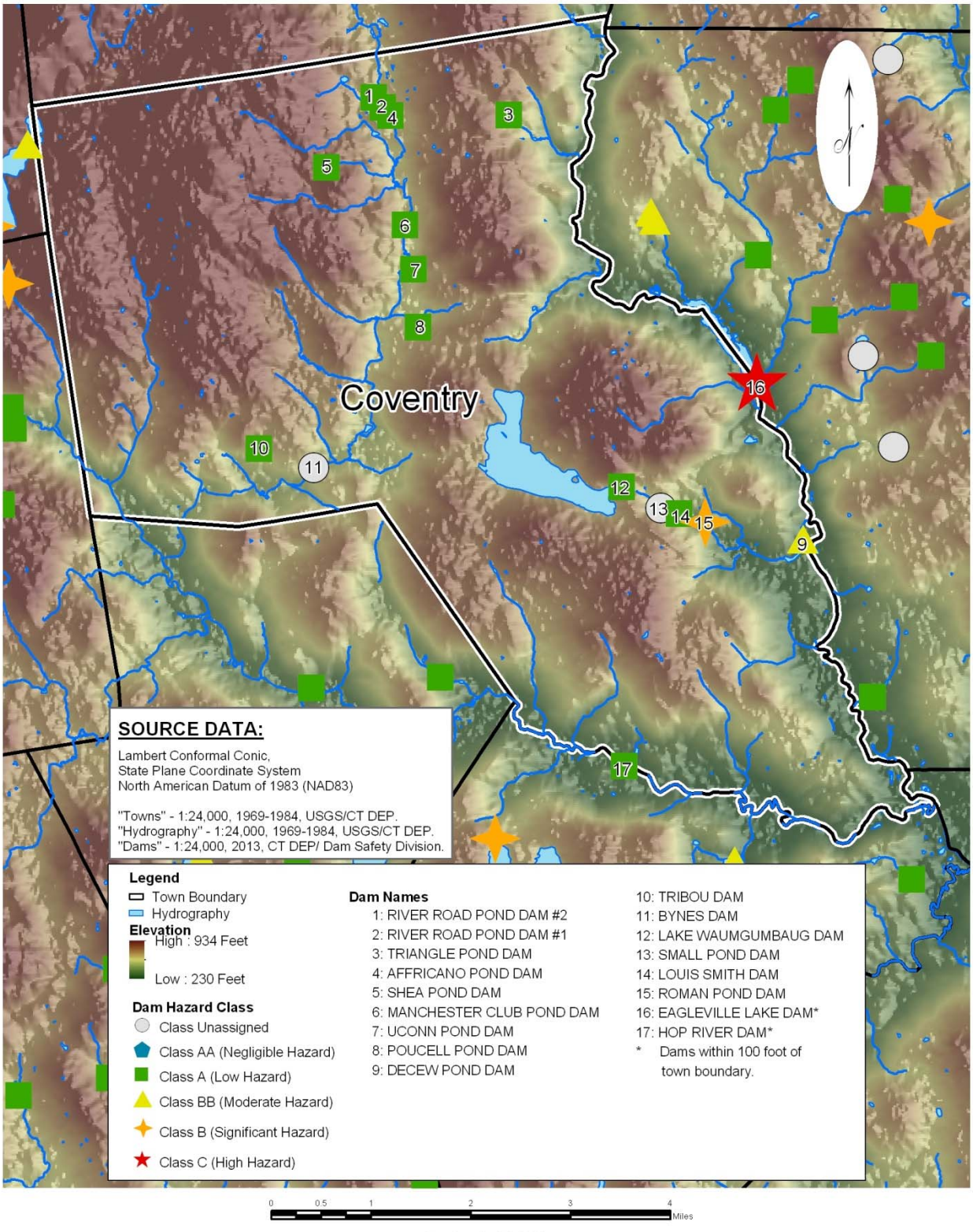
The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Coventry. Based on the 2010 Census data in Section II.A., Coventry has approximately 8.1% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Coventry for dam failure is estimated at $764.

Note that this estimate does not take into account site specific details or particular dam failure damages that may have affected the Town of Coventry in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to dam failure.

Town staff indicate that there has not been any damage to municipal and private structures and infrastructure due to dam failure in recent memory. This is consistent with the relatively minimal annualized loss estimate based on information in the 2014 State Plan.

Town of Coventry Dams

Figure 20



Scale: 1:96,000

March 2014

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Mitigation Efforts

Current state mitigation measures are described on a regional level in Section II.B of the Natural Hazard Mitigation Plan Update. Among these mitigation measures are periodic dam inspections. Periodic inspections help to determine if dams are structurally sound. If a dam's structural integrity is questioned, recommendations made to ensure the safety of the structure may include:

- Any emergency measures or actions, if required to assure the immediate safety of the structure;
- Remedial measures and actions related to design, construction, operation, maintenance and inspection of the structure; additional detailed studies, investigations and analyses; or
- Recommendations for routine maintenance and inspection by the owner.

A total of 21 privately owned dams are in Coventry. Private owners of dams are generally reluctant to make repairs, which tend to be costly. In these instances, needed repairs may not be done in a timely manner.

Whether it is a structurally sound dam or a weak dam, Emergency Operation Plans (EOPs)/Emergency Action Plans (EAPs) are very important mitigation measures. A detailed discussion of these plans is provided in Section II.B. The DEEP works with owners of dams at greatest risk to make certain EOPs are in place and up-to-date. Hurricanes, flooding, ice jams and tornadoes may breach even a well-built dam, given a destructive enough event. Having a plan that lays out how to respond to a disaster, prior to the disaster occurring, is a very important tool in reducing loss of property and life. Mitigation measures for flooding (see below), which is a risk commonly associated with a dam failure, should also be encouraged.

While the state is assuming less responsibility for routine inspection of dams, DEEP will continue recommending measures to lessen the risk of dam failure, and the municipality can take the following mitigation actions:

- For municipally-owned dams, make sure that EOPs/EAPs are in place and current, and implement recommendations resulting from state inspections; and
- For privately-owned dams, encourage each dam owner to have an EOP/EAP in place and current, and implement recommendations resulting from inspections; monitor compliance as possible.

The Town of Coventry has limited policies, programs, and resources dedicated to dam failure since most of these efforts are performed at the State level. The Town of Coventry owns one dam (Lake Waumgumbaug Dam) which is believed to be a high hazard dam despite a recent DEEP classification of Class A. The Town of Coventry expends a small

amount of resources each year to maintain, monitor, and conduct planning for the Lake Waumgumbaug Dam.

The Town's ability to mitigate dam failure is considered to be good for town-owned dams but limited for privately owned dams. Overall, the Town of Coventry's capability to mitigate for dam failure and prevent loss of life and property has significantly increased since the initial hazard mitigation plan was adopted because of recent repairs to Roman Pond Dam as well as a result of recent statewide legislative actions described above and in Section II.B. Over the next few years, it is expected that dam safety programs will continue to strengthen in Connecticut. In addition, the Town of Coventry has recently evaluated the Lake Waumgumbaug Dam, implemented a Reverse 9-1-1 system, upgraded its shelters, improved emergency communications, and created a public information program using the Town's website, email, and the local government access channel.

Drought

Risk & Vulnerability:

Drought risk and vulnerability is discussed in Section II.B. The overall risk of Coventry to drought is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides loss estimates by county for drought in Table 2-69. However, no damages are reported. Therefore, the estimated annualized loss for drought in Coventry would also be $0. The number of annualized events for Tolland County is reported at 0.05.

The Town of Coventry reports that no losses have occurred due to recent droughts including reductions of employment or lost revenue. Fire ponds and dry hydrants have not been impacted. Residents rely on private water supplies or small private community systems. As such, the Town does not have water conservation ordinances or associated costs. Based on the Town's assessment, it is expected that the annualized loss in the Town of Coventry due to drought is minimal (less than $300).

Mitigation Efforts

As with any rural community that depends on aquifers and local well systems, Coventry's vulnerability to drought increases with population growth and the accompanying increased demands for water. Good land use planning and helping the community to understand the importance of water conservation can reduce the threat of drought. Other specific measures that should be considered include:

- Completing a town-wide groundwater study, including recharge into existing aquifers to develop recommendations for future land use patterns;
- Implementing site design techniques and criteria such as strict regulation of vegetative buffers for stream and river corridors, rain gardens for site drainage, and prohibition of wetlands alteration;
- Studying effectiveness of conservation measures; and
- Implementing water conservation awareness programs.

The Town of Coventry does not currently perform mitigation activities for drought. Overall, the Town of Coventry's capability to mitigate for drought and prevent loss of life and property is generally unchanged since the initial hazard mitigation plan was adopted, mainly because drought planning and response occurs at the State level and local public water supply is limited.

Earthquake

Risk & Vulnerability:

Earthquake risk and vulnerability is discussed in Section II.B. The overall risk of Coventry to earthquakes is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides a range of annualized loss estimates by county for earthquakes in Figure 2-66. Based on the data provided in Figure 2-66 of the State Plan, the annualized loss for Tolland County lies between zero and $56,050. To be conservative, the maximum county-wide annualized loss value of $56,050 is utilized herein.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Coventry. Based on the 2010 Census data in Section II.A., Coventry has approximately 8.1% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Coventry for earthquakes is estimated at $4,565.

Note that this estimate does not take into account site specific details or particular earthquake damages that may have affected the Town of Coventry in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to earthquakes.

The Town of Coventry does not recall any municipal or private damages or losses due to recent earthquakes. Emergency calls due to recent earthquakes were not received by emergency staff. The annualized loss estimate of $4,565 based on the values in the 2014 State Plan is therefore likely high but is reasonable enough to use for planning purposes.

Mitigation Efforts

Occurrences of large earthquakes in the region are infrequent. While many mitigation measures may not be cost-effective, the community should consider the following:

- Enforcing effective building codes and local ordinances;
- Encouraging emergency facilities such as hospitals to be constructed to withstand seismic events; and
- Encouraging a low-cost earthquake rider for homeowners and businesses.

The Town does not specifically mitigate for earthquake hazards. Overall, the Town of Coventry's capability to mitigate for earthquakes and prevent loss of life and property is limited and generally unchanged since the initial hazard mitigation plan was adopted, mainly because it is not a high priority because earthquake damage is so infrequent.

Flooding

The overall risk of Coventry to flooding is considered to be moderate.

Risks (Extent)

The Town of Coventry is at risk of flooding because of a number of streams, brooks and ponds in the town. According to the 1979 Federal Emergency Management Agency's (FEMA's) updated Flood Insurance Study (FIS) for the town:

> "Floods in Coventry have occurred in every season of the year. Spring floods are common and are caused by rainfall in combination with snowmelt. Floods in late summer and fall are usually the result of hurricanes or other storms moving northeast along the Atlantic coast. Winter floods result from occasional thaws, particularly in years of heavy snowfall.
>
> Major floods of the past 50 years have occurred in Coventry in March 1936, September 1938, and August and October of 1955. Of these the hurricane-caused flood of August 1955 was by far the most severe in terms of amount of runoff and property damage. The Willimantic River at the U.S. Geological Survey (USGS) gaging station (no. 01119500) just upstream of Route 31 recorded a peak discharge of 24,200 cubic feet per second (cfs) on August 19, 1955. This is equivalent to a flood having a recurrence interval of more than 200 years (4)."

Vulnerability (Location, Impact)

Areas studied for vulnerability, as noted in FEMA's 1979 FIS for the town, are as follows:

> "The areas studied by detailed methods were selected with priority given to all known flood hazard areas, and areas of projected development of proposed construction until 1980.
>
> Approximate methods of analysis were used to study those areas having low development potential and/or minimal flood hazards as identified at the initiation of the study. The scope and methods of study were proposed to and agreed upon by the Federal Insurance Administration and the Town of Coventry.
>
> The flooding sources studied by detailed methods are listed below:
>
> a. The Willimantic River within the corporate limits;
> b. The Skungamaug River within the corporate limits;
> c. Ash Brook from its mouth to State Route 44A; and
> d. The Hop River from the downstream corporate limit to about 700 feet upstream of Parker Bridge Road.
>
> Mill Brook from the outlet of Coventry Lake to its mouth at the Willimantic River and the Hop River from the Andover-Coventry town line to the upstream corporate limit were studied by approximate methods (2)."

A map of the flood risk areas is provided on Figure 21. In addition to the flooding areas of concern on Coventry's FIRM, the town also has three "scour bridges" which are flooding concerns. These are bridges which, by ConnDOT's standards, may be undermined by soil erosion during certain rainfall or stream flow events, thus affecting their stability and safety. Two structures cross the Willimantic River, one on Brigham Road and another on Depot Road. The third crosses the Mill Brook on Depot Road.

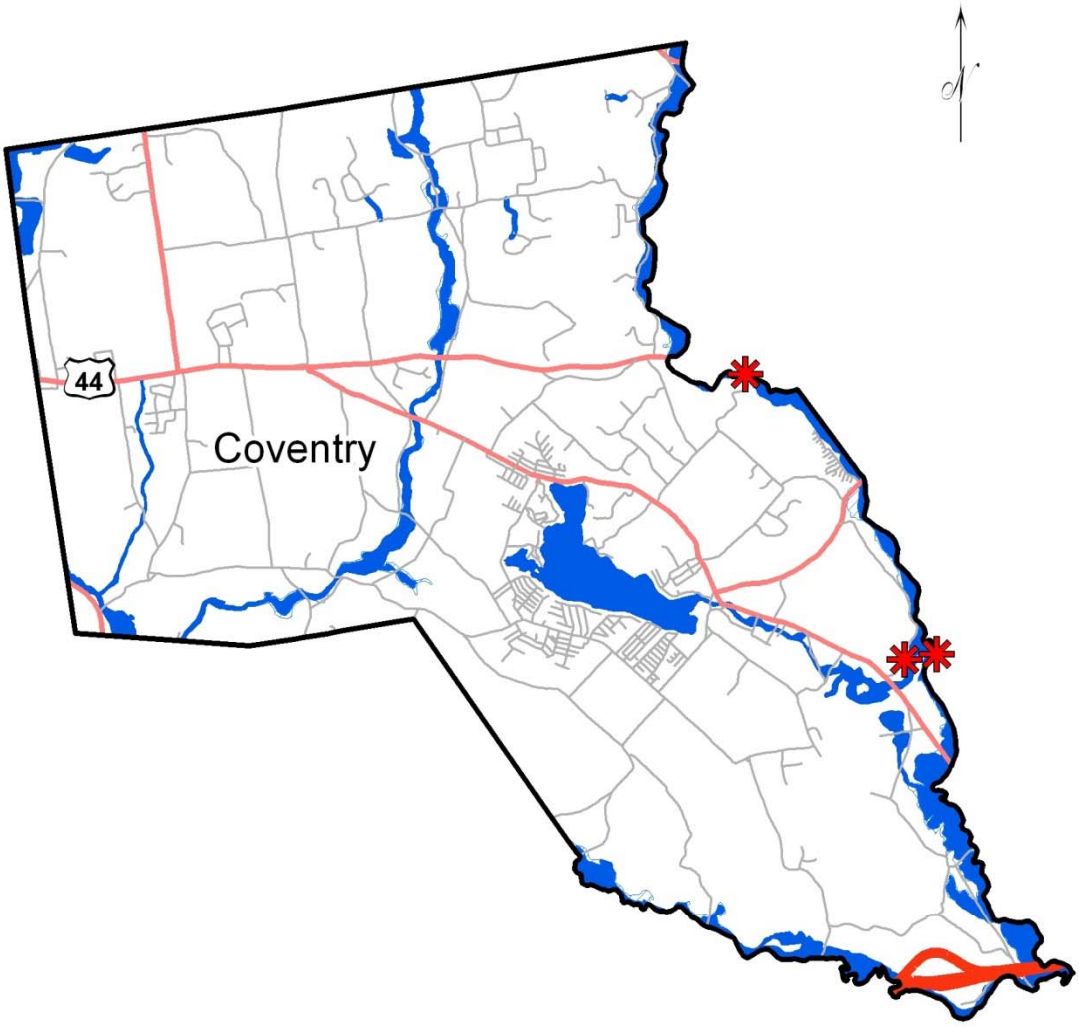
Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of annualized loss by county for flooding in Table 2-44. Based on the data provided in Table 2-44 of the State Plan, the annualized loss for Tolland County based on the historic record through the National Climatic Data Center through the past 20 years is $255,828.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Coventry. Based on the 2010 Census data in Section II.A., Coventry has approximately 8.1% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Coventry for flooding is estimated at $20,834.

Flood Risk Zones of Coventry

Figure 21



Legend

- Scour Bridges
- Major Highways
- Highways
- Local Roads
- 100 Year Flood Zone
- 500 Year Flood Zone

SOURCE DATA:

Lambert Conformal Conic,
State Plane Coordinate System
North American Datum of 1983 (NAD83)

"Towns" - 1:24,000, 1969-1984, USGS/CT DEP.
"Roads and Trails" - 1:24,000, 1969-1984, USGS/CT DEP.
"FEMA Flood Insurance Rate Maps (FIRM)" - scale varies, collection date varies, FEMA.
"Dynamap Transportation v11.3 streets" - Scale varies, 2009,
Tele Atlas North America Inc.
"Scour Critical Town Bridges" - Conndot Bridge Safety + Evaluation, 10/10/2012.

0 0.5 1 2 3 4 Miles

Scale: 1:96,000

October 2012

Prepared for: The Windham Region Council of Governments Hazard Mitigation Plan.

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Note that this estimate does not take into account site specific details or particular flooding damages that may have affected the Town of Coventry in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to flooding.

According to the Town of Coventry, flood damages have been relatively minor in recent years. No public assistance reimbursements were received for flooding in October 2005, April 2007, or October 2010, and no specific damage areas were reported. According to FEMA, The Town of Coventry does not have any repetitive loss or severe repetitive loss properties. Based on the above, the annualized loss estimate of $20,834 is likely high, but is still considered reasonable for planning purposes.

Mitigation Efforts

The Town of Coventry has consistently participated in the NFIP since June 4, 1980. The most recent FIRM was published on June 11, 1982. The current Town of Coventry FIS was published December 1979. The original FIS and FIRMs for flooding sources in the Town are based on work completed in March 1978. Many of the local flooding problems are consistent with the floodplains mapped by FEMA.

Section 5.06 of the Town of Coventry's current zoning regulations include limitations in the flood zone[δ], and may be found on the town's web site: www.coventryct.org. The flood regulations were last revised on June 15, 2012 and include the following regulations:

- New construction and substantial improvement of any residential structures shall have the lowest floor, including basement, elevated to or above the base flood elevation (Section 5.06.07(c)).

- New construction and substantial improvement of non-residential structures shall have the lowest floor, including basement, elevated to or above the base flood elevation, or may be flood proofed in lieu of being elevated provided that together with all attendant utilities and sanitary facilities the areas of the structure below the base flood elevation are watertight and walls substantially impermeable to the passage of water, and use structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effect of buoyancy (Section 5.06.07(d)).

- All new construction and substantial improvements shall be anchored to prevent flotation, collapse or lateral movement of the structure (Section 5.06.07(h)).

[δ] The flood zone being the Flood Hazard Zones, designated as Zones A-1 through A-15 and unnumbered A Zones (areas of the 100-year flood). (Coventry Zoning Regulations Section 5.06.01)

- Encroachments, including fill, new construction, substantial improvements to existing structures and other development are prohibited in the floodway unless certification by a registered professional engineer is provided by the applicant demonstrating that such encroachment shall not result in any increase in flood levels during the occurrence of the 100 year flood discharge (Section 5.06.07(i)).

- No new construction, substantial improvement, or other development (including fill) shall be permitted within the floodplain unless the applicant demonstrates that the cumulative effect of the proposed development combined with all other existing and anticipated development will not increase the water surface elevation of the base flood more than one (1.0) foot at any point within the community (Section 5.06.07(j)).

- To verify compliance, "as built" first floor and basement elevations and final ground elevations shall be submitted to the Zoning Agent for authorized primary structures, major additions, major land disturbing activities or any other development where certifications are necessary. Elevations must be certified by a professional engineer or land surveyor (Section 5.06.08).

Coventry's regulations require that proposed structures meet elevation requirements and strict construction demands. Structures may be required to be constructed with certain materials, elevated, flood proofed, watertight or anchored. It must be shown that with not only proposed structures, but also with any activity in the 100-year flood plain, that encroachment will not significantly alter the flood levels. These types of regulations help to keep structures out of areas at risk of flooding. Structures that are allowed in the flood plain must meet requirements put in place to greatly reduce the risk of damage to property and the loss of life, should a flood occur.

The degree of flood protection established by the variety of regulations in the Town meets the minimum reasonable for regulatory purposes under the NFIP. The Town plans to remain compliant with the NFIP and will continue to participate in the NFIP.

Additional mitigation measures recommended for all towns in the region include:

- Educating the public on
  - Risks of flooding,
  - Risks of building in hazard-prone areas,
  - Federal Emergency Management Agency (FEMA) floodplain maps (and making these maps easily available to the public);
- Implementing a maintenance program to clear debris from storm water drainage areas;
- Developing sediment control to prevent clogged drainage systems, such as street sweeping, curb and gutter cleaning, paving dirt roads, and planting vegetation on bare ground;
- Investigating the use of flood-prone areas as open spaces;

- Encouraging individuals in flood-prone areas to purchase flood insurance;
- Elevating structures above the 100-year flood level; and
- Considering the conservation of open space by acquisition of repetitive loss structures.

The Town of Coventry has several scour bridges. The Depot Road bridge and the Brigham Road bridge over the Willimantic River, as both structures are scour bridges for the 10-year flood event. Town staff inspect these bridges for scour following flood events of this magnitude.

The Town's capabilities are considered to be effective in regards to response to flood damage, and the Town's capability to mitigate flood hazard damage is also considered effective for preventing damage to new development and substantial improvements. Overall, the Town of Coventry's capability to mitigate for flooding and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted. This is because the Town has implemented a series of drainage improvements at the western end of Avery Shore to reduce flood damages in the area, has implemented a Reverse 9-1-1 system to contact residents in cases of emergency conditions, and the Town now posts is regulations on its website. Furthermore, the Town now has a more formalized inspection and upgrade program for faulty culverts and catch basins, with inspections of areas conducted annually and faulty areas added to the capital improvement list.

Stormwater

Stormwater runoff can significantly exacerbate flooding; therefore, managing stormwater runoff is a priority mitigation measure. Residential and commercial development increases impervious land area, reduces the infiltration of stormwater runoff into the ground, and increases the volume and velocity of stormwater runoff causing flooding. Enforcing appropriate maintenance programs for stormwater facilities will therefore help reduce the impact of these events and subsequently reduce the damage caused by flooding. A good stormwater management system promotes groundwater recharge and controls peak flows, while reducing local flooding and maintaining stream bank integrity. An example of a good stormwater management system would be one that calls for removing sediment accumulation from catch basins yearly. This may make the difference in whether or not flooding occurs. Coventry is encouraged to develop a municipal stormwater management plan. All towns within the region are also encouraged to consider the effects of proposed future development on stormwater runoff.

Hurricanes

Risk & Vulnerability:

Hurricane risk and vulnerability is discussed in Section II.B. The overall risk of Coventry to hurricanes is considered to be high.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of hurricane wind losses for a variety of hurricane wind events by county in Table 2-21. This data was developed using HAZUS-MH. Based on the data provided in Table 2-21 of the State Plan, the predicted annualized loss for Tolland County due to hurricane wind damage is $10,347,317.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Coventry. Based on the 2010 Census data in Section II.A., Coventry has approximately 8.1% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Coventry for hurricane wind damage is estimated at $842,675.

Note that this estimate does not take into account site specific details or particular hurricane wind damages that may have affected the Town of Coventry in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to hurricane wind damage.

The Town of Coventry received a public assistance reimbursement of $69,652.09 related to cleanup following Hurricane Irene, and a public assistance reimbursement of $30,277.81 for Hurricane Sandy. Public assistance reimbursements were not received for Hurricane Bob. Other notable losses were not reported to the Town, but were expected to have been incurred by property owners on some scale during these strong wind events.

Mitigation Efforts

Some of the greatest damage from hurricanes is caused by flooding, high winds and tornadoes. Mitigation measures for these events are looked at separately in the flooding and tornado/wind damage sections. Other mitigation efforts that should be considered include:

- Providing emergency shelters;
- Implementing a tree hazard management program, which would encourage responsible planting practices and minimize future storm and insect damage to buildings, utilities, and streets;
- Practicing a tree trimming maintenance program; and
- Relandscaping with native species.

The Town maintains shelter facilities and performs debris management through Public Works with the assistance of the local electrical utility when necessary. The Town's capabilities are considered to be effective with regard to mitigating hurricane damage.

Overall, the Town of Coventry's capability to mitigate for hurricanes and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted, because the Town has implemented a Reverse 9-1-1 system, the State building code has been updated and locally adopted, the Town's sheltering resources and emergency communications have been expanded, and other flooding mitigation measures have been completed.

Ice Jams

Risk & Vulnerability:

Ice jam risk and vulnerability is discussed in Section II.B. The overall risk of Coventry to ice jams is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update indicates that ice jams have not occurred in Connecticut since 2010. Due to the infrequency of the hazard and the limited information available regarding damages, it is no longer considered a separate hazard from flooding. The potential annualized loss estimate due to ice jams in Coventry is therefore included in the annualized loss estimate for flooding presented above.

The Town of Coventry has not experienced any damage due to ice jams or ice jam flooding in recent memory.

Mitigation Efforts

During ice jams the biggest concern is the risk of flooding. See mitigation measures under flooding (above).

Severe Winter Storms

Risk & Vulnerability (Impact):

Severe winter storm risk and vulnerability is discussed in Section II.B. Key risks are the relative isolation of the rural communities from emergency services; loss of electrical power to large areas from ice accumulation or high winds, and fire from improper use of alternative heating sources, candles and gas stoves. The leading cause of death is from automobile and other transportation accidents. Property damage can also occur from frozen water pipes and falling trees or branches from ice accumulation and/or wind. The overall risk of Coventry to severe winter storms is considered to be high.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of severe winter storm losses for a variety of events by county in Table 2-35. This data was developed based on damages reported in the NCDC database. Based on the data provided in Table 2-35 of the State Plan, the predicted annualized loss for Tolland County due to severe winter storm damage is $532,131.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Coventry. Based on the 2010 Census data in Section II.A., Coventry has approximately 8.1% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Coventry for severe winter storm damage is estimated at $43,336.

Note that this estimate does not take into account site specific details or particular severe winter storm damages that may have affected the Town of Coventry in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to severe winter storm damage.

The Town of Coventry received a public assistance reimbursement of $35,956.17 related to the heavy snow in January and February 2011. The heavy snows resulted in major damage to the roof of an equestrian riding center resulting in the building needing to be demolished and rebuilt. An estimate of the cost to rebuild this facility is not immediately available.

The public assistance reimbursement following Winter Storm "Alfred" in late October 2011 was $38,417.18, and the public assistance reimbursement for Winter Storm "Nemo" in February 2013 was $74,316.05. Damages to town-owned buildings were not reported. Other notable losses were not reported to the Town, but were expected to have been incurred by property owners on some scale during these severe winter storm events.

Mitigation Efforts (see also flooding and tornado/wind damage)

Some of the greatest damage from winter storms is caused by flooding and high winds, and mitigation measures for such hazards are discussed under those headings.

It is particularly important to encourage people to stay indoors and out of harm's way when severe winter weather threatens. Such conditions increase the frequency of traffic accidents and emergency responders take longer to reach accident scenes because of vehicles unnecessarily on the roads.

Power outages can cause a number of problems, from loss of heat and the risk of frozen pipes to fire hazards. Tree-trimming programs can lessen the risk of power outages to some

extent. Putting utility wires underground can lessen the risk even further. In any event, the municipality should develop a plan to restore power as quickly as possible.

The National Weather Service's Early Warning System is an important mitigation measure for winter storms. Other hazard-specific mitigation efforts that should be considered include:

- Educating the public on
  - The risks of hypothermia,
  - The risks of carbon monoxide poisoning in motor vehicles and from portable heaters and power generators in homes,
  - The risk of fires from portable heaters and candles,
  - The importance of staying off the roads,
  - Landscaping practices that encourage the planting of species that are less susceptible to damage from ice storms to reduce the risk of damage to structures;
- Implementing a tree trimming maintenance program;
- Encouraging underground utility wires; and
- Providing emergency shelters before, during, and after the event.

The Town maintains shelters and provides plowing services through Public Works. The Town's capabilities are considered to be effective in regards to response to severe winter storms, although the Town's capability to mitigate severe winter storm damage is relatively limited to town-owned facilities. Overall, the Town of Coventry's capability to mitigate for severe winter storms and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted, because the Town implemented a Reverse 9-1-1 system to notify residents of emergency conditions, the sheltering capability of the Town has improved, and a public information program has been implemented.

<u>Thunderstorms</u>

Risk & Vulnerability:

Thunderstorm risk and vulnerability is discussed in Section II.B. The overall risk of Coventry to thunderstorms is considered to be moderate.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of thunderstorm losses by county in Table 2-19. This data was developed based on damages reported in the NCDC database. Based on the data provided in Table 2-19 of the State Plan, the predicted annualized loss for Tolland County due to thunderstorm damage is $55,581.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Coventry. Based on the 2010 Census data in

Section II.A., Coventry has approximately 8.1% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Coventry for thunderstorm damage is estimated at $4,526.

Note that this estimate does not take into account site specific details or particular thunderstorm damages that may have affected the Town of Coventry in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to thunderstorm damage.

The Town of Coventry has not incurred additional costs for localized severe thunderstorms that are not met within the regular operating budget. Private losses are not typically reported to the Town, but are expected to be incurred by property owners on some scale during severe thunderstorm events.

Mitigation Efforts (see also wildfires, flooding and tornado/wind damage)

Some of the greatest damage from thunderstorms is caused by fires, flooding, high winds, and (on occasion) tornadoes. Mitigation measures for such hazards are discussed under those headings.

The National Weather Service's Early Warning System is an important mitigation measure for thunderstorms. Other hazard-specific mitigation efforts that should be considered include:

- Educating the public on how to minimize risk of injury both indoors and outdoors (more specific);
  - When to turn off gas, electricity, and water; and
  - When and how to avoid contact with water and metal.
- Clearing dead or rotting tree branches;
- Securing outdoor objects that could become projectiles; and
- Installing lightning rods.

The Town notifies the public when severe thunderstorms are to occur, and performs debris management through Public Works with the assistance of the local electrical utility when necessary. The Town's capabilities are considered to be effective in regards to response to thunderstorms, although the Town's capability to mitigate thunderstorm damage is relatively limited to town-owned facilities and right-of-ways. Overall, the Town of Coventry's capability to mitigate for thunderstorms and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted because the Town implemented a Reverse 9-1-1 system to notify residents of emergency conditions, and because the local electrical utility has performed an intensive trimming program near electrical lines following the severe storms in 2011.

Tornado/Wind Damage

Risk & Vulnerability:

Tornado/Wind Damage risk and vulnerability is discussed in Section II.B. The overall risk of Coventry to tornadoes is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of tornado losses for a variety of events by county in Table 2-30. This data was developed based on damages reported in the NCDC database. Based on the data provided in Table 2-30 of the State Plan, the predicted annualized loss for Tolland County due to tornado damage is $44,371.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Coventry. Based on the 2010 Census data in Section II.A., Coventry has approximately 8.1% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Coventry for tornado damage is estimated at $3,614.

Note that this estimate does not take into account site specific details or particular tornado damages that may have affected the Town of Coventry in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to tornado damage.

The Town of Coventry reported experiencing an EF-1 tornado on July 10, 2013. One privately-owned building received roof damage and numerous trees were uprooted. Cleanup by town staff occurred during normal business hours within the regular budget. These damages are consistent with the annualized loss estimate of $3,614 presented above.

Mitigation Efforts

While the region has a very low risk of experiencing a tornado with great destructive potential, basic measures to minimize damage from high winds can be implemented and public education efforts can help to prepare residents. Owners of older mobile homes should be particularly aware of mitigation measures that could protect their homes from damage.

The National Weather Service's Early Warning System is an important mitigation measure for tornado/wind damage events. Other hazard-specific mitigation efforts that should be considered include:

- Being aware of, and educating the public through pamphlets and web-based information on
  - The warning signs for a tornado,
  - The importance of securing outdoor objects that could become projectiles,
  - What kinds of buildings are most vulnerable to damage from tornadoes or high winds (such as manufacture housing),
  - Structural alterations to protect against wind damage,
  - When and where to seek shelter;
- Encouraging upgrading of existing buildings to meet current building codes;
- Enforcing and updating building code standards for light frame construction, especially wind resistant roofs. FEMA articles on bracing for gable trussed roofs and bracing for doors and windows are available for review. Information is also available on placement of HVAC systems and electrical utilities to resist both wind and flood damage; and
- Encouraging underground utility wires.

The Town's policies for mitigating tornado damage are response-oriented and include maintaining shelters and debris cleanup equipment, and notifying residents when a tornado could occur. The Town's capabilities are considered to be effective in regards to response to tornadoes. Overall, the Town of Coventry's capability to mitigate for tornadoes and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted because the Town implemented a Reverse 9-1-1 system to notify residents of emergency conditions, upgraded the local shelters, and implemented a public information program to inform the public on how to prepare and respond to natural hazards and emergencies.

Wildfire Hazards

Risk & Vulnerability:

Wildfire Hazard risk and vulnerability is discussed in Section II.B. The overall risk of Coventry to wildfires is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update does not provide loss estimates by county for wildfires except on Figure 2-52, where the reported annualized loss for the county is reported as being less than $56,040. Table 2-61 of the 2014 State Plan indicates that Tolland County experienced 387 wildfire events that burned an average of 1.53 acres per fire from 1991 to 2013. The number of annualized events is therefore 17.6, and the average acres burned in Tolland County is therefore 26.9 acres per year.

Town staff report that wildfires are a minimal problem in Coventry and do not require additional expenditures outside of normal operating budgets. It is estimated that the annualized loss due to wildfires in Coventry is less than $500 per year.

Mitigation Efforts

Long periods of drought are one of the primary natural causes of wildfires. Mitigation measures for drought are discussed under that heading. Other mitigation efforts that should be considered include:

- Educating the public on safe fire practices;
- Using fire-resistant material when renovating, building, and retrofitting structures;
- Moving shrubs and other landscaping away from structures;
- Periodically clearing brush and dead grass from property; and
- Acquiring land susceptible to wildfires to maintain it as open space.

The Town uses a variety of regulatory, preparedness, and public information programs to mitigate the effect of wildfires, including the Open Burning Program, maintenance of dry hydrants and cisterns, and educational programs on fire safety. The Town's capabilities are considered to be effective in regards to response to wildfires. Overall, the Town of Coventry's capability to mitigate for wildfires and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted. The Town implemented a Reverse 9-1-1 system to notify residents of emergency conditions, installed additional dry hydrants and cisterns to improve overall fire protection capabilities, implemented a public education program, and implemented Connecticut DEEP's updated Open Burning Program (see Section II.B.)

Mitigation Strategies

The Town of Coventry has reviewed the "Risk and Vulnerability Assessment," the strengths and weaknesses of its existing mitigation strategies, and developed proposed mitigation strategies. Based upon internal resources, discussions and meetings with local officials and the general public, this section presents goals, objectives and proposed mitigation strategies. These mitigation strategies guide future efforts to reduce the loss of life and property as a result of natural disasters and attempt to break the expensive cycle of repeated damage and reconstruction. The proposed mitigation strategies are further prioritized to help guide the implementation schedule.

The goal of the Town of Coventry continues to be "to reduce the loss of life and property and economic consequences as a result of natural disasters". The Town identified 12 objectives in the initial plan to meet this goal:

1. To reduce the likelihood of flooding by improving bridge conditions.
2. To reduce the likelihood of wildfire hazards by improving water availability.
3. To reduce the likelihood of flooding and icy conditions by improving existing road conditions.

4. To reduce the likelihood of flooding by improving existing natural and artificial drainage systems.
5. Reduce costs associated with providing emergency services and other public services in the event of a natural disaster.
6. Reduce the amount of debris from severe storms through preventative tree maintenance.
7. Expand activities related to emergency preparedness and improve natural hazard response capabilities.
8. Whenever practical, incorporate natural hazard mitigation strategies into existing town projects.
9. Educate the public in areas of natural disasters, mitigation activities, and preparedness.
10. To reduce the likelihood of flooding, evaluate property prone to flooding.
11. To reduce the likelihood of catastrophic loss as a result of dam failure.
12. Update Flood Insurance Rate Maps (FIRMs) and Floodway Maps based on an engineered study.

A total of 26 specific tasks were identified in the initial plan to meet these objectives. These tasks are discussed in more detail in the table below:

Status of Strategies and Actions for Coventry from Initial Hazard Mitigation Plan

Obj.	Task	Priority	Responsible Department*	Comment	Status
1	Replace construction on Parker Bridge crossing the Hop River	Low	Contracted Out	This was completed in 2008	Completed
1	Examine Pucker Street Bridge crossing the Hop River	Low	Contracted Out	This bridge inspection was contracted out. This single-lane bridge will be upgraded to a double-lane bridge. Design underway in 2014 in coordination with the Town of Columbia	Completed, Updated
1	Examine Depot Road Bridge crossing the Willimantic River	High	Public Works, Contracted	Inspections are performed following 10-year river flow events. This is a capability.	Completed
1	Examine Brigham Road Bridge crossing the Willimantic River	High	Public Works, Contracted	Inspections are performed following 10-year river flow events. This is a capability.	Completed
2	Add dry hydrants or underground cisterns near wildfire susceptible areas around town based on finding from study already conducted	High	Contracted Out, Public Works	Additional water sources were installed throughout town in 2009	Completed

Status of Strategies and Actions for Coventry from Initial Hazard Mitigation Plan (Continued)

Obj.	Task	Priority	Responsible Department*	Comment	Status
2	Seek grant for large 2,000 gallon tanker fire apparatus	High	Fire, Town Manager, CT DEP	A grant was not obtained but is still needed for this action to be completed. The current largest capacity truck is 1,000 gallons	Carried Forward
3	Improve the intersection of South Street, Swamp Road, and Swamp Road Extension where there are drainage problems	High	Contracted Out	Not completed due to lack of funding	Carried Forward
3	Improve roads around the lake area where flash flooding issues (especially at the western end of Avery Shore) cause residential property damage multiple times during the year	High	Contracted Out	Some work was completed by a contractor overseen by Public Works in 2008, but additional areas remain due to time and funding constraints	Partially Completed, Carried Forward
4	Town-wide inspection and upgrade of faulty culverts and catch basins	High	Contracted Out, Public Works	Inspections conducted at least annually with faulty areas added to the capital improvement list. This is a capability.	Completed
4	Encourage state to restore silted-in ponds along Mill Stream in the village from Coventry Lake to the Willimantic River in order to restore their flood attenuation capacity	Medium	Contracted	Efforts to make this a state project did not succeed. This action has been carried forward and updated	Carried Forward, Updated
5	Upgrade five of the town's plows with liquid spreaders	Medium	Public Works	This was not performed as it is no longer desired by the town. This action has been updated based on current needs	Updated
6	Based on the results of the hazardous tree survey, remove dead, dying, dangerous, or diseased trees	High	Public Works	Some tree removal work was completed. This action has been updated to reflect a focus on the Ash tree	Updated
7	Work with Capitol Region COG to implement a reverse 911 or similar system to alert residents of natural phenomenon and if necessary, evacuation procedures	High	Town Manager, Fire, Police	Coventry implemented the Everbridge reverse 9-1-1 system in 2010	Completed
7	Develop a strategy and obtain the necessary equipment to provide adequate heat at emergency shelters, specifically acquire a new generator at the town hall	High	EMD, Town Manager	This planning and the new generator were acquired in 2009	Completed

Status of Strategies and Actions for Coventry from Initial Hazard Mitigation Plan (Continued)

Obj.	Task	Priority	Responsible Department*	Comment	Status
7	Use grants to obtain additional cots and bedding to adequately serve the emergency shelters in the event of an emergency or natural disaster	High	EMD, Town Manager	The additional supplies were acquired in 2010	Completed
7	Ensure that emergency shelters have adequate supplies to respond to natural emergencies	High	EMD, Town Manager	This assessment was completed in 2011 and is updated annually	Completed
7	Develop a GIS application to assist town personnel in the event of an emergency or natural disaster	High	Planning Office	This was completed in 2009	Completed
7	Evaluate a trunking communication system throughout the town for emergency personnel and first responders	High	Police, Fire, Town Manager	The evaluation was completed in 2010	Completed
8	Use the Government Access Channel to inform the Coventry public about how to prepare and respond to hazards and emergencies and to encourage residents to be prepared to help others in need	High	Police, Fire, Town Manager	Specific programs were conducted on the channel in 2005 and 2013	Completed
8	Publish all town ordinances and regulations on the town's website including those that mitigate natural hazards	High	Town Clerk	This was completed in 2013	Completed
9	Visit schools and educate children about the risks of floods and other natural hazards and how to prepare for them	High	Police, Fire Marshal	This action was not completed due to time and funding constraints	Carried forward
9	Make available literature on natural disasters and preparedness at Coventry Town Hall and at the Booth and Dimock Memorial Library	High	Police, Fire Marshal	This strategy was only partially completed due to insufficient time and funding. More information needs to be distributed	Partially Completed, Carried Forward
9	Make available information on natural disasters and preparedness on Coventry's website with links to state and federal resources	High	Police, Fire Marshal	This action was only partially completed due to insufficient time and funding. Some information is now available online	Partially Completed, Carried Forward

Status of Strategies and Actions for Coventry from Initial Hazard Mitigation Plan (Continued)

Obj.	Task	Priority	Responsible Department*	Comment	Status
10	Conduct a study and acquire property in the floodplain through grants and donations	Medium	Town Manager, Conservation Commission	This was not completed as funding was not available to conduct the study	Carried Forward
11	Urge FEMA to update maps illustrating the inundation zone of Roman Pond Dam	Medium	Contracted Out, Public Works	The private dam owner updated the inundation mapping in 2008	Completed
12	Urge FEMA to conduct an engineered study of the town to develop more accurate FIRMs and floodway maps	Medium	Planning Department	Efforts to convince FEMA to update FIRMs were not successful. There is a renewed commitment to this effort.	Carried Forward

*Identifying that a task will be "Contracted Out" is no longer allowed by FEMA, but is provided in the above table because this is how it was worded in the initial plan. New strategies (below) will not have this identifier. For a similar reason, the term DEP is still used in the above table even though the agency is now known as DEEP.

During the Plan Update process, the Town of Coventry did not identify any additional objectives to help meet the stated hazard mitigation planning goal.

Current mitigation strategies for the Town of Coventry are presented below. Note that Objective #8 does not have any current strategies. This objective remains applicable and will be reevaluated during the next plan update.

The STAPLEE method was used to assign priority to each strategy as discussed in Section III.B. The STAPLEE analysis scoring is presented in Appendix IV. Scores ranged from 1.5 to 8.5, with a higher STAPLEE score being representative of a higher priority project. Scores less than 5.0 were considered to be "Low" priority, while scores greater than 6.0 were considered to be "High" priority. The intermediate scores were considered to have "Medium" priority.

Based on the STAPLEE methodology, "high" priority projects mitigate the most significant natural hazards that affect the town or multiple natural hazards, are considered feasible, would be effective in avoiding or reducing future losses, seem reasonable for the size of the problem and likely benefits, have political and public support, and improve upon existing programs or support other municipal priorities. All other supporting tasks were assigned a "Medium" or "Low" priority rating based on the same criteria.

Mitigation Strategies for the Town Of Coventry:

Goal: **To reduce the loss of life and property and economic consequences as a result of natural disasters.**

Objective 1: To reduce the likelihood of flooding by improving bridge conditions.

Task: Update single-lane Pucker Street bridge to a double-lane bridge with increased water capacity. Under design as of March 2014.

Who: Town Engineer; Timeframe: 7/2015-7/2017 Priority: Low

Objective 2 To reduce the likelihood of wildfire hazards by improving water availability.

Task: Seek grant for large 2,000 gallon tanker fire apparatus. Current largest capacity truck is 1000.

Who: Emergency Services Coordinator Timeframe: 7/2015-6/2020 Priority: High

Objective 3: To reduce the likelihood of flooding and icy conditions by improving existing road conditions.

Task: Improve the intersection of South Street, Swamp Road and Swamp Road Extension, where there are drainage problems.

Who: Town Engineer Timeframe: 7/2018-6/2019 Priority: Low

Task: Improve roads around the lake area where there are flash flooding issues.

Who: Town Engineer; Public Works Timeframe: 7/2015-6/2020 Priority: Medium

Objective 4: To reduce the likelihood of flooding by improving existing natural and artificial drainage systems.

Task: Substantially change the collection of stormwater and improve redistribution through silted-in ponds along Mill Stream in the village from Coventry Lake to the Willimantic River.

Who: ConnDOT; Town Engineer Timeframe : 7/2015-6/2016 Priority: Low

Objective 5: Reduce costs associated with providing emergency services and other public services in the event of a natural disaster.

Task: Upgrade all town plows to salt/slurry mixture spreaders.

Who: Public Works Timeframe: 7/2015-6/2020 Priority: Low

Objective 6: Reduce the amount of debris from severe storms through preventative tree management.

Task: Based of the results of the hazardous tree survey, remove dead, dying, dangerous or diseased trees. Focus on the Ash tree, which is suffering a massive regional die-off due to insect infestation.

Who: Public Works; Timeframe: 7/2015-6/2020 Priority: High

Objective 7: Expand activities related to emergency preparedness and improve natural hazard response capabilities.

Task: Upgrade town-wide communication systems.

Who: EMD Timeframe: 7/2015-6/2020 Priority: High

Objective 9: Educate the public in the areas of natural disasters, mitigation activities and preparedness.

Task: Educate the public on tree planting around power lines.

Who: Tree Warden Timeframe: 7/2015-6/2020 Priority: Medium

Task: Visit schools and educate children about the risks of floods and other natural hazards and how to prepare for them.

Who: Police, Fire Marshall Timeframe: 7/2015-6/2020 Priority: Medium

Task: Make available literature on natural disasters and preparedness at Coventry Town Hall and at the Booth & Dimock Memorial Library.

Who: Police, Fire Marshall Timeframe: 7/2016-6/2018 Priority: High

Task: Make available information on natural disasters and preparedness on Coventry's website with links to state and federal resources.

Who: Police, Fire Marshall Timeframe: 7/2016-6/2018 Priority: High

Objective 10: To reduce the likelihood of flooding, evaluate property prone to flooding.

Task: Conduct a study and acquire property in the floodplain through grants and donations.

Who: Planner, Conservation Commission When: 7/2015-6/2020 Priority: Low

Objective 11: To reduce the likelihood of catastrophic loss as a result of dam failure.

Task: Design and improve Coventry Lake Gate, as it is currently compromised.

Who: Town Planner, Town Engineer, Town Manager, Public Works Director
Timeframe: 7/2016-6/2018 Priority: Medium

Objective 12: Update Flood Insurance Rate Maps (FIRMs) and Floodway Maps based on an engineered study.

Task: Urge FEMA to conduct an engineered study of the town to develop more accurate FIRMs and floodway maps (ex. Cove Village area).

Who: Planning Department Timeframe: 7/2015-6/2020 Priority: Medium

Lebanon Mitigation:

Scope/Overview

The Risk and Vulnerability Assessment portion of this plan looked at the historical and potential impacts of the following hazards throughout the region: dam failures, droughts, earthquakes, floods, hurricanes, ice jams, severe winter weather, thunderstorms, tornadoes and wind damage, and wildfires. A review of the historical occurrences of each hazard provided valuable information used in assessing potential future risk. A review of each community's resources provided the basis for an analysis of the community's vulnerability to each hazard – the extent to which the community might suffer loss of human life, injuries, and/or property damage.

With an understanding of its risk and vulnerability to natural disasters, the community can take steps prior to such an event to reduce its impacts (loss of property and life). The Connecticut Department of Energy and Environmental Protection (DEEP) has provided guidance in the form of a comprehensive list of possible mitigation measures for each hazard (see Appendix III). In the context of the community's risk and vulnerability assessment, only some of these measures will be cost-effective. The purpose of the Natural Hazard Mitigation Plan (NHMP) is to identify reasonable and appropriate mitigation measures for each hazard.

Certain mitigation practices are beneficial for any disaster, and the following measures are recommended for all communities:

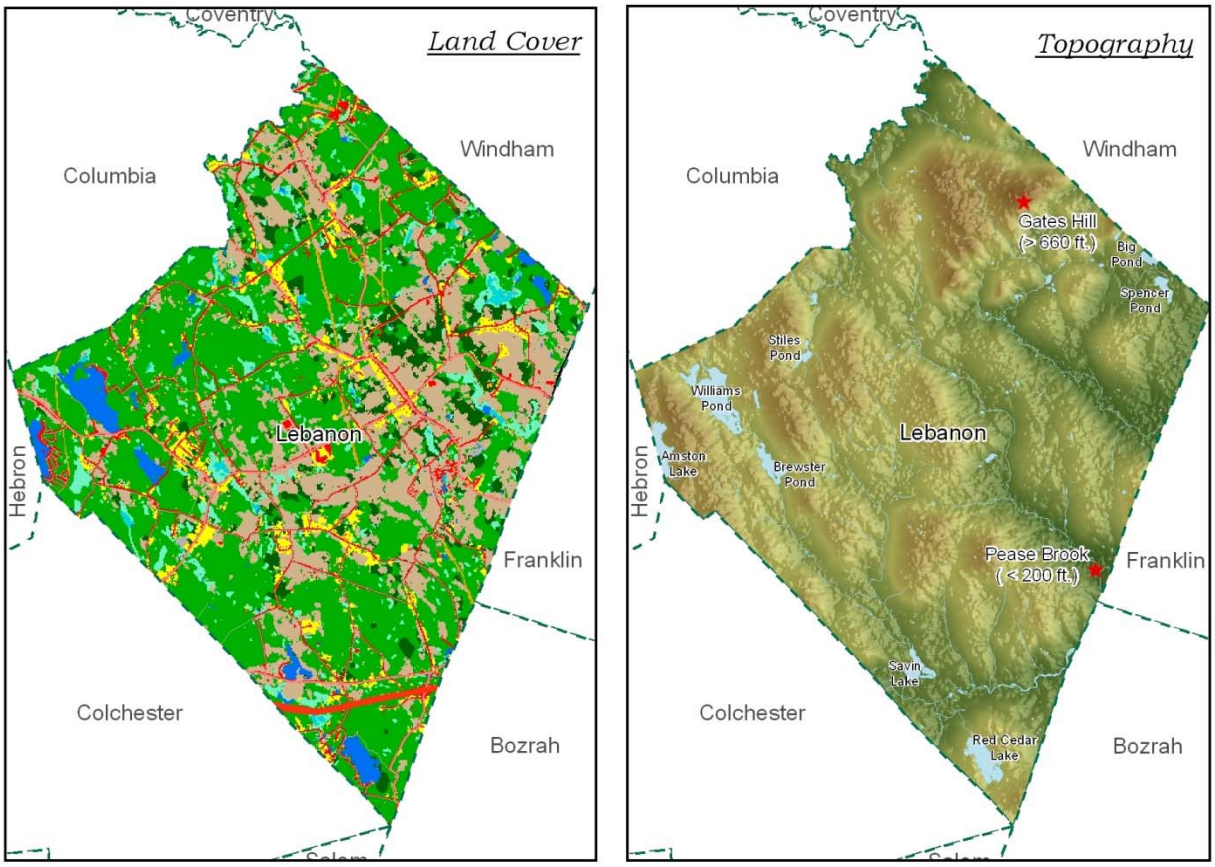
- Encourage all buildings to be improved to meet current building codes. Changes in building codes apply only to new constructions and renovations.
- Educate the public about disaster preparedness and the benefits of mitigation measures. Increasing the public's awareness of possible consequences of natural disasters and how they might better prepare to safeguard their lives and property is an important part of every community's mitigation plan.

General Town Description

Lebanon is located in New London County in southeastern Connecticut and is the southernmost town in the former WINCOG Region. Lebanon has a total area of 55.2 square miles (35,308 acres) and is bounded on the east by Franklin and Bozrah, on the south by the tip of Salem, on the north by Windham and Columbia, and on the west by Hebron and Colchester. The 2010 Census population count was 7,308 persons, a 5.8% increase from 2000 (6,907). Lebanon is a rural/agricultural community. About 8% of Lebanon is developed (see Figure 26), an increase of 0.4% from the figure reported in the initial plan. The recent influx of population and residential development increases the town's overall vulnerability to natural hazards. However, new buildings are constructed to more recent building codes (and generally away from floodplains) and are considered to be less vulnerable to natural hazards than older buildings.

Figure 26

Town of Lebanon Overview



Lebanon Land Cover Breakdown

QUICK TOWN STATS:

Town Area -
55.2 sq. miles
(35,301 acres)

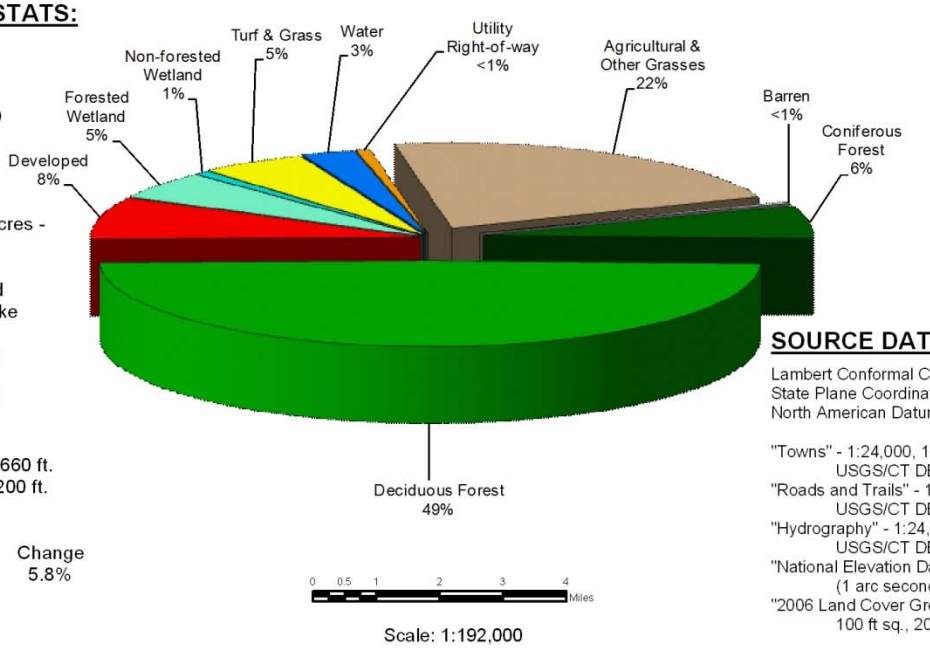
Water body area -
932 acres

Water bodies > 10 acres -
Amston Lake
Big Pond
Brewster Pond
Red Cedar Lake
Savin Lake
Spencer Pond
Stiles Pond
Williams Pond

Elevation -
Maximum = > 660 ft.
Minimum = < 200 ft.

Population -

2000	2010	Change
6,907	7,308	5.8%



Scale: 1:192,000

SOURCE DATA:

Lambert Conformal Conic,
State Plane Coordinate System
North American Datum of 1983 (NAD83)

"Towns" - 1:24,000, 1969-1984,
USGS/CT DEP.
"Roads and Trails" - 1:24,000, 1969-1984,
USGS/CT DEP.
"Hydrography" - 1:24,000, 1969-1984,
USGS/CT DEP.
"National Elevation Dataset" - 30 meter
(1 arc second).
"2006 Land Cover Greater Connecticut" -
100 ft sq., 2006, UConn, CLEAR.

October 2012

Prepared for: The Windham Region Council of Governments Hazard Mitigation Plan.

FOR ADVISORY PURPOSES ONLY

Lebanon has seasonal concentrations of people in the vicinity of Lake Williams, Amston Lake and Red Cedar Lake. This makes these areas more vulnerable to disasters which occur in the summer.

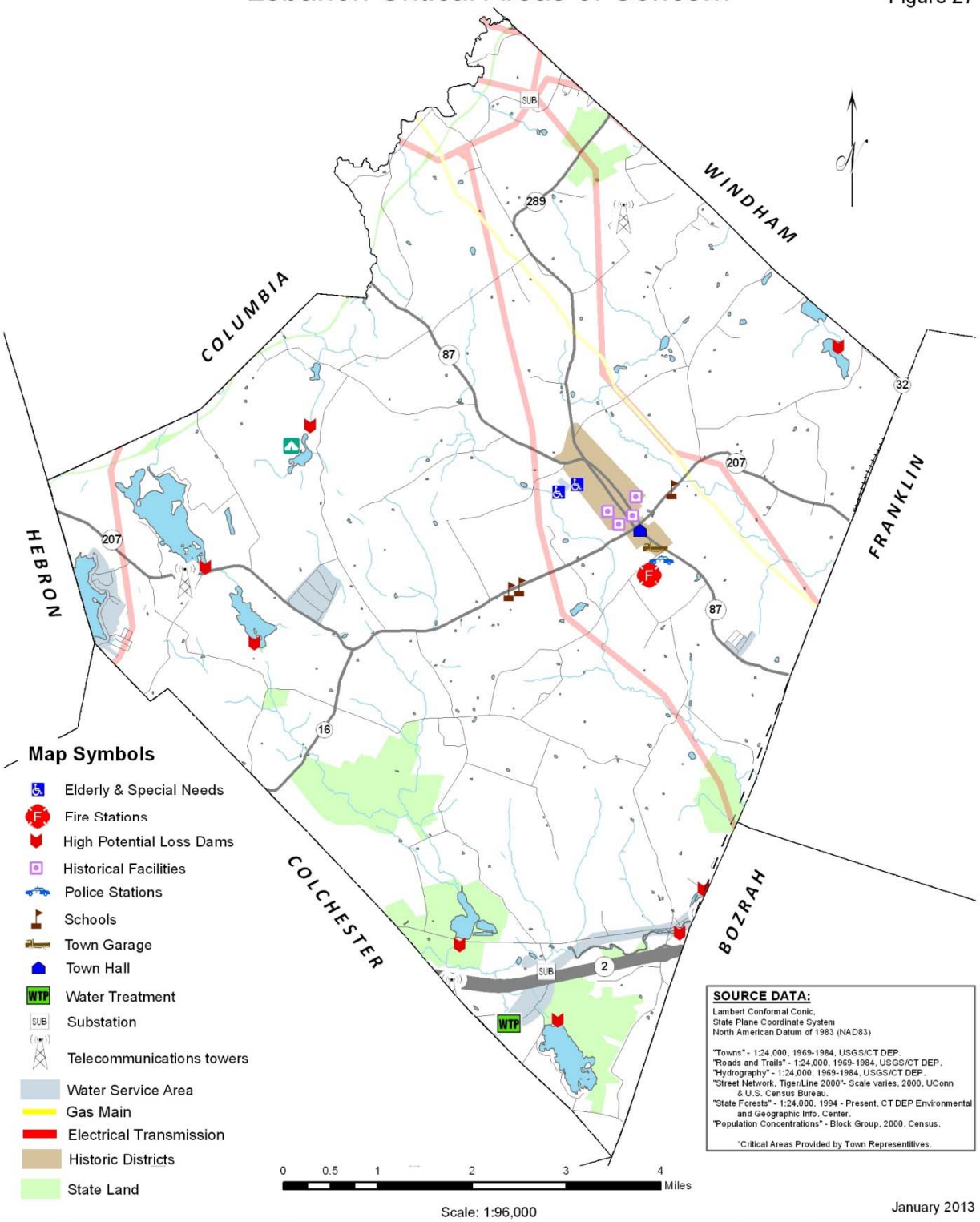
Critical facilities and cultural resources in Lebanon include: (see Figure 27)

- One volunteer fire department on Goshen Hill Road;
- One police department on Goshen Hill Road;
- Three schools: one elementary school on Exeter Road, one middle school on Exeter Road and one high school on Exeter Road;
- One small industrial park off Route 207;
- A historic district in the center of Lebanon, which includes the Jonathan Trumbull home, the Jonathan Trumbull Jr. home, a town green which housed the French army during the Revolutionary War, the War Office which was used during the Revolutionary War, and several other structures dating back to the 1700's;
- One elderly housing facility off Dr. Manning Drive;
- One senior center on West Town Street;
- A water treatment plant on Reservoir Road;
- Two transformer stations and several telephone towers throughout town;
- One Girl Scout camp off Clubhouse Road; and
- Eight high potential loss dams.

Largely forested, Lebanon is made up of approximately 49% deciduous forest, 6% coniferous forest and 5% forested wetlands. Other land cover in the town includes: agricultural and other grasses (22%), developed (8%), water (3%), turf and grass (5%), non-forested wetlands (1%), barren land (<1%), and utility rights-of-way (<1%). The approximate 894 acres of the town occupied by water bodies includes: Amston Lake, Big Pond, Brewster Pond, Red Cedar Lake, Savin Lake, Spencer Pond, Stiles Pond and Williams Pond. Lebanon's elevation ranges from about 200 feet in the southeastern section of town at the Pease Brook to about 660 feet at the peak of Gates Hill in the northeast section. In addition to all the natural hazards described previously in this plan on a regional level, Lebanon is also at risk of damage caused by flooding and dam failures.

Lebanon Critical Areas of Concern

Figure 27



Scale: 1:96,000

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Authorities in the Town of Lebanon who play advisory, supervisory, or direct roles in hazard mitigation for the Town include:

Authorities	Role			Hazard Mitigated
	Advisory	Supervisory	Direct	
Board of Selectmen / Flood and Erosion Control Board		X	X	All
Building Department	X		X	All except drought
Burning Official	X		X	Wildfire
Conservation and Agriculture Commission	X			Flooding
Emergency Management	X	X	X	All
Fire Department			X	Wildfire
Fire Marshall	X		X	Wildfire
First Selectman		X		All
Inland Wetlands Commission	X			Flooding
Planning and Zoning Commission	X		X	Flooding
Public Works Department	X	X	X	All except drought
Town Engineer	X		X	All
Town Planner	X		X	All
Zoning Board of Appeals			X	Flooding

Evaluation of Risks & Vulnerability

Dam Failure

Risks & Vulnerability:

Dam failure risk and vulnerability is discussed on a regional level in Section II.B. The overall risk of Lebanon to dam failure is considered to be low.

Risks (Extent)

There are 36 dams in Lebanon ranging from Hazard Class A (low hazard) to Hazard Class B (significant hazard). A total of 11 dams in the town are classified as low hazard (Class A); failure of any of these dams would hardly be of concern. Four dams are classified as moderate hazard (Class BB) and their failure would cause some damage, but no major disruptions. The failure of any of the four significant hazard (Class B) dams could cause serious damage and these dams are of greatest concern in the town. There are also 17 unassigned dams in the town, but the fact that close watch is kept over significant and high hazard dams suggests that these structures are either moderate, low, or negligible hazards.

Vulnerability (Location, Impact)

The failure of any Class B dam brings with it damages, economic loss and the potential of loss of life. One of these dams is located on the north end of Stiles Pond, another is located on the south end of Williams Pond, the next is located on the south end of Brewster Pond

and the last dam is located on the north end of Red Cedar Lake. These dams being classified as significant hazards means that in the event of their failure, besides the definite loss of property and economic losses, the loss of life is possible. Figure 28 shows the placement of all twenty-eight dams in the town. A Class C dam, the Deep River Reservoir Dam, located near the southwest border of Lebanon in Colchester has the potential of causing damage within Lebanon if it were to fail.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides loss estimates by county for dam failure in Table 2-54. The period of record for these loss estimates is 136 years (1877 through 2013). Based on the data provided in Table 2-54 of the State Plan, the annualized loss for New London County for dam failure is $326,450.

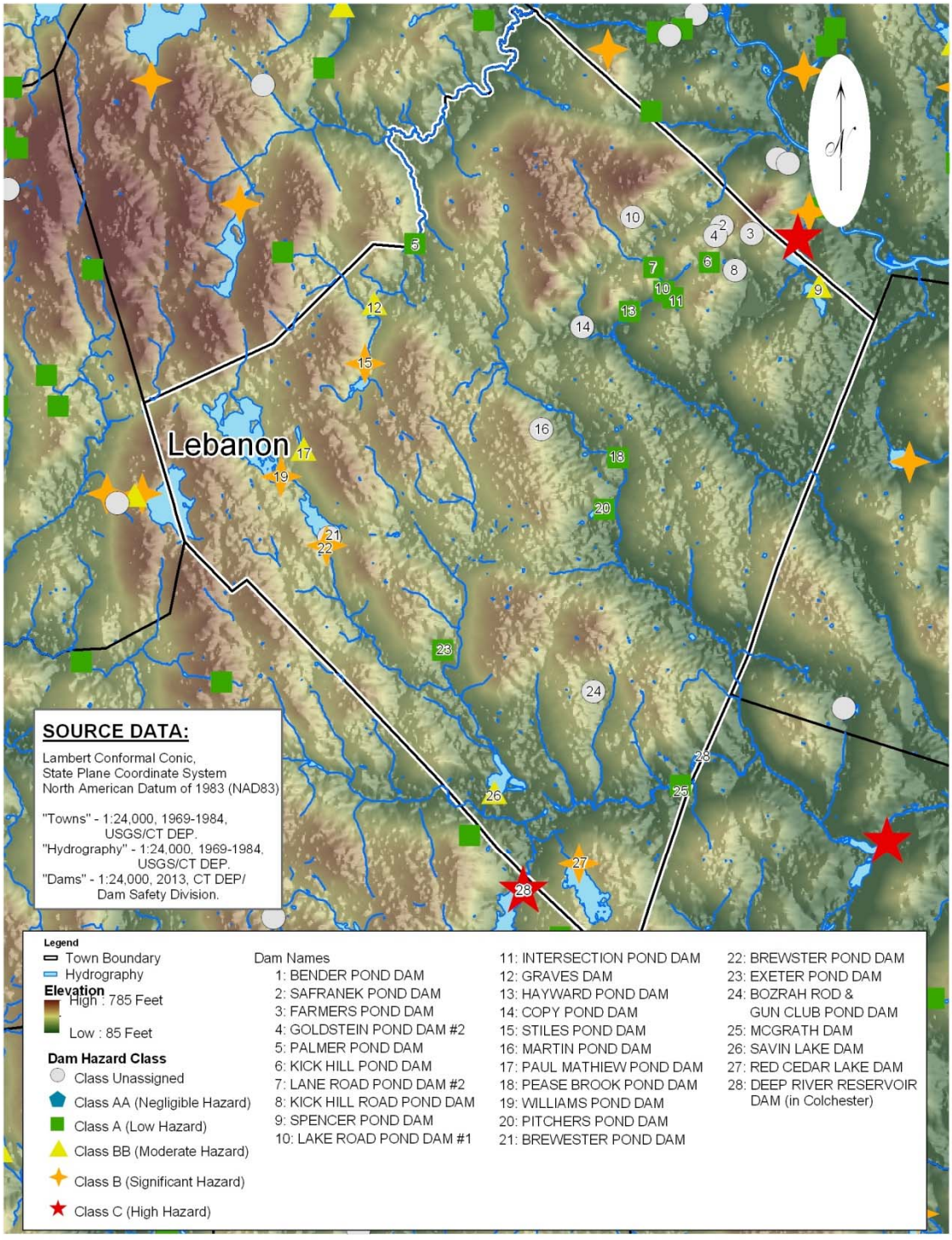
The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Lebanon. Based on the 2010 Census data in Section II.A., Lebanon has approximately 2.7% of the population of New London County. Based on this percentage, the annualized loss in the Town of Lebanon for dam failure is estimated at $8,705.

Note that this estimate does not take into account site specific details or particular dam failure damages that may have affected the Town of Lebanon in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to dam failure.

Town staff indicate that there has not been any damage to municipal and private structures and infrastructure due to dam failure in recent memory. This is inconsistent with the relatively high annualized loss estimate based on information in the 2014 State Plan. Given the condition and classification of dams within and upstream of Lebanon, as well as the structures and infrastructure located in downstream areas, it is likely that the annualized loss for dam failure would more on the order of $1,000 per year.

Town of Lebanon Dams

Figure 28



Scale: 1:120,000

March 2014

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Mitigation Efforts

Current state mitigation measures are described on a regional level in Section II.B of the Natural Hazards Mitigation Plan. Among these mitigation measures are periodic dam inspections. Periodic inspections help to determine if dams are structurally sound. If a dam's structural integrity is questioned, recommendations made to ensure the safety of the structure may include:

- Any emergency measures or actions, if required to assure the immediate safety of the structure;
- Remedial measures and actions related to design, construction, operation, maintenance and inspection of the structure; additional detailed studies, investigations and analyses; or
- Recommendations for routine maintenance and inspection by the owner.

A total of 30 privately-owned dams are in Lebanon. Private owners of dams are generally reluctant to make repairs, which tend to be costly. In these instances, needed repairs may not be done in a timely manner. Four dams in Lebanon are owned by the Connecticut DEEP (McGrath Dam, Savin Lake Dam, Brewster Pond Dam, and Red Cedar Lake Dam). McGrath Dam is rated Class A, while the remaining dams are rated Class B. State-owned dams are typically maintained in good condition.

Whether it is a structurally sound dam or a weak dam, Emergency Operation Plans (EOPs)/Emergency Action Plans (EAPs) are very important mitigation measures. A detailed discussion of these plans is provided in Section II.B. The DEEP works with owners of dams at greatest risk to make certain EOPs are in place and up-to-date. Hurricanes, flooding, ice jams and tornadoes may breach even a well-built dam, given a destructive enough event. Having a plan that lays out how to respond to a disaster, prior to the disaster occurring, is a very important tool in reducing loss of property and life. Mitigation measures for flooding (see below), which is a risk commonly associated with a dam failure, should also be encouraged.

While the state is assuming less responsibility for routine inspection of dams, DEEP will continue recommending measures to lessen the risk of dam failure, and the municipality can take the following mitigation actions:

- For municipally-owned dams, make sure that EOPs/EAPs are in place and current, and implement recommendations resulting from state inspections; and
- Ror privately-owned dams, encourage each dam owner to have an EOP/EAP in place and current, and implement recommendations resulting from inspections; monitor compliance as possible.

The Town of Lebanon has limited policies, programs, and resources dedicated to dam failure since most of these efforts are performed at the State level. Town staff report that

the Town of Lebanon owns and maintains the Williams Pond Dam (DEEP Inventory #7101) which is rated hazard class B. Since 1993, the Town has spent a total of $1.6 million on reconstructing the dam and performing annual maintenance and minor repairs to ensure the safety of the structure and the downstream area. The Town of Lebanon does not have an EOP for this dam.

Norwich Public Utilities has prepared an EOP for the Deep River Reservoir Dam (Class C) in Colchester in 2008. Portions of Lebanon are located in the downstream inundation area. A updated EAP that follows the new DEEP dam EAP guidelines is expected to be completed in 2015.

The Town's ability to mitigate dam failure is considered to be good for town-owned dams but limited for privately owned dams. Overall, the Town of Lebanon's capability to mitigate for dam failure and prevent loss of life and property has significantly increased since the initial hazard mitigation plan was adopted, mainly as a result of recent statewide legislative actions described above and in Section II.B. Over the next few years, it is expected that dam safety programs will continue to strengthen in Connecticut. In addition, the Town of Lebanon has upgraded its shelters, improved emergency communications, and created a public information program using the Town's website and at local government buildings.

Drought

Risk & Vulnerability:

Drought risk and vulnerability is discussed in Section II.B. The overall risk of Lebanon to drought is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides loss estimates by county for drought in Table 2-69. However, no damages are reported. Therefore, the estimated annualized loss for drought in Lebanon would also be $0. The number of annualized events for New London County is reported at 0.30.

The Town of Lebanon reports that losses due to drought have been reported over the past 10 years. Specifically, loss of feed (corn/grass), water, and revenue to farms have been reported. Quantitative town-wide damages are not available, but are likely relatively low (less than $1,000) on an annualized basis.

Town staff report that fire ponds and dry hydrants have not been impacted by drought. Residents rely on private water supplies or small private community systems. As such, the Town does not have water conservation ordinances or associated costs. It is not known if any recent well redevelopments or replacements were specifically due to the effects of

drought. Based on the Town's assessment, it is expected that the annualized loss in the Town of Lebanon due to drought is relatively low (less than $1,000).

Mitigation Efforts

As with any rural community that depends on aquifers and local well systems, Lebanon's vulnerability to drought increases with population growth and the accompanying increased demands for water. Good land use planning and helping the community to understand the importance of water conservation can reduce the threat of drought. Other specific measures that should be considered include:

- Completing a town-wide groundwater study, including recharge into existing aquifers to develop recommendations for future land use patterns;
- Implementing site design techniques and criteria such as strict regulation of vegetative buffers for stream and river corridors, rain gardens for site drainage, and prohibition of wetlands alteration;
- Studying effectiveness of conservation measures; and
- Implementing water conservation awareness programs.

The Town of Lebanon does not perform mitigation activities for drought. Overall, the Town of Lebanon's capability to mitigate for drought and prevent loss of life and property is limited and generally unchanged since the initial hazard mitigation plan was adopted, mainly because drought planning and response occurs at the State level and local public water supply is limited.

<u>Earthquake</u>

Risk & Vulnerability:

Earthquake risk and vulnerability is discussed in Section II.B. The overall risk of Lebanon to earthquakes is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides a range of annualized loss estimates by county for earthquakes in Figure 2-66. Based on the data provided in Figure 2-66 of the State Plan, the annualized loss for New London County lies between zero and $56,050. To be conservative, the maximum county-wide annualized loss value of $56,050 is utilized herein.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Lebanon. Based on the 2010 Census data in Section II.A., Lebanon has approximately 2.7% of the population of New London County.

Based on this percentage, the annualized loss in the Town of Lebanon for earthquakes is estimated at $1,495.

Note that this estimate does not take into account site specific details or particular earthquake damages that may have affected the Town of Lebanon in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to earthquakes.

The Town of Lebanon does not recall any municipal or private damages or losses due to recent earthquakes. Emergency calls due to recent earthquakes were not received by emergency staff. The annualized loss estimate of $1,495 based on the values in the 2014 State Plan is therefore likely high but is reasonable enough to use for planning purposes.

Mitigation Efforts

Occurrences of large earthquakes in the region are infrequent. While many mitigation measures may not be cost-effective, the community should consider the following:

- Enforcing effective building codes and local ordinances;
- Encouraging emergency facilities such as hospitals to be constructed to withstand seismic events; and
- Encouraging a low-cost earthquake rider for homeowners and businesses.

The Town does not specifically mitigate for earthquake hazards. Overall, the Town of Lebanon's capability to mitigate for earthquakes and prevent loss of life and property is limited and generally unchanged since the initial hazard mitigation plan was adopted, mainly because it is not a high priority because earthquake damage is so infrequent.

<u>Flooding</u>

The overall risk of Lebanon to flooding is considered to be low.

Risks (Extent)

The Town of Lebanon is at risk of flooding because of a number of streams, brooks and ponds in the town. According to the 1988 Federal Emergency Management Agency's (FEMA's) updated Flood Insurance Study (FIS) for the town:

> "Floods in Lebanon have occurred in every season of the year. Spring floods are common and are caused by rainfall combined with snowmelt. Floods in late summer and fall are usually the result of hurricanes or other storms moving northeast along the Atlantic coast. Winter floods result from occasional thaws, particularly in years of heavy snow cover.

> Major floods of the past 50 years in Lebanon occurred in March 1936, September 1938, and August 1955. Of these, the flood of September 1938, caused by a hurricane, was the most severe. Stream-flow records at USGS gaging station No. 01193500 on the Salmon River at East Hampton and No. 01127500 on the Yantic River at Yantic, which are in the vicinity of Lebanon, indicate that the September 1938 flood has a recurrence interval of approximately 100 years (4)."

The Flood Insurance Study for New London County was updated July 18, 2011.

Vulnerability (Location, Impact)

Areas studied for vulnerability, as noted in FEMA's 1988 FIS for the town, are as follows:

> "The following streams were studied by detailed methods: Susquetonscut Brook, from the downstream corporate limits to Bender Road; the Tenmile River, from its confluence with the Willimantic River upstream to Palmer Pond; and the Yantic River, from the downstream corporate limits to Sisson Road. Williams Pond, Amston Lake, and Red Cedar Lake were also studied by detailed methods. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction through December 1991.
>
> All or portions of the following flooding sources were studied by approximate methods: Sherman Brook, the Deep River, Hall Brook, Brewster Pond, Exeter Brook, Bartlett Brook, Savin Lake, Pease Brook, Jordan Brook, Spinning Mill Brook, the Tenmile River, and the Yantic River. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and the Town of Lebanon (2)."

A map of the flood risk areas is provided on Figure 29.

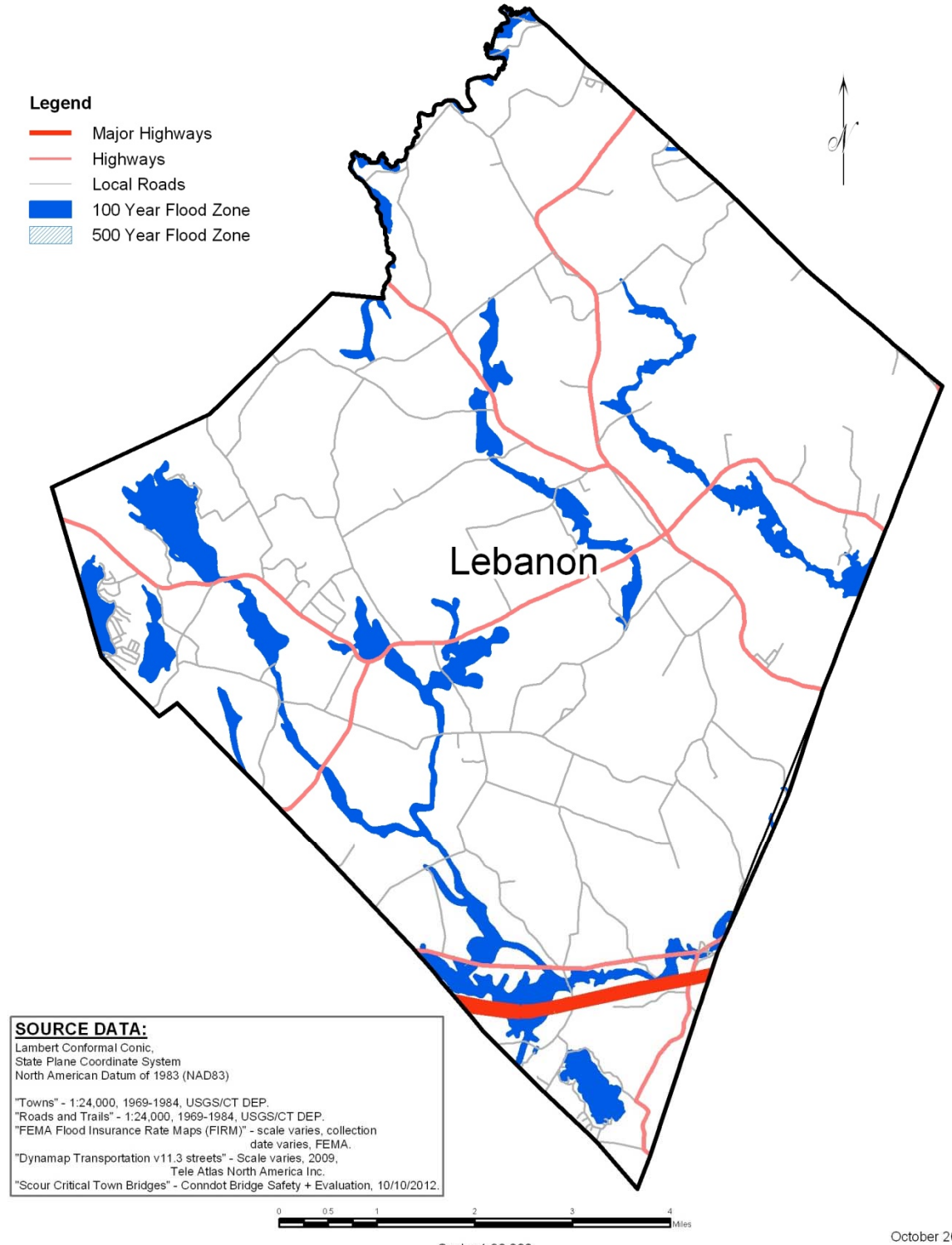
Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of annualized loss by county for flooding in Table 2-44. Based on the data provided in Table 2-44 of the State Plan, the annualized loss for New London County based on the historic record through the National Climatic Data Center through the past 20 years is $350,705.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Lebanon. Based on the 2010 Census data in Section II.A., Lebanon has approximately 2.7% of the population of New London County. Based on this percentage, the annualized loss in the Town of Lebanon for flooding is estimated at $9,352.

Flood Risk Zones of Lebanon

Figure 29



Scale: 1:96,000

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Note that this estimate does not take into account site specific details or particular flooding damages that may have affected the Town of Lebanon in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to flooding.

According to the Town of Lebanon, flood damages have been relatively minor in recent years. No public assistance reimbursements were received for flooding in October 2005, April 2007, or October 2010, and no specific damage areas were reported. According to FEMA, The Town of Lebanon does not have any repetitive loss or severe repetitive loss properties.

The Town of Lebanon reports that most of its flooding damages are due to localized heavy rain events, such as the short duration, high intensity rain event that recently occurred on March 30, 2014. Damage from this event consisted of unimproved gravel road washouts and erosion to paved road shoulders. Based on the above, the annualized loss estimate of $9,352 for flooding is considered reasonable for the Town of Lebanon.

Mitigation Efforts

The Town of Lebanon has consistently participated in the National Flood Insurance Program (NFIP) since June 3, 1988. The most recent FIRM was published on July 18, 2011 as part of the New London County FIS. The current Town of Lebanon FIS was published on August 5, 2013 as part of the New London County FIS. The original FIS and FIRMs for flooding sources in the Town are based on work completed in December 1986. Many of the local flooding problems are consistent with the floodplains mapped by FEMA.

The Town of Lebanon updated their zoning regulations on June 16, 2011 in a manner consistent with the updated 2011 Flood Insurance Study for New London County. The Lebanon Special Flood Hazard Area District (Sec. 4.9-10 of the Lebanon Zoning Regulations) includes, but is not limited to, the following limitations in the flood zone[ϕ]:

- Residential structures shall have the lowest floor elevation, including the basement, elevated above the base flood elevation,

- Non-residential structures shall have the lowest floor elevation, including basement, elevated as above or flood proofed to a point above the base flood elevation, as below,

- Non-residential structures located in all A-Zones may be flood-proofed in lieu of being elevated provided that together with all attendant utilities and sanitary facilities the areas of the structure below the required elevation are watertight with walls

[ϕ] The flood zone being the Special Flood Hazard Area District, designated as the Zone A (areas of the 100-year flood), AE as shown on the Flood Insurance Rate Map(s).

substantially impermeable to the passage of water, and use structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effect of buoyancy,

- New construction or substantial improvements of elevated buildings that include fully enclosed areas formed by foundation and other exterior walls below the base flood elevation shall be designed to preclude finished living space and designed to allow for the entry and exit of floodwaters to automatically equalize hydrostatic flood forces on exterior walls,

- In AE-Zones where base flood elevations have been determined, but before a floodway is designated, no new construction, substantial improvement, or other development (including fill) shall be permitted which would increase base flood elevations more than one (1) foot at any point within the community when all anticipated development is considered cumulatively with the proposed development,

- In areas where floodways have been determined, encroachments, including fill, new construction, substantial improvements and other developments shall be prohibited unless certification (with supporting technical data) by a registered professional engineer is provided demonstrating that encroachment shall not result in any (0.00) increase in flood levels during occurrence of the base flood discharge. When utilizing data other than that provided by the Federal Emergency Management Agency, the following standard applies: the Commission shall utilize a regulatory floodway based on the principal that the area chosen for the regulatory floodway must be designed to carry the waters of the base flood, without increasing the water surface elevation of that flood more than one foot at any one point,

- All new construction or substantial improvements shall be:

  (a) Designed and anchored to prevent flotation, collapse, or lateral movement; constructed with materials and utility equipment resistant to flood damage; and be constructed by methods and practices which minimize flood damage, and

  (b) Consistent with the need to minimize flood damage within floodprone areas; serviced by utilities such as gas, sewers, electric, heating, ventilation, plumbing, air conditioning equipment, HVAC ductwork, and water systems located and constructed to minimize or eliminate flood damage, and provide with adequate drainage to reduce exposure to flood hazards,

- New and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system.

- New and replacement sanitary sewer systems shall be designed to minimize or eliminate infiltration of floodwaters into the system and discharges from the systems into the floodwaters; on site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding.

- Manufactured homes (including a recreational vehicle placed on a site for 180 consecutive days or longer) and manufactured home parks and subdivisions are prohibited in the Special Flood Hazard Area District.

- If any portion of a structure lies within the Special Flood Hazard Area (SFHA), the entire structure is considered to be in the SFHA. The entire structure must meet the construction requirements of the flood zone. The structure includes any attached additions, garages, decks, sunrooms, or any other structure attached to the main structure. Decks or porches that extend into a more restrictive flood zone will require the entire structure to meet the standards of the more restrictive zone.

- If a structure lies within two or more flood zones, the construction standards of the most restrictive zone apply to the entire structure (i.e., V zone is more restrictive than A zone; structure must be built to the highest BFE). The structure includes any attached additions, garages, decks, sunrooms, or any other structure attached to the main structure.

- New construction, substantial improvements and repair to structures that have sustained substantial damage cannot be constructed or located entirely or partially over water unless it is a functionally dependent use or facility.

- Above-ground storage tanks (oil, propane, etc.) which are located outside or inside of the structure must either be elevated above the base flood elevation (BFE) on a concrete pad, or be securely anchored with tie-down straps to prevent flotation or lateral movement, have the top of the fill pipe extended above the BFE, and have a screw fill cap that does not allow for the infiltration of flood water.

Lebanon's regulations require that proposed structures meet elevation requirements and strict construction demands. Structures may be required to be constructed with certain materials, elevated, flood proofed, watertight or anchored. It must be shown with not only proposed structures, but with any activity in the 100-year flood plain that encroachment will not alter the flood levels in the floodway. These types of regulations help to keep structures out of areas at risk of flooding. Structures that are allowed in the flood plain must meet requirements put in place to greatly reduce the risk of damage to property and the loss of life, should a flood occur.

The degree of flood protection established by the variety of regulations in the Town meets the minimum reasonable for regulatory purposes under the NFIP. The Town plans to remain compliant with the NFIP and will continue to participate in the NFIP.

Additional mitigation measures recommended for all towns in the region include:

- Educating the public on
  - Risks of flooding,
  - Risks of building in hazard-prone areas,
  - Federal Emergency Management Agency (FEMA) floodplain maps (and making these maps easily available to the public);
- Implementing a maintenance program to clear debris from storm water drainage areas;
- Developing sediment control to prevent clogged drainage systems, such as street sweeping, curb and gutter cleaning, paving dirt roads, and planting vegetation on bare ground;
- Investigating the use of flood-prone areas as open spaces;
- Encouraging individuals in flood-prone areas to purchase flood insurance;
- Elevating structures above the 100-year flood level; and
- Considering the conservation of open space by acquisition of repetitive loss structures.

The Town's capabilities are considered to be effective in regards to response to flood damage, and the Town's capability to mitigate flood hazard damage is also considered effective for preventing damage to new development and substantial improvements. Overall, the Town of Lebanon's capability to mitigate for flooding and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted. This is because the Town has implemented a series of bridge projects over the last several years to reduce the vulnerability of infrastructure, has implemented several drainage improvements to reduce flooding of roads and nearby properties, and now posts its regulations on its website. The Town is also part of the CT Alert Emergency Notification System, which utilizes the state's Enhanced 9-1-1 database to provide location-based notifications to the public for life-threatening emergencies.

Stormwater

Stormwater runoff can significantly exacerbate flooding; therefore, managing stormwater runoff is a priority mitigation measure. Residential and commercial development increases impervious land area, reduces the infiltration of stormwater runoff into the ground, and increases the volume and velocity of stormwater runoff causing flooding. Enforcing appropriate maintenance programs for stormwater facilities will therefore help reduce the impact of these events and subsequently reduce the damage caused by flooding. A good stormwater management system promotes groundwater recharge and controls peak flows, while reducing local flooding and maintaining stream bank integrity. An example of a good stormwater management system would be one that calls for removing sediment accumulation from catch basins

yearly. This may make the difference in whether or not flooding occurs. Lebanon is encouraged to develop a municipal stormwater management plan. All towns within the region are also encouraged to consider the effects of proposed future development on stormwater runoff.

Hurricanes

Risk & Vulnerability:

Hurricane risk and vulnerability is discussed in Section II.B. The overall risk of Lebanon to hurricanes is considered to be high.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of hurricane wind losses for a variety of hurricane wind events by county in Table 2-21. This data was developed using HAZUS-MH. Based on the data provided in Table 2-21 of the State Plan, the predicted annualized loss for New London County due to hurricane wind damage is $31,180,884.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Lebanon. Based on the 2010 Census data in Section II.A., Lebanon has approximately 2.7% of the population of New London County. Based on this percentage, the annualized loss in the Town of Lebanon for hurricane wind damage is estimated at $831,475.

Note that this estimate does not take into account site specific details or particular hurricane wind damages that may have affected the Town of Lebanon in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to hurricane wind damage.

The Town of Lebanon received a public assistance reimbursement of $50,322.79 related to cleanup following Hurricane Irene, and a public assistance reimbursement of $30,671.64 for Hurricane Sandy. Public assistance reimbursements were not received for Hurricane Bob. Other notable losses were not reported to the Town, but were expected to have been incurred by property owners on some scale during these strong wind events.

Mitigation Efforts

Some of the greatest damage from hurricanes is caused by flooding, high winds and tornadoes. Mitigation measures for these events are looked at separately in the flooding and tornado/wind damage sections. Other mitigation efforts that should be considered include:

- Providing emergency shelters;
- Implementing a tree hazard management program, which would encourage responsible planting practices and minimize future storm damage to buildings, utilities, and streets;
- Practicing a tree trimming maintenance program; and
- Relandscaping with native species.

The Town maintains shelter facilities and performs debris management through Public Works with the assistance of the local electrical utility when necessary. The Town's capabilities are considered to be effective with regard to mitigating hurricane damage. Overall, the Town of Lebanon's capability to mitigate for hurricanes and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted because the State building code has been updated and locally adopted, the Town's sheltering resources and emergency communications have been expanded, and other flooding mitigation measures have been completed. Furthermore, the Town now budgets an appropriate amount of money to adequately maintain and remove dead, dying, dangerous, or diseased trees.

Ice Jams

Risk & Vulnerability:

Ice jam risk and vulnerability is discussed in Section II.B. The overall risk of Lebanon to ice jams is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update indicates that ice jams have not occurred in Connecticut since 2010. Due to the infrequency of the hazard and the limited information available regarding damages, it is no longer considered a separate hazard from flooding. The potential annualized loss estimate due to ice jams in Lebanon is therefore included in the annualized loss estimate for flooding presented above.

The Town of Lebanon has not experienced any damage due to ice jams or ice jam flooding in recent memory.

Mitigation Efforts

During ice jams the biggest concern is the risk of flooding. See mitigation measures under flooding (above).

Severe Winter Storms

Risk & Vulnerability (Impact):

Severe winter storm risk and vulnerability is discussed in Section II.B. Key risks are the relative isolation of the rural communities from emergency services; loss of electrical power to large areas from ice accumulation or high winds, and fire from improper use of alternative heating sources, candles and gas stoves. The leading cause of death is from automobile and other transportation accidents. Property damage can also occur from frozen water pipes and falling trees or branches from ice accumulation and/or wind. The overall risk of Lebanon to severe winter storms is considered to be high.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of severe winter storm losses for a variety of events by county in Table 2-35. This data was developed based on damages reported in the NCDC database. However, an annualized loss value was not provided in Table 2-35 for New London County.

Lebanon is located in northern New London County and therefore is likely to experience severe winter storms similar to the effects felt in Columbia and Windham. Based on the data provided in Table 2-35 of the State Plan, the predicted annualized loss due to severe winter storm damage is $532,131 for Tolland County and $432,441 for Windham County. The population of Lebanon is equivalent to 4.7% of the population of Tolland County, and equivalent to 6.2% of the population of Windham County. Based on these percentages, the estimated annualized loss in Lebanon due to severe storm damage is $25,010 (based on Tolland County) or $26,811 (based on Windham County). An annualized loss estimate of $26,000 therefore appears reasonable for Lebanon.

Note that this estimate does not take into account site specific details or particular severe winter storm damages that may have affected the Town of Lebanon in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to severe winter storm damage.

The Town of Lebanon received a public assistance reimbursement of $20,977.78 related to the heavy snow in January and February 2011. The heavy snows resulted in the Town of Lebanon assessing municipal buildings for snow load and hiring contractors to remove snow where necessary. Only minor damage was reported to municipal buildings from the 2011 storms.

The public assistance reimbursement following Winter Storm “Alfred” in late October 2011 was not available. The public assistance reimbursement for Winter Storm “Nemo” in February 2013 was $29,919.39. Damages to town-owned buildings were not reported for

these latter storms. Other notable losses were not reported to the Town, but were expected to have been incurred by property owners on some scale during these severe winter storm events. Overall, these figures appear to be consistent with the estimated annual loss estimate of $26,000 for the town.

Mitigation Efforts (see also flooding and tornado/wind damage)

Some of the greatest damage from winter storms is caused by flooding and high winds, and mitigation measures for such hazards are discussed under those headings.

It is particularly important to encourage people to stay indoors and out of harm's way when severe winter weather threatens. Such conditions increase the frequency of traffic accidents and emergency responders take longer to reach accident scenes because of vehicles unnecessarily on the roads.

Power outages can cause a number of problems, from loss of heat and the risk of frozen pipes to fire hazards. Tree-trimming programs can lessen the risk of power outages to some extent. Putting utility wires underground can lessen the risk even further. In any event, the municipality should develop a plan to restore power as quickly as possible.

The National Weather Service's Early Warning System is an important mitigation measure for winter storms. Other hazard-specific mitigation efforts that should be considered include:

- Educating the public on
  - The risks of hypothermia,
  - The risks of carbon monoxide poisoning in motor vehicles and from portable heaters and power generators in homes,
  - The risk of fires from portable heaters and candles,
  - The importance of staying off the roads,
  - Landscaping practices that encourage the planting of species that are less susceptible to damage from ice storms to reduce the risk of damage to structures;
- Implementing a tree trimming maintenance program;
- Encouraging underground utility wires; and
- Providing emergency shelters before, during, and after the event.

The Town maintains shelters and provides plowing services through Public Works. The Town's capabilities are considered to be effective in regards to response to severe winter storms, although the Town's capability to mitigate severe winter storm damage is relatively limited to town-owned facilities. Overall, the Town of Lebanon's capability to mitigate for severe winter storms and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted, because numerous drainage and bridge projects have been completed, the sheltering capability of the Town has improved, and a public information program has been implemented.

Thunderstorms

Risk & Vulnerability:

Thunderstorm risk and vulnerability is discussed in Section II.B. The overall risk of Lebanon to thunderstorms is considered to be moderate.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of thunderstorm losses by county in Table 2-19. This data was developed based on damages reported in the NCDC database. Based on the data provided in Table 2-19 of the State Plan, the predicted annualized loss for New London County due to thunderstorm damage is $38,251.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Lebanon. Based on the 2010 Census data in Section II.A., Lebanon has approximately 2.7% of the population of New London County. Based on this percentage, the annualized loss in the Town of Lebanon for thunderstorm damage is estimated at $1,020.

Note that this estimate does not take into account site specific details or particular thunderstorm damages that may have affected the Town of Lebanon in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to thunderstorm damage.

The Town of Lebanon reports that the cost to respond to each individual downed branches incident is approximately $500. The Town does not respond to reports of downed power lines, as these calls are referred to the electrical utility. Private losses are not typically reported to the Town, but are expected to be incurred by property owners on some scale during severe thunderstorm events.

Mitigation Efforts (see also wildfires, flooding and tornado/wind damage)

Some of the greatest damage from thunderstorms is caused by fires, flooding, high winds, and (on occasion) tornadoes. Mitigation measures for such hazards are discussed under those headings.

The National Weather Service's Early Warning System is an important mitigation measure for thunderstorms. Other hazard-specific mitigation efforts that should be considered include:

- Educating the public on how to minimize risk of injury both indoors and outdoors (more specific);

  - When to turn off gas, electricity, and water; and
  - When and how to avoid contact with water and metal.
- Clearing dead or rotting tree branches;
- Securing outdoor objects that could become projectiles; and
- Installing lightning rods.

The Town performs debris management through Public Works with the assistance of the local electrical utility when necessary. The Town's capabilities are considered to be effective in regards to response to thunderstorms, although the Town's capability to mitigate thunderstorm damage is relatively limited to town-owned facilities and right-of-ways. Overall, the Town of Lebanon's capability to mitigate for thunderstorms and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted because the Town implemented regulations to bury power lines in new developments, and because the local electrical utility has performed an intensive trimming program near electrical lines following the severe storms in 2011.

Tornado/Wind Damage

Risk & Vulnerability:

Tornado/Wind Damage risk and vulnerability is discussed in Section II.B. The overall risk of Lebanon to tornadoes is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of tornado losses for a variety of events by county in Table 2-30. This data was developed based on damages reported in the NCDC database. However, an annualized loss value was not provided in Table 2-30 for New London County due to the lack of damage reported for the four occurrences in the database.

Lebanon is located in northern New London County and therefore is likely to be at a similar risk for tornadoes as Columbia and Windham. Based on the data provided in Table 2-30 of the State Plan, the predicted annualized loss due to tornado damage is $44,371 for Tolland County and $84,682 for Windham County. The population of Lebanon is equivalent to 4.7% of the population of Tolland County, and equivalent to 6.2% of the population of Windham County. Based on these percentages, the estimated annualized loss in Lebanon due to tornado damage is $2,085 (based on Tolland County) or $5,250 (based on Windham County). An annualized loss estimate of $3,700 therefore appears reasonable for Lebanon.

Note that this estimate does not take into account site specific details or particular tornado damages that may have affected the Town of Lebanon in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to tornado damage.

As reported above, the Town of Lebanon reports that the cost to respond to each individual downed branches incident is approximately $500. The Town does not respond to reports of downed power lines, as these calls are referred to the electrical utility.

Mitigation Efforts

While the region has a very low risk of experiencing a tornado with great destructive potential, basic measures to minimize damage from high winds can be implemented and public education efforts can help to prepare residents. Owners of older mobile homes should be particularly aware of mitigation measures that could protect their homes from damage.

The National Weather Service's Early Warning System is an important mitigation measure for tornado/wind damage events. Other hazard-specific mitigation efforts that should be considered include:

- Being aware of, and educating the public through pamphlets and web-based information on
  - The warning signs for a tornado,
  - The importance of securing outdoor objects that could become projectiles,
  - What kinds of buildings are most vulnerable to damage from tornadoes or high winds (such as manufacture housing),
  - Structural alterations to protect against wind damage,
  - When and where to seek shelter;
- Encouraging upgrading of existing buildings to meet current building codes;
- Enforcing and updating building code standards for light frame construction, especially wind resistant roofs. FEMA articles on bracing for gable trussed roofs and bracing for doors and windows are available for review. Information is also available on placement of HVAC systems and electrical utilities to resist both wind and flood damage; and
- Encouraging underground utility wires.

The Town's policies for mitigating tornado damage include maintaining shelters and debris cleanup equipment and distributing preparedness information to residents. The Town's capabilities are considered to be effective in regards to response to tornadoes. Overall, the Town of Lebanon's capability to mitigate for tornadoes and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted because the Town upgraded the local shelters and implemented a public information program to inform the public on how to prepare and respond to natural hazards and emergencies.

Wildfire Hazards

Risk & Vulnerability:

Wildfire Hazard risk and vulnerability is discussed in Section II.B. The overall risk of Lebanon to wildfires is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update does not provide loss estimates by county for wildfires except on Figure 2-52, where the reported annualized loss for the county is reported as being less than $56,040. Table 2-61 of the 2014 State Plan indicates that New London County experienced 453 wildfire events that burned an average of 1.81 acres per fire from 1991 to 2013. The number of annualized events is therefore 20.6, and the average acres burned in New London County is therefore 37.3 acres per year.

Town staff report that wildfires are a minimal problem in Lebanon and do not require additional expenditures outside of normal operating budgets. It is estimated that the annualized loss due to wildfires in Lebanon is less than $500 per year.

Mitigation Efforts

Long periods of drought are one of the primary natural causes of wildfires. Mitigation measures for drought are discussed under that heading. Other mitigation efforts that should be considered include:

- Educating the public on safe fire practices;
- Using fire-resistant material when renovating, building, and retrofitting structures;
- Moving shrubs and other landscaping away from structures;
- Periodically clearing brush and dead grass from property; and
- Acquiring land susceptible to wildfires to maintain it as open space.

The Town uses a variety of regulatory, preparedness, and public information programs to mitigate the effect of wildfires, including the Open Burning Program, maintenance of dry hydrants and cisterns, and educational programs on fire safety. The Town's capabilities are considered to be effective in regards to response to wildfires. Overall, the Town of Lebanon's capability to mitigate for wildfires and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted. The Town implemented a public education program and implemented Connecticut DEEP's updated Open Burning Program (see Section II.B.)

Mitigation Strategies

The Town of Lebanon has reviewed the "Risk and Vulnerability Assessment," the strengths and weaknesses of its existing mitigation strategies, and developed proposed mitigation strategies. Based upon internal resources, discussions and meetings with local officials and the general public, this section presents goals, objectives and proposed mitigation strategies. These mitigation strategies guide future efforts to reduce the loss of life and property as a result of natural disasters and attempt to break the expensive cycle of repeated damage and reconstruction. The proposed mitigation strategies are further prioritized to help guide the implementation schedule.

The goal of the Town of Lebanon continues to be "to reduce the loss of life and property and economic consequences as a result of natural disasters". The Town identified 10 objectives in the initial plan to meet this goal:

1. To reduce the likelihood of flooding by improving existing natural and artificial drainage systems.
2. To reduce the likelihood of flooding and natural disaster related damages by improving bridge conditions.
3. To reduce the likelihood of flooding and icy conditions by improving existing road conditions.
4. Reduce costs associated with providing emergency services and other public services in the event of a natural disaster.
5. Reduce the amount of debris from severe storms through preventative tree maintenance.
6. Expand activities related to emergency preparedness and improve natural hazard response capabilities.
7. Whenever practical, incorporate natural hazard mitigation strategies into existing town projects.
8. Educate the public in the areas of natural disasters, mitigation activities and preparedness.
9. Reduce the frequency and severity of power outages and road closures as a result of wind and ice storm events.
10. Reduce the impact runoff and flooding have on the Amston Lake community.

A total of 32 specific tasks were identified in the initial plan to meet these objectives. Two additional tasks were identified by the Town and completed since the Initial Plan was developed. These tasks are discussed in more detail in the table below:

Status of Strategies and Actions for Lebanon from Initial Hazard Mitigation Plan

Obj.	Task	Priority	Responsible Department*	Comment	Status
1	Procure giant vac-all or similar equipment to assist public works in keeping up to date with the removal of silt and leaves from the town's waterways along all town roads	Medium	Public Works	This was not completed due to lack of funding. The Town believes it will be more cost-efficient to rent or contract this service.	Carried Forward, Updated
1	Procure vehicle-mounted catch basin cleaning equipment	High	Selectmen, Board of Finance	This was not completed due to lack of funding. The town believes it will be more cost-efficient to contract this service.	Carried Forward, Updated
2	Replace or repair Waterman Road Bridge crossing the Pease Brook	High	Contracted out	Work was completed in 2011.	Completed
2	Replace or repair McGrath Lane #2 bridge crossing the Yantic River	High	Contracted out	This was not completed due to lack of funding.	Carried Forward
2	Replace or repair Taylor Bridge Road bridge crossing the Bartlett Brook	High	Contracted out	Work was completed in 2012.	Completed
2	Replace or repair Mack Road bridge crossing the Pease Brook	High	Contracted out	Work was completed in 2011.	Completed
2	Repair Tobacco Street bridge crossing the Ten Mile Brook	High	Contracted out	Work was completed in 2011.	Completed
2	Repair Goshen Hill Road bridge crossing the Exeter Brook	High	Contracted out	Work was completed in 2004.	Completed
2	Improve road stability by adding a road bridge on Old Meeting House Road at the dam spillway	High	CT DEP, Public Works	This road is not a critical access road. Further evaluation by the town concluded that there would be minimal benefit for the associated cost.	Deleted
2	To improve bridge stability, eliminate or replace all wooden bridge decks on town bridges (5): Randall, Sisson, Tobacco, Hoxie, and Simon	High	Contracted out, Public Works	Work was completed on the Sisson (2009), Tobacco (2012), and Hoxie (2006) bridges. Simon Road has been closed so work is no longer necessary. Work on Randall Road has not yet been performed due to lack of funding.	Mostly Completed, Randall Road Carried Forward
3	Improve Route 207 from Seabury Road to Briggs Drive where there are drainage problems	High	ConnDOT	This project was identified in the Regional Transportation Plan. Work was completed in 2012.	Completed

Status of Strategies and Actions for Lebanon from Initial Hazard Mitigation Plan (Continued)

Obj.	Task	Priority	Responsible Department*	Comment	Status
3	Reclaim and resurface Route 207 at Industrial Park Road where there are drainage problems	High	ConnDOT	This project was identified in the Regional Transportation Plan. Work was completed in 2012.	Completed
3	Improve Route 16 from the Colchester town line easterly for 0.5 miles where there are drainage problems	High	ConnDOT	This project was identified in the Regional Transportation Plan. Upon further evaluation no specific drainage problems could be identified.	Deleted
3	Improve Route 87 from Waterman Road to the Franklin town line where drainage problems form puddles of water and ice build-up result in many serious motor vehicle accidents	High	ConnDOT	This project was identified in the Regional Transportation Plan. ConnDOT did not complete the work due to lack of resources.	Carried Forward
3	Repair Lake Williams Drive just before Lakeshore Road where there are drainage problems	High	Public Works	Work was completed in 2008.	Completed
3	Improve Card Street where there are numerous drainage problems	High	Public Works	Work was completed in 2012.	Completed
3	Improve Goshen Hill Road at the top of the hill where there are drainage problems	High	Public Works	Work was completed in 2006.	Completed
3	Improve Lakeshore Drive where there are drainage problems	High	Public Works	Work was completed in 2008. This included work on Lake Williams Drive.	Completed
3	Improve Waterman Road from the intersection of Norwich Avenue to Fowler Road where there are drainage problems	High	Contracted out	This was completed by Public Works in 2011.	Completed
3	Improve Leonard Bridge Road from Route 207 to Tobacco Street to correct flooding, drainage problems, and sight lines	High	Contracted out	This was completed by Public Works in 2010	Completed
3	Improve Mack Road from the 90-degree corner to Route 207 to correct flooding and drainage problems	High	Public Works	Upon further evaluation no specific drainage problems could be identified.	Deleted
3	Improve Smith Road in the vicinity of Goshen Hill Road to correct approximately 300 feet of flooding and drainage problems	High	Public Works	This was completed by Public Works in 2010.	Completed

Status of Strategies and Actions for Lebanon from Initial Hazard Mitigation Plan (Continued)

Obj.	Task	Priority	Responsible Department*	Comment	Status
4	Upgrade some of the town's plows with liquid spreaders	Low	Selectmen, Public Works	Public Works no longer wants liquid spreaders as they are believed unreliable.	Deleted
5	Budget appropriate money necessary to maintain and remove dead, dying, dangerous, or diseased trees	High	Public Works	Work has been completed in some areas but identification and removal of trees continues. This is now a capability.	Completed
6	Implement a program that autodials emergency personnel	High	Selectmen, Police, Fire	Connecticut Department of Emergency Management and Homeland Security implemented a statewide system in 2010	Completed
6	Develop a GIS application to assist town personnel in the event of an emergency or natural disaster	High	Selectmen, Contracted Planners	The Town no longer has an interest in developing or maintaining such a program	Deleted
6	Obtain additional cots and bedding adequate to serve the emergency shelters in the event of an emergency or natural disaster	Medium	EMD, Selectmen	This strategy was not identified in the initial plan but was completed by the Town in 2012.	Completed
7	Use the Government Access Channel to inform the Lebanon public about how to prepare and respond to hazards and emergencies and to encourage residents to be prepared to help others in need	High	Selectmen, Police, Fire	The Town has multiple cable service providers so conducting a simulta-neous broadcast was impractical. This strategy was modified to put information on the town website instead. Work was begun in 2012 but has not been completed due to lack of time and funding	Updated, Consolidated into an Objective 8 Strategy
7	Publish all town ordinances and regulations on the town's website including those that mitigate natural hazards	High	Selectmen	Planning and Zoning and the Selectmen completed this task in 2012. This is now a capability.	Completed

Status of Strategies and Actions for Lebanon from Initial Hazard Mitigation Plan (Continued)

Obj.	Task	Priority	Responsible Department*	Comment	Status
7	Review plans that fulfill DEP (now DEEP) Storm Water Management, Phase II requirements and identify projects that may be eligible for FEMA natural hazard mitigation grants	High	Selectmen, Contracted Planners	Upon further evaluation, it was found that Lebanon does not have any urbanized areas that qualify under Phase II. It is also unlikely that such projects would qualify for FEMA natural hazard mitigation grants.	Deleted
8	Make available literature on natural disasters and preparedness at Lebanon Town Hall and at the Jonathan Trumbull Public Library	High	Selectmen	This was begun by the EMD and Selectmen in 2012 and only partially completed due to lack of time and resources.	Partially Completed, Updated
8	Mail emergency preparedness informational materials to every residence	High	Planning and Zoning, Selectmen	This strategy was not identified in the initial plan but was completed by the Town in 2012. The Town plans to send information every five years (in 2017).	Completed, Carried forward
9	Develop a long-term plan to bury power lines in existing development	High	Planning and Zoning	This strategy was amended to develop regulations to bury power lines in new development. This was completed in 2006. The long-term plan to bury power lines in existing developments was not completed due to lack of resources.	Completed, Carried forward
10	Analyze and prepare an impact study of water runoff and flooding at Amston Lake as it pertains to potable water and sewage	High	Contracted out	This was completed in 2007.	Completed

*Identifying that a task will be "Contracted Out" is no longer allowed by FEMA, but is provided in the above table because this is how it was worded in the initial plan. New strategies (below) will not have this identifier. For a similar reason, the term DEP is still used in the above table even though the agency is now known as DEEP.

During the Plan Update process, the Town of Lebanon did not identify additional objectives to help meet the stated hazard mitigation planning goal.

Current mitigation strategies for the Town of Lebanon are presented below. Note that Objectives #4, #5, and #10 do not have any current strategies. These objectives remain applicable and will be reevaluated during the next plan update.

The STAPLEE method was used to assign priority to each strategy as discussed in Section III.B. The STAPLEE analysis scoring is presented in Appendix IV. Scores ranged from 2.5 to 7.0, with a higher STAPLEE score being representative of a higher priority project. Scores less than 5.0 were considered to be "Low" priority, while scores greater than 6.0 were considered to be "High" priority. The intermediate scores were considered to have "Medium" priority.

Based on the STAPLEE methodology, "high" priority projects mitigate the most significant natural hazards that affect the town or multiple natural hazards, are considered feasible, would be effective in avoiding or reducing future losses, seem reasonable for the size of the problem and likely benefits, have political and public support, and improve upon existing programs or support other municipal priorities. All other supporting tasks were assigned a "Medium" or "Low" priority rating based on the same criteria.

Mitigation Strategies for the Town Of Lebanon:

Goal: **To reduce the loss of life and property and economic consequences as a result of natural disasters.**

Objective 1: **To reduce the likelihood of flooding by improving existing natural and artificial drainage systems.**

Task: Rent or contract for giant vac-all or similar equipment to assist public works in keeping up to date with the removal of silt and leaves from the town's waterways along all town roads.

Who: Public Works Timeframe: 7/2015-6/2020 Priority: Low

Task: Contract for vehicle mounted catch basin cleaning equipment to assist public works in keeping up to date with the removal of silt and leaves from catch basins.

Who: Public Works Timeframe: 7/2015-6/2020 Priority: Medium

Task: Inventory all culverts and catch basins for upgrading and prioritize, schedule, and provide funding for their upgrade.

Who: Public Works Timeframe: 7/2016-6/2018 Priority: High

Objective 2: To reduce the likelihood of flooding and natural disaster related damages by improving bridge conditions.

Task: Remove McGrath Lane #2 Bridge crossing the Yantic River; ConnDOT's 2004 inspection report rated this structure as "poor".

Who: Public Works Timeframe: 7/2018-6/2020 Priority: Medium

Task: Upgrade Chappell Road Bridge crossing Susquetonscut Brook.

Who: Public Works Timeframe: 7/2017-6/2019 Priority: Low

Task: Upgrade bridge stability, eliminate or replace wooden deck on Randall Road bridge.

Who: Public Works Timeframe: 7/2016-6/2018 Priority: Low

Objective 3: To reduce the likelihood of flooding and icy conditions by improving existing road conditions.

Task: Encourage ConnDOT to improve Route 87 from Waterman Road to the Franklin town line, where drainage problems form puddles of water and ice resulting in many serious motor vehicle accidents.

Who: First Selectman Timeframe: 7/2015-6/2020 Priority: High

Task: Encourage ConnDOT to replace culvert on Route 207 between North Street and Mack Road.

Who: First Selectman Timeframe: 7/2015-6/2020 Priority: Medium

Objective 6: Expand activities related to emergency preparedness and improve natural hazard response capabilities.

Task: Install generator at Senior Center to provide secondary or small capacity shelter (High School is current primary, high capacity shelter) and at all critical facilities.

Who: EMD/Selectmen Timeframe: 7/2015-6/2020 Priority: Medium

Task: Ensure that the emergency shelters have adequate supplies to respond to natural emergencies.

Who: EMD/Selectmen Timeframe: 7/2015-6/2020 Priority: Medium

Objective 7: Whenever practical, incorporate natural hazard mitigation strategies into existing town projects.

Task: Identify location for secondary access to Lake Shore Drive and prepare and file map of proposed street in the office of the town clerk in accordance with CT General Statute Section 8-29.

Who: Town Planner Timeframe: 7/2015-6/2017 Priority: Medium

Task: Identify projects that may be eligible for FEMA natural hazard mitigation grants.

Who: First Selectman Timeframe: 7/2015-6/2020 Priority: Medium

Objective 8: Continue to educate the public in the areas of natural disasters, mitigation activities and preparedness.

Task: Make available literature on natural disasters and preparedness at Lebanon Town Hall, Public Library, Senior Center and website.

Who: EMD, Selectmen Timeframe: 7/2015-6/2020 Priority: High

Task: Mail emergency preparedness informational materials to every residence.

Who: EMD, Selectmen Timeframe: 7/2017-6/2018 Priority: High

Objective 9: Reduce the frequency and severity of power outages and road closures as a result of wind and ice storm events.

Task: Develop a long-term plan to bury power lines in existing development.

Who: Town Planner Timeframe: 7/2016-6/2018 Priority: Low

Mansfield Mitigation:

Scope/Overview

The Risk and Vulnerability Assessment portion of this plan looked at the historical and potential impacts of the following hazards throughout the region: dam failures, droughts, earthquakes, floods, hurricanes, ice jams, severe winter weather, thunderstorms, tornadoes and wind damage, and wildfires. A review of the historical occurrences of each hazard provided valuable information used in assessing potential future risk. A review of each community's resources provided the basis for an analysis of the community's vulnerability to each hazard – the extent to which the community might suffer loss of human life, injuries, and/or property damage.

In addition to historical trends, Mansfield is concerned with the potential impacts of climate change on hazard vulnerability, particularly with regard to severe storms, droughts and wildfire potential. As such, additional objectives and tasks have been added to this latest version of the Natural Hazards Mitigation Plan to begin addressing those impacts.

With an understanding of its risk and vulnerability to natural disasters, the community can take steps prior to such an event to reduce its impacts (loss of property and life). The Connecticut Department of Energy and Environmental Protection (DEEP) has provided guidance in the form of a comprehensive list of possible mitigation measures for each hazard (see Appendix III). In the context of the community's risk and vulnerability assessment, only some of these measures will be cost-effective. The purpose of the Natural Hazard Mitigation Plan (NHMP) is to identify reasonable and appropriate mitigation measures for each hazard.

Certain mitigation practices are beneficial for any disaster, and the following measures are recommended for all communities:

- Encourage all buildings to be improved to meet current building codes. Changes in building codes apply only to new constructions and renovations.
- Educate the public about disaster preparedness and the benefits of mitigation measures. Increasing the public's awareness of possible consequences of natural disasters and how they might better prepare to safeguard their lives and property is an important part of every community's mitigation plan.

General Town Description

Mansfield is located in Tolland County in eastern Connecticut and lies in the center of the former WINCOG Region. Mansfield has a total area of 45.7 square miles (29,227 acres) and is bounded on the east by Chaplin, on the south by Windham, on the north by Ashford and Willington, and on the west by Coventry. The 2010 Census population count was 26,543 persons, a 28.1% increase from 2000 (20,720). Mansfield is mostly rural with some agriculture. Fourteen percent of Mansfield is developed (See Figure 30), an increase of 0.1% from the figure

reported in the initial plan. Much of the new residential development occurred at the University of Connecticut. The recent influx of population and residential development increases the town's overall vulnerability to natural hazards. However, new buildings are constructed to more recent building codes (and usually away from floodplains) and are considered to be less vulnerable to natural hazards than older buildings.

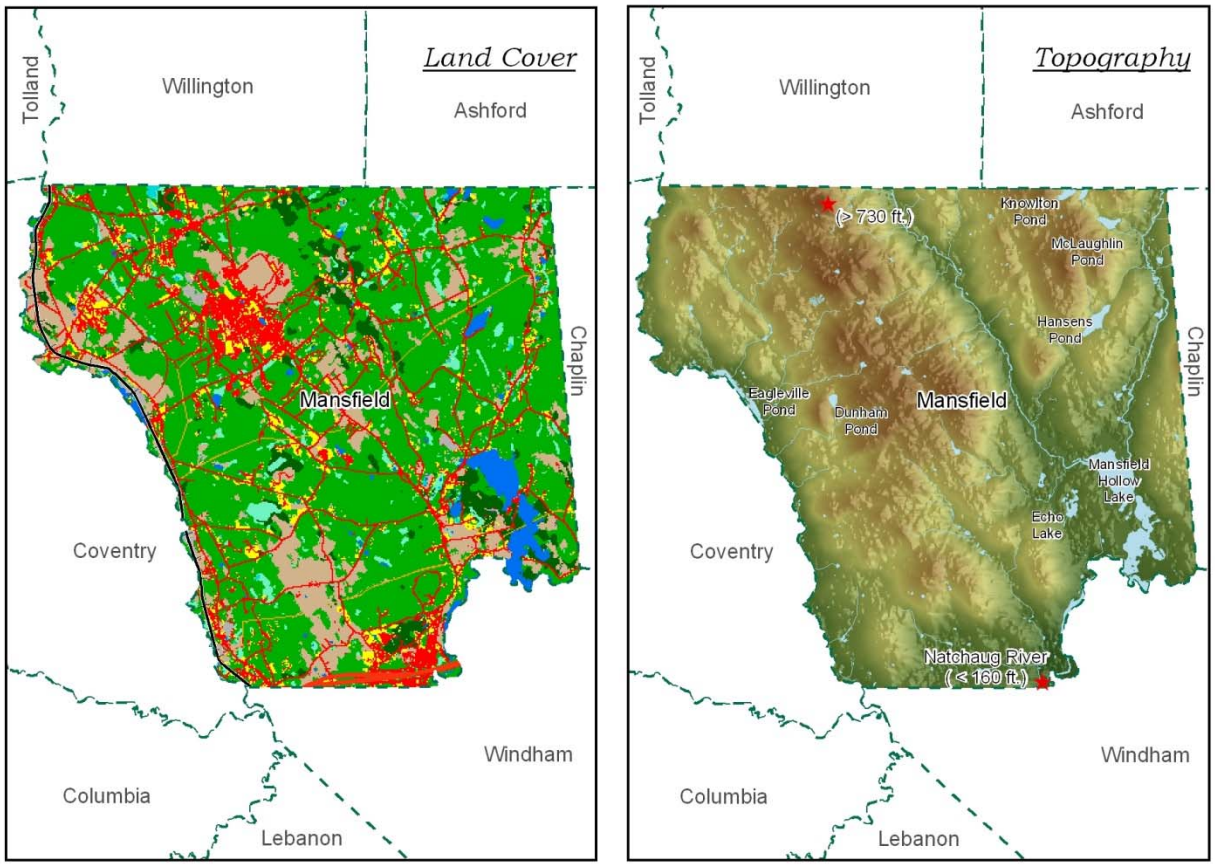
Urban densities of population are found in the village of Storrs (home of the main campus of the University of Connecticut) and in southern Mansfield. The number of students living on-campus at the University accounts for 44.3% of the Town's total population.

Critical Facilities and cultural resources in Mansfield include: (See Figure 31)

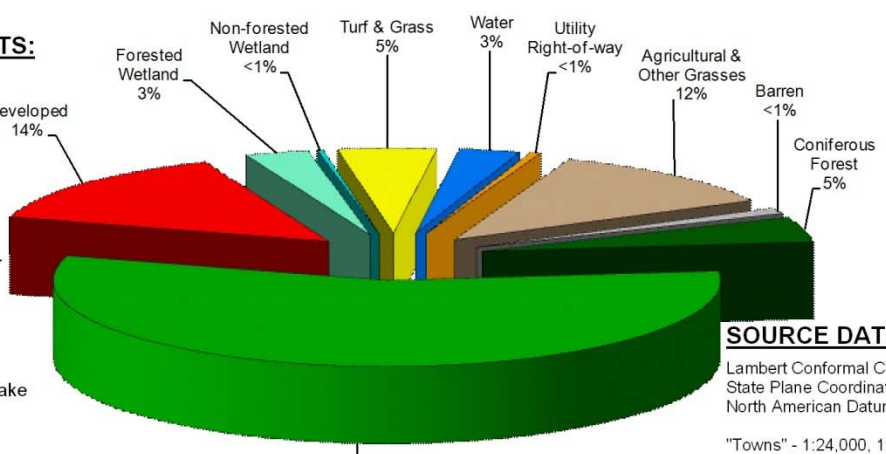
- Two fire departments: one is the Mansfield Fire Department, a combination department with three station locations (Route 32 at the junction of S. Eagleville Road, Route 195 north of Route 44 and one department on Route 195; and the second is a full-time department, separate from the town, on the University of Connecticut's campus;
- One private psychiatric and substance abuse hospital off Route 195 near the town of Windham border;
- One resident trooper's office near the intersection of Route 195 and South Eagleville Road;
- One police department on the University of Connecticut's Campus;
- Eight primary and secondary level schools: two Montessori schools, three elementary schools, one middle school, one high school, and one school associated with the Natchaug Hospital;
- Six historic districts: the Spring Hill Historic District, the Mansfield Centre Historic District, the Mansfield Hollow Historic District, the Gurleyville Historic District, the UConn Historic District, the Mansfield Training School Historic District;
- A number of historic buildings throughout town, including the old town hall off Route 195 in the center of town and several buildings on the UConn Campus;
- The University of Connecticut, a cultural beacon that attracts people to university sporting events, the Connecticut State Museum of Natural History, the William Benton Museum of Art, the Ballard Institute and Museum of Puppetry, and a number of other cultural centers;
- Two elderly concentrations: one off South Eagleville Road, which includes the Mansfield Center for Nursing and Rehabilitation, the Juniper Hill elderly housing, and the Wright's Way elderly housing, and a second one off Route 44 at Jensen's Residential Community;
- Three shopping areas including: Storrs Center mixed use housing/commercial area, the Eastbrook Mall near the town of Windham border, and the Four Corners shopping area at the intersection with Route 195 and Route 44;
- One telephone facility (Route 195 and Oak Hill Road);

Town of Mansfield Overview

Figure 30



Mansfield Land Cover Breakdown



QUICK TOWN STATS:

Town Area -
45.7 sq. miles
(29,174 acres)

Water body area -
856 acres

Water bodies > 10 acres -
Dunham Pond
Eagleville Pond
Echo Lake
Hansens Pond
Knowlton Pond
Mansfield Hollow Lake
McLaughlin Pond

Elevation -
Maximum = > 730 ft.
Minimum = < 160 ft.

Population -

2000	2010	Change
20,720	26,543	28.1%

0 0.5 1 2 3 4 Miles

Scale: 1:180,000

SOURCE DATA:

Lambert Conformal Conic,
State Plane Coordinate System
North American Datum of 1983 (NAD83)

"Towns" - 1:24,000, 1969-1984, USGS/CT DEP.
"Roads and Trails" - 1:24,000, 1969-1984, USGS/CT DEP.
"Hydrography" - 1:24,000, 1969-1984, USGS/CT DEP.
"National Elevation Dataset" - 30 meter (1 arc second).
"2006 Land Cover Greater Connecticut" - 100 ft sq., 2006, UConn, CLEAR.

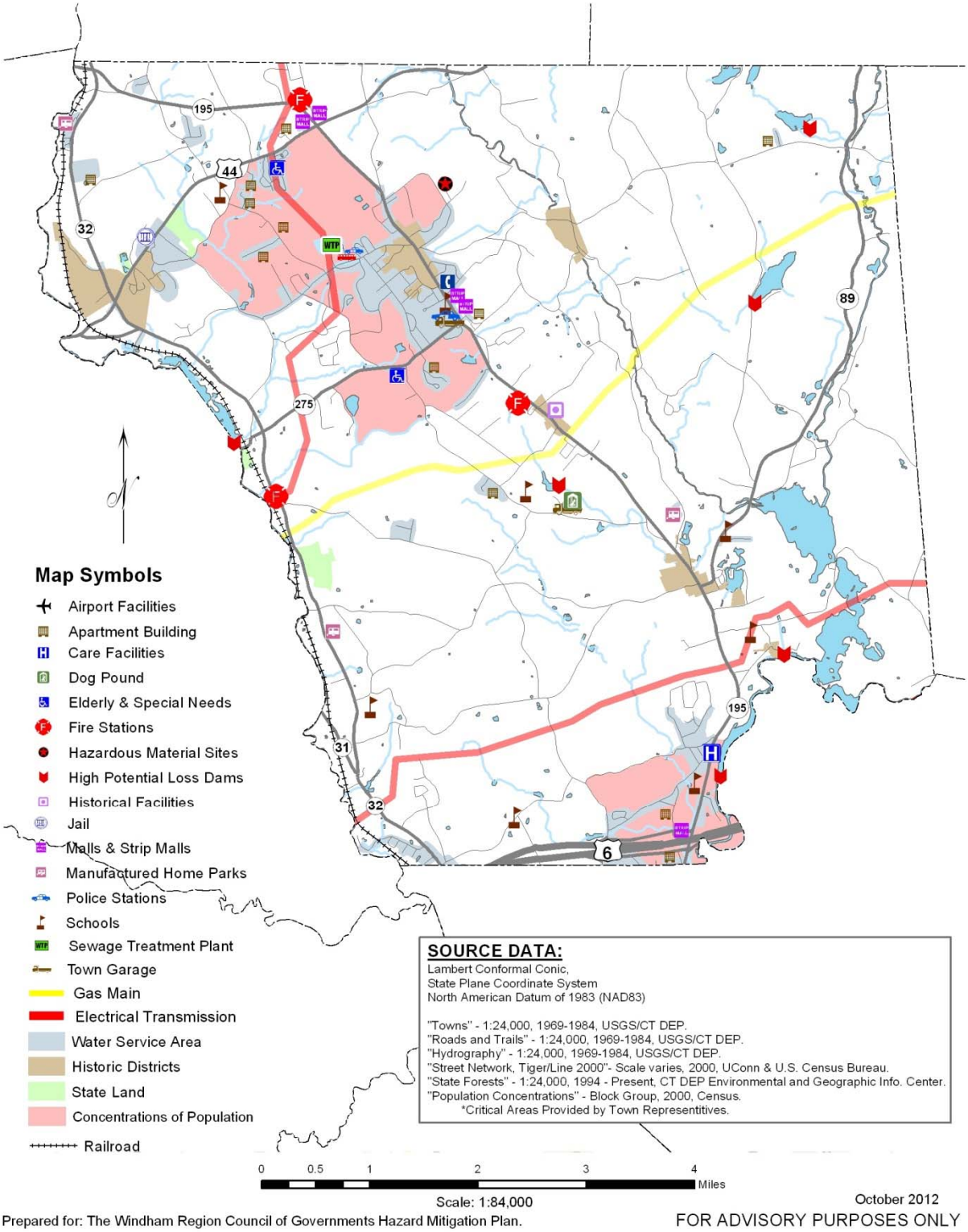
October 2012

Prepared for: The Windham Region Council of Governments Hazard Mitigation Plan.

FOR ADVISORY PURPOSES ONLY

Mansfield Critical Areas of Concern

Figure 31



- Two well fields and associated water treatment facilities: the UConn Willimantic River well field off Route 32 in the northern section of town and the UConn Fenton River well field located north of the Gurleyville Village, and the UConn water storage facility located on Horse Barn Hill (the latter two facilities primarily serve the University of Connecticut Campus and commercial and governmental facilities that are adjacent to the campus);
- One wastewater treatment plant and one reclaimed water plant owned by UConn and located on the campus;
- One central utility plant owned by UCONN and located on the campus;
- Holiday Hill camp;
- A reservoir and water treatment facility owned by Windham and located in the southeastern section of town, which primarily serves the Town of Windham and the southern section of Mansfield;
- Four major manufactured home parks: Jensen's Residential Community off Route 44, Valleyview off Route 32, Chaffeeville Road Park off Route 195, and Burcamp off Route 32, as well as a number of manufactured homes dispersed throughout town;
- Several apartment buildings, fourteen of which house large populations; and
- Three high hazard/potential loss dams.

The largest individual population concentration in town, the University of Connecticut's Storrs campus, had 18,206 undergraduates and 4,122 graduate students enrolled in the Fall 2013 semester. UConn's housing facilities allow the campus to accommodate over 12,500 students while the university is in session. The State recently announced plans to increase undergraduate enrollment at the Storrs Campus by 5,000 students over the next ten years. It is anticipated that the number of both on and off-campus housing units will grow to meet the new demand. The seasonal increase in population in this area creates an elevated concern. It should be noted that the University's Police and Fire protection capabilities are comparable to that of a municipality, but given a disaster of a large enough scale, the University would require further assistance beyond that which they can provide for themselves.

Other areas of concern in Mansfield include one home on Laurel Lane, which during times of high water levels becomes isolated; five homes on Thornbush Road, which during times of high water become isolated/inundated, (this happens approximately once every five years to one out of seven of these structures); and an area of Bassett Bridge Road which is closed during times of high water. This latter area is a flood control area and is designed for this purpose, however, traffic is disrupted during these times. The last area of concern in the town is the railroad which runs along the western town line. This railroad is not only an economic concern, but, given the cargo, at times this rail can be a hazardous material concern.

Largely forested, Mansfield is made up of approximately 56% deciduous forest, 5% coniferous forest and 3% forested wetlands. Other land cover in the town includes: developed (14%), agricultural and other grasses (12%), water (3%), turf and grass (5%), barren land (<1%), utility rights-of-way (<1%) and non-forested wetlands (<1%). The approximate 786 acres of the town occupied by water bodies includes: Dunham Pond, Eagleville Pond, Echo Lake, Hansens Pond, Knowlton Pond, Mansfield Hollow Lake and McLaughlin Pond. Mansfield's elevation ranges

from about 160 feet in the southeast corner of town at the Natchaug River to about 730 feet in the north/northwest section. In addition to all the natural hazards described previously in this plan on a regional level, Mansfield is also at risk of damage caused by flooding and dam failures.

Authorities in the Town of Mansfield who play advisory, supervisory, or direct roles in hazard mitigation for the Town include:

Authorities	Role			Hazard Mitigated
	Advisory	Supervisory	Direct	
Agriculture Committee	X			Drought
Conservation Commission	X			Flooding
Department of Building and Housing Inspection	X		X	All except drought
Department of Public Works	X	X	X	All except drought
Division of Fire and Emergency Services			X	Wildfire
Emergency Management Advisory Council	X			All
Human Services	X		X	All except drought
Office of Emergency Management	X	X	X	All
Office of the Fire Marshall	X		X	Wildfire
Open Space Preservation Committee	X			Flooding
Planning and Zoning Commission / Inland Wetland Agency	X		X	Flooding
Sustainability Committee	X			Drought
Town Council		X	X	All
Town Manager		X		All
Town Planning	X		X	All
Town / University Relations Committee	X			All
UConn Water and Wastewater Policy Advisory Committee	X			Drought, Wildfire
Zoning Board of Appeals			X	Flooding

The Town of Mansfield is currently updating its Plan of Conservation and Development. The proposed plan includes goals, strategies, and actions related to mitigation of natural hazards and is integrated into decision making at multiple levels.

Evaluation of Risks & Vulnerability

Dam Failure

Risks & Vulnerability:

Dam failure risk and vulnerability is discussed on a regional level in Section II.B. The overall risk of Mansfield to dam failure is considered to be low.

Risk (Extent)

There are thirty- six dams in Mansfield ranging from Hazard Class AA (negligible hazard) to Hazard Class C (high hazard). Thirteen dams in the town are classified as very low hazard (Class AA) or low hazard (Class A); failure of any of these dams would hardly be of concern. Five dams are classified as moderate hazard (Class BB) and their failure would cause some damage, but no major disruptions. The failure of any of the three dams classified as significant hazard (Class B), or the three high hazard (Class C) dams could cause serious damage. The greatest concern would be the failure of the high hazard dams in the town, Eagleville Lake Dam, Mansfield Hollow Dam or Willimantic Reservoir Dam. There are also 12 unassigned dams in the town, but the fact that close watch is kept over significant and high hazard dams suggests that these structures are either moderate, low, or negligible hazards.

Vulnerability (Location, Impact)

The failure of any Class B or Class C dam brings with it damages, economic loss and the potential for loss of life. One of three Class C dams is located on the south end of the Eagleville Pond, another is located on a section of the Mansfield Hollow Lake and the last is located on the south end of the Willimantic Reservoir. Their high hazard classification means that in the event of their failure, besides the definite loss of property and economic losses, the loss of life is probable. Figure 32 shows the placement of dams in the town.

Loss Estimates (Impact)

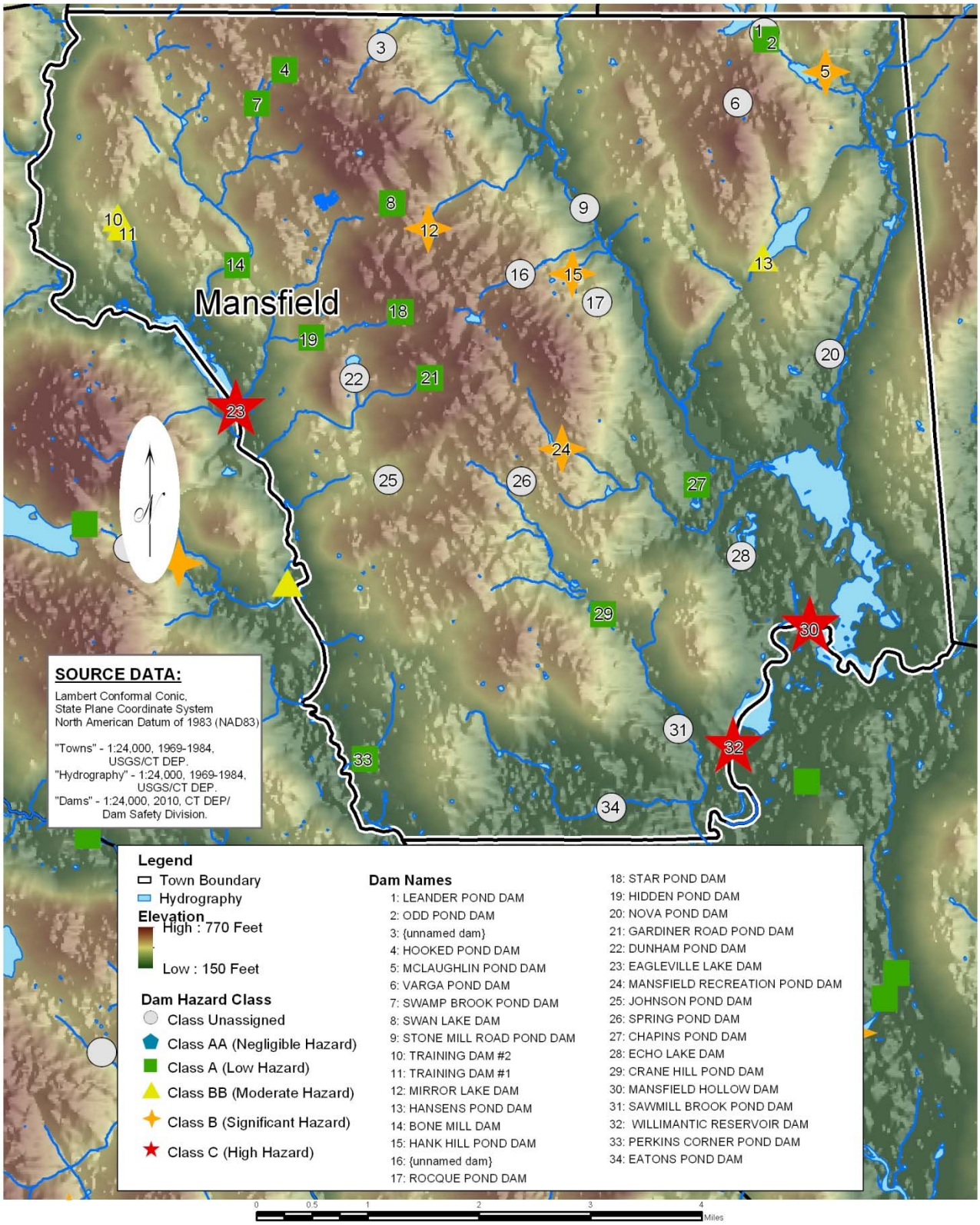
The 2014 Connecticut Natural Hazard Mitigation Plan Update provides loss estimates by county for dam failure in Table 2-54. The period of record for these loss estimates is 136 years (1877 through 2013). Based on the data provided in Table 2-54 of the State Plan, the annualized loss for Tolland County for dam failure is $9,385.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Mansfield. Based on the 2010 Census data in Section II.A., Mansfield has approximately 17.4% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Mansfield for dam failure is estimated at $1,631.

Note that this estimate does not take into account site specific details or particular dam failure damages that may have affected the Town of Mansfield in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to dam failure.

Town of Mansfield Dams

Figure 32



Scale: 1:84,000

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Town staff indicate that there has not been any damage to municipal and private structures and infrastructure due to dam failure in recent memory. This is consistent with the relatively low annualized loss estimate based on information in the 2014 State Plan.

Mitigation Efforts

Current state mitigation measures are described on a regional level on page 17, section II.B of the Natural Hazards Mitigation Plan. Among these mitigation measures are periodic dam inspections. Periodic inspections help to determine if dams are structurally sound. If a dam's structural integrity is questioned, recommendations made to ensure the safety of the structure may include:

- Any emergency measures or actions, if required to assure the immediate safety of the structure;
- Remedial measures and actions related to design, construction, operation, maintenance and inspection of the structure; additional detailed studies, investigations and analyses; or
- Recommendations for routine maintenance and inspection by the owner.

A total of 23 privately-owned dams are in Mansfield. Private owners of dams are generally reluctant to make repairs, which tend to be costly. In these instances, needed repairs may not be done in a timely manner. The condition of private dams also serves as a disincentive for the Town to acquire properties with existing dams. While a property may be desirable for open space, the potential liability and costs associated with dam repair often outweigh the overall value of the property for public open space. Additionally, grant funding sources for open space acquisition cannot be used for dam repair.

A total of eight dams in Mansfield are owned by the State of Connecticut, and one is owned by the Federal government (Mansfield Hollow Lake Dam). State and federally-owned dams are typically maintained in good condition.

Whether it is a structurally sound dam or a weak dam, Emergency Operation Plans (EOPs)/Emergency Action Plans (EAPs) are very important mitigation measures. A detailed discussion of these plans is provided in Section II.B. The DEEP works with owners of dams at greatest risk to make certain EOPs are in place and up-to-date. Hurricanes, flooding, ice jams and tornadoes may breach even a well-built dam, given a destructive enough event. Having a plan that lays out how to respond to a disaster, prior to the disaster occurring, is a very important tool in reducing loss of property and life. Mitigation measures for flooding (see below), which is a risk commonly associated with a dam failure, should also be encouraged.

While the state is assuming less responsibility for routine inspection of dams, DEEP will continue recommending measures to lessen the risk of dam failure, and the municipality can take the following mitigation actions:

- For municipally-owned dams, make sure that EOPs/EAPs are in place and current, and implement recommendations resulting from state inspections; and
- For privately-owned dams, encourage each dam owner to have an EOP/EAP in place and current, and implement recommendations resulting from inspections; monitor compliance as possible.

The Town of Mansfield has limited policies, programs, and resources dedicated to dam failure since most of these efforts are performed at the State level. The Town of Mansfield owns three dams (Mansfield Recreation Pond Dam on Bicentennial Pond, Clover Mill Pond Dam, and Wild Goose Pond Dam), and a fifth dam is owed by the Town of Windham (Willimantic Reservoir Dam). Of these, the Willimantic Reservoir Dam is rated Class C, the Bicentennial Pond dam is rated Class B, and the remaining dams are unclassified.

The Town of Mansfield reports that it is currently in the process of developing an EAP for the dam at Bicentennial Pond to achieve compliance with the recent Connecticut DEEP regulations. The EAP is expected to cost up to $20,000. Annual expenses to maintain town-owned dams are incorporated into the annual budget for parks and recreation and public works. The Town of Mansfield maintains copies of EOPs/EAPs for dams within and upstream of Mansfield where they have been developed.

The Town's ability to mitigate dam failure is considered to be good for town-owned dams but limited for privately owned dams. Overall, the Town of Mansfield's capability to mitigate for dam failure and prevent loss of life and property has significantly increased since the initial hazard mitigation plan was adopted, mainly as a result of recent statewide legislative actions described above and in Section II.B. Over the next few years, it is expected that dam safety programs will continue to strengthen in Connecticut. In addition, the Town of Mansfield has instituted a reverse 9-1-1 program, upgraded its shelters, and improved emergency communication and response capabilities.

<u>Drought</u>

Risk & Vulnerability:

Drought risk and vulnerability is discussed in Section II.B. Given recent studies on potential climate change impacts Connecticut, there is enhanced emphasis on drought mitigation strategies for Mansfield in this plan. The overall risk of Mansfield to drought is considered to be low.

Loss Estimates (Location, Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides loss estimates by county for drought in Table 2-69. However, no damages are reported. Therefore, the

estimated annualized loss for drought in Mansfield would also be $0. The number of annualized events for Tolland County is reported at 0.05.

With only 5% of the town protected by public fire protection, the local fire department relies on fire ponds and dry hydrants throughout most of the community. Mansfield Fire Department maintains ten fire ponds and they have all become unusable at one time or another due to a combination of maintenance issues (sedimentation) and drought conditions. When a water source is not available, an alternate source is located and water is carried to the location of the fire via pumper truck. Fortunately, the public fire protection covers a significant percentage of the town's population.

Many residents rely on private water supplies or small private community systems. Several residential wells have been re-drilled over the past few years due to running dry, although it was reportedly not conclusive that these events were due to drought.

The two major areas of town that are served by public water supply with fire protection are the student population at the University of Connecticut which utilizes that institution's public water system, and the southern end of town which is served with public water supply from Windham Water Works. Although it reportedly does not have any water conservation ordinances, the Town of Mansfield follows conservation orders when they are issued by any of the major utilities in town. In particular, the University of Connecticut enacts significant voluntary and mandatory water conservation measures for its users when drought conditions occur as referenced in its 2011 *Wellfield Management Plan*. Several town facilities are connected to the University's water system. Costs related to compliance with these conservation measures are not available.

The Town of Mansfield reports that direct losses due to drought have not been reported over the past 10 years. Based on the Town's assessment, it is estimated that the annualized loss in the Town of Mansfield due to drought is relatively low (less than $1,000).

Mitigation Efforts

As with any rural community that depends on aquifers and local well systems, Mansfield's vulnerability to drought increases with population growth and the accompanying increased demands for water. Good land use planning and helping the community to understand the importance of water conservation can reduce the threat of drought. Other specific measures that should be considered include:

- Completing a town-wide groundwater study, including recharge into existing aquifers to develop recommendations for future land use patterns;
- Implementing site design techniques and criteria such as strict regulation of vegetative buffers for stream and river corridors, rain gardens for site drainage, and prohibition of wetlands alteration;
- Studying effectiveness of conservation measures; and

- Implementing water conservation awareness programs.

The town estimates the cost to dredge and increase capacity of an individual fire pond to withstand drought conditions to range between $2,000 to over $10,000 depending on site-specific conditions. Assuming it costs $10,000 per pond to restore each to withstand drought, this could be an expense of $100,000 or more.

Given the inconsistent reliability of the fire ponds and dry hydrants, the Town of Mansfield has been actively researching the purchase of a water tanker for firefighting purposes. The Fire Department expects to purchase a water tanker in early summer 2015 at a cost of approximately $475,000.

Other than monitoring dry hydrants and implementing water conservation measures when requested, the Town does not mitigate for drought. Overall, the Town of Mansfield's capability to mitigate for drought and prevent loss of life and property has slightly improved since the initial hazard mitigation plan was adopted, mainly because the Town has conducted planning at the local level to determine mitigation measures and has partnered with the University of Connecticut to conserve water during dry periods. However, the majority of drought planning and response occurs at the State level and local capabilities are relatively limited. Mansfield plans to continue drought planning locally as indicated by its mitigation strategies at the end of this section, and will continue to work with the University of Connecticut to promote water conservation as is currently performed each year.

<u>Earthquake</u>

Risk & Vulnerability:

Earthquake risk and vulnerability is discussed in Section II.B. The overall risk of Mansfield to earthquakes is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides a range of annualized loss estimates by county for earthquakes in Figure 2-66. Based on the data provided in Figure 2-66 of the State Plan, the annualized loss for Tolland County lies between zero and $56,050. To be conservative, the maximum county-wide annualized loss value of $56,050 is utilized herein.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Mansfield. Based on the 2010 Census data in Section II.A., Mansfield has approximately 17.4% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Mansfield for earthquakes is estimated at $9,743.

Note that this estimate does not take into account site specific details or particular earthquake damages that may have affected the Town of Mansfield in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to earthquakes.

The Town of Mansfield does not recall any municipal or private damages or losses due to recent earthquakes. Emergency calls due to recent earthquakes were not received by emergency staff. The annualized loss estimate of $9,743 based on the values in the 2014 State Plan is therefore likely high but is reasonable enough to use for planning purposes, particularly in light of the hundreds of millions of dollars in State infrastructure located at the University of Connecticut.

Mitigation Efforts

Occurrences of large earthquakes in the region are infrequent. While many mitigation measures may not be cost-effective, the community should consider the following:

- Enforcing effective building codes and local ordinances;
- Encouraging emergency facilities such as hospitals to be constructed to withstand seismic events; and
- Encouraging a low-cost earthquake rider for homeowners and businesses.

The Town does not specifically mitigate for earthquake hazards. Overall, the Town of Mansfield's capability to mitigate for earthquakes and prevent loss of life and property is limited and generally unchanged since the initial hazard mitigation plan was adopted, mainly because it is not a high priority because earthquake damage is so infrequent.

<u>Flooding</u>

The overall vulnerability of Mansfield to flooding is considered to be moderate.

Risks (Extent)

The Town of Mansfield is at risk of flooding because of a number of streams, brooks and ponds in the town. According to the 1980 Federal Emergency Management Agency's (FEMA's) updated Flood Insurance Study (FIS) for the town:

> "Floods in Mansfield have occurred in every season of the year. Spring floods are common and are caused by rainfall in combination with snowmelt. Floods in late summer and fall are usually the result of hurricanes or other storms moving northeastward along the Atlantic coast. Winter floods result from occasional thaws, particularly in years of heavy snowfall.

> Major floods of the past 50 years occurred in Mansfield in March 1936, September 1938, and August 1955. The 1936 and 1938 floods are equivalent to a 20-year frequency flood and a 100-year frequency flood, respectively. Of these, the hurricane-caused flood of August 1955 was by far the most severe in terms of amount of runoff and property damage. The Willimantic River at the U.S, Geological Survey (USGS) gaging station (no. t01119500, with 40 years of operation) located just upstream of Route 31, recorded a peak discharge of 24,200 cubic feet per second (cfs) on August 19, 1955. This is equivalent to a flood having a recurrence interval of more than 200 years. The Natchaug River valley was spared serious flooding in 1955 because of the tremendous storage capacity in Mansfield Hollow Lake, which rose to within 8 feet of its spillway elevation (4)."

Vulnerability (Location, Impact)

Areas studied for vulnerability, as noted in FEMA's 1980 FIS for the town, are as follows:

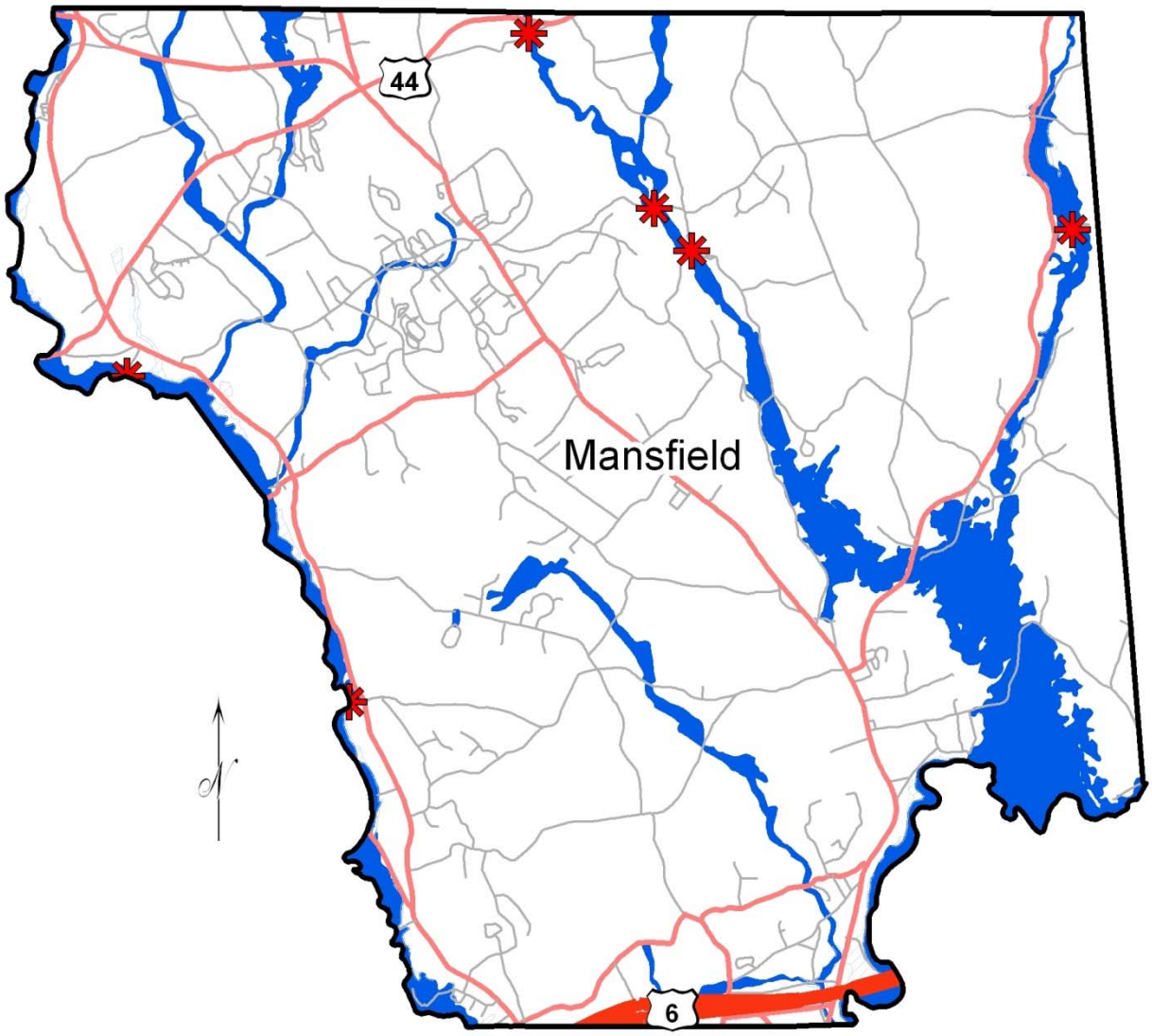
> "The areas studied by detailed methods were selected with priority given to all known flood hazard areas, and areas of projected development or proposed construction until 1980.
>
> Approximate methods of analysis were used to study those areas having low development potential and/or minimal flood hazards as identified at the initiation of the study. The scope and methods of study were proposed to and agreed upon by the Federal Insurance Administration and the community.
>
> The streams studied in detail were the Natchaug River from the downstream corporate limit to Hollow Dam; the Willimantic River from the downstream corporate limits, the limit of flooding affecting the community (a point about 6,350 feet downstream from Cider Mill Road) to the upstream corporate limits; Mount Hope River from its mouth to the upstream corporate lime; and Conantville Brook from its downstream corporate limit to Pleasant Valley Road. Streams studied by approximate methods were the Fenton River, Fishers Brook, Eagleville Brook, Cedar Swamp Brook, Nelson Brook and Sawmill Brook (2)."

A map of the flood risk areas is provided on Figure 33.

In addition to these areas noted by the FIS, Mansfield also has six "scour bridges". This is a term used by ConnDOT to describe a bridge whose structure may be undermined by soil erosion during certain rainfall or stream flow events, thus affecting its stability and safety. The structures located on Old Turnpike Road, Stonemill Road and Gurleyville Road all cross the Fenton River, while the structure located on Laurel Lane crosses the Mount Hope River. The Stone Mill Road and Laurel Lane bridges were both replaced between 2011 and 2013; minimizing the potential for significant damage to those bridges during a flood event.

Flood Risk Zones of Mansfield

Figure 33



Legend

- Scour Bridges
- Major Highways
- Highways
- Local Roads
- 100 Year Flood Zone
- 500 Year Flood Zone

SOURCE DATA:

Lambert Conformal Conic,
State Plane Coordinate System
North American Datum of 1983 (NAD83)

"Towns" - 1:24,000, 1969-1984, USGS/CT DEP.
"Roads and Trails" - 1:24,000, 1969-1984, USGS/CT DEP.
"FEMA Flood Insurance Rate Maps (FIRM)" - scale varies, collection date varies, FEMA.
"Dynamap Transportation v11.3 streets" - Scale varies, 2009, Tele Atlas North America Inc.
"Scour Critical Town Bridges" - Conndot Bridge Safety + Evaluation, 10/10/2012.

0 0.5 1 2 3 4 Miles

Scale: 1:84,000

January 2012

Prepared for: The Windham Region Council of Governments Hazard Mitigation Plan.

FOR ADVISORY PURPOSES ONLY

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of annualized loss by county for flooding in Table 2-44. Based on the data provided in Table 2-44 of the State Plan, the annualized loss for Tolland County based on the historic record through the National Climatic Data Center through the past 20 years is $255,828.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Mansfield. Based on the 2010 Census data in Section II.A., Mansfield has approximately 17.4% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Mansfield for flooding is estimated at $44,472.

Note that this estimate does not take into account site specific details or particular flooding damages that may have affected the Town of Mansfield in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to flooding.

According to the Town of Mansfield, flood damages have been relatively minor in recent years. No public assistance reimbursements were received for flooding in October 2005, April 2007, or October 2010, and no specific damage areas were reported although several roads were closed.

According to FEMA, The Town of Mansfield has two severe repetitive loss properties and two additional repetitive loss properties. All of the properties are listed as residential. One of these properties is listed as mitigated. According to the Town, this property was elevated through a severe repetitive loss grant.

The two severe repetitive loss properties and the two repetitive loss properties are all located in the 1% annual chance floodplain of the Willimantic River. The two severe repetitive loss properties have reported 22 losses with an average payment of $20,300 per loss. The two repetitive loss properties have reported seven losses with an average payment of $6,500 per loss.

The Town of Mansfield reports that most of its flooding problems are confined to three areas. The Thornbush Road neighborhood has a long history of flooding issues. Laurel Lane experiences flooding which reportedly affects one residence although details are not available. Finally, Bassetts Bridge Road is typically closed part of the year in the vicinity of the State boat launch due to flood control measures controlled by the United States Army Corps of Engineers at the Mansfield Hollow Dam. Based on the above, the annualized loss estimate of $44,472 for flooding is considered reasonable for the Town of Mansfield.

Mitigation Efforts

The Town of Mansfield has consistently participated in the NFIP since January 2, 1981. The most recent FIRM was published on January 2, 1981. The current Town of Mansfield FIS was published July 1980. The original FIS and FIRMs for flooding sources in the Town are based on work completed in March 1978. Many of the local flooding problems are consistent with the floodplains mapped by FEMA.

Article 10, Section E of the Town of Mansfield's current zoning regulations include, but are not limited to, the following limitations in the flood zone[γ]:

- No structures to be used for residential occupancy are allowed within designated Flood Hazard Areas. The lowest floor elevation, including basement, of all non-residential structures located within designated flood hazard areas shall be elevated to at least one (1) foot above the base flood level (100-year flood level) or be flood proofed with structural certification by a registered professional engineer or architect certifying that the building will withstand a flood equivalent to the 100-year storm without damage (Article 10.E.4.a).

- In all Flood Hazard Areas and areas subject to a base flood, any new construction or any substantial improvements shall be: anchored to prevent flotation, collapse or lateral movement of the structure; constructed with materials resistant to flood damage; constructed by methods and practices that minimize flood damage; and constructed with electrical, heating, ventilation, plumbing, air conditioning equipment and other services facilities designed and/or located to prevent water from accumulating within components during flooding (Article 10.E.4.b.1-4).

- All existing manufactured homes to be replaced or to be substantially improved shall be elevated so that the lowest floor is at least one (1) foot above the base flood elevation. It shall be placed on a permanent foundation which itself is securely anchored and to which the structure is securely anchored so that it will resist flotation, lateral movement, and hydrostatic and hydrodynamic pressures. Anchoring may include, but not be limited to, the use of over-the-top or frame ties to ground anchors (Article 10.E.4.c).

- Within designated floodways, including zone A as designated in the flood Insurance Rate Map, all development is prohibited, unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that

[γ] The flood zone being the Flood Hazard Areas, designated as land within flood encroachment lines administered by the State Department of Environmental Protection, and other land subject to 100-year flooding.

the proposed development would not result in any increase in flood levels within the community during the occurrence of the base flood discharge (Article 10.E.4.f).

Mansfield prohibits residential structures from being constructed within designated flood hazard areas. All non-residential proposed structures must meet elevation requirements and strict construction demands. Proposed structures may be required to be constructed with certain materials, elevated, flood proofed or anchored. Manufactured (mobile) homes are required to meet further elevation, anchoring and tie down requirements. It must be shown that any proposed development in the 100-year flood plain will not alter the flood levels in the community. These types of regulations help to keep structures out of areas at risk of flooding. Structures that are allowed in the flood plain must meet requirements put in place to greatly reduce the risk of damage to property and the loss of life, should a flood occur.

The degree of flood protection established by the variety of regulations in the Town exceeds the minimum reasonable for regulatory purposes under the NFIP. The Town plans to remain compliant with the NFIP and will continue to participate in the NFIP.

Additional mitigation measures recommended for all towns in the region include:

- Educating the public on
  - risks of flooding,
  - risks of building in hazard-prone areas,
  - Federal Emergency Management Agency (FEMA) floodplain maps (and making these maps easily available to the public);
- Implementing a maintenance program to clear debris from storm water drainage areas;
- Developing sediment control to prevent clogged drainage systems, such as street sweeping, curb and gutter cleaning, paving dirt roads, and planting vegetation on bare ground;
- Investigating the use of flood-prone areas as open spaces;
- Encouraging individuals in flood-prone areas to purchase flood insurance;
- Elevating structures above the 100-year flood level; and
- Considering the conservation of open space by acquisition of repetitive loss structures.

The Town performs monitoring at several bridges that are known to be scour prone. These include the Laurel Lane bridge over the Mount Hope River; the Hillyndale Road bridge and the Shady Lane bridge over Eagleville Brook; the Old Turnpike Road bridge, the Gurleyville Road bridge, and the Stone Mill Road #1 bridge over the Fenton River; and the Depot Road bridge, Plains Road bridge, and Brigham Road bridge over the Willimantic River.

The Town's capabilities are considered to be effective in regards to response to flood damage, and the Town's capability to mitigate flood hazard damage is also considered effective for preventing damage to new development and substantial improvements.

Overall, the Town of Mansfield's capability to mitigate for flooding and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted. This is because the Town has implemented a monitoring program to evaluate certain bridges on a regular basis, and has implemented a Reverse 9-1-1 system to contact residents in cases of emergency conditions.

Stormwater

Stormwater runoff can significantly exacerbate flooding; therefore, managing stormwater runoff is a priority mitigation measure. Residential and commercial development increases impervious land area, reduces the infiltration of stormwater runoff into the ground, and increases the volume and velocity of stormwater runoff causing flooding. Enforcing appropriate maintenance programs for stormwater facilities will therefore help reduce the impact of these events and subsequently reduce the damage caused by flooding. A good stormwater management system promotes groundwater recharge and controls peak flows, while reducing local flooding and maintaining stream bank integrity. An example of a good stormwater management system would be one that calls for removing sediment accumulation from catch basins yearly. This may make the difference in whether or not flooding occurs. Mansfield is encouraged to develop a municipal stormwater management plan. All towns within the region are also encouraged to consider the effects of proposed future development on stormwater runoff.

Hurricanes

Risk & Vulnerability:

Hurricane risk and vulnerability is discussed in Section II.B. The overall risk of Mansfield to hurricanes is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of hurricane wind losses for a variety of hurricane wind events by county in Table 2-21. This data was developed using HAZUS-MH. Based on the data provided in Table 2-21 of the State Plan, the predicted annualized loss for Tolland County due to hurricane wind damage is $10,347,317.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Mansfield. Based on the 2010 Census data in Section II.A., Mansfield has approximately 17.4% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Mansfield for hurricane wind damage is estimated at $1,798,723.

Note that this estimate does not take into account site specific details or particular hurricane wind damages that may have affected the Town of Mansfield in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to hurricane wind damage.

The Town of Mansfield received a public assistance reimbursement of $74,987.49 related to cleanup following Hurricane Irene, and a public assistance reimbursement of $55,692.96 for Hurricane Sandy. Public assistance reimbursements were not available for Hurricane Bob. Other notable losses were not reported to the Town, but were expected to have been incurred by property owners on some scale during these strong wind events.

Mitigation Efforts

Some of the greatest damage from hurricanes is caused by flooding, high winds and tornadoes. Mitigation measures for these events are looked at separately in the flooding and tornado/wind damage sections. Other mitigation efforts that should be considered include:

- Providing emergency shelters;
- Implementing a tree hazard management program, which would encourage responsible planting practices and minimize future storm damage to buildings, utilities, and streets;
- Practicing a tree trimming maintenance program; and
- Encouraging use of native species.

The Town maintains shelter facilities and evaluates the need for supplies at least annually or following each event. The Town performs debris management through Public Works with the assistance of the local electrical utility when necessary. The Town's capabilities are considered to be effective with regard to mitigating hurricane damage. Overall, the Town of Mansfield's capability to mitigate for hurricanes and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted because a reverse 9-1-1 program was implemented, the town budget for preventative tree maintenance has increased, and the State building code has been updated and locally adopted.

<u>Ice Jams</u>

Risk & Vulnerability:

Ice jam risk and vulnerability is discussed in Section II.B. The overall risk of Mansfield to ice jams is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update indicates that ice jams have not occurred in Connecticut since 2010. Due to the infrequency of the hazard and the limited information available regarding damages, it is no longer considered a separate hazard from flooding. The potential annualized loss estimate due to ice jams in Mansfield is therefore included in the annualized loss estimate for flooding presented above.

The Town of Mansfield has not experienced any damage due to ice jams or ice jam flooding in recent memory.

Mitigation Efforts

During ice jams the biggest concern is the risk of flooding. See mitigation measures under flooding (above).

Severe Winter Storms

Risk & Vulnerability (Impact):

Severe winter storm risk and vulnerability is discussed in Section II.B. Key risks are the relative isolation of the rural communities from emergency services; loss of electrical power to large areas from ice accumulation or high winds, and fire from improper use of alternative heating sources, candles and gas stoves. The leading cause of death is from automobile and other transportation accidents. Property damage can also occur from frozen water pipes and falling trees or branches from ice accumulation and/or wind. The overall risk of Mansfield to severe winter storms is considered to be high.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of severe winter storm losses for a variety of events by county in Table 2-35. This data was developed based on damages reported in the NCDC database. Based on the data provided in Table 2-35 of the State Plan, the predicted annualized loss for Tolland County due to severe winter storm damage is $532,131.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Mansfield. Based on the 2010 Census data in Section II.A., Mansfield has approximately 17.4% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Mansfield for severe winter storm damage is estimated at $92,503.

Note that this estimate does not take into account site specific details or particular severe winter storm damages that may have affected the Town of Mansfield in the historic record.

Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to severe winter storm damage.

The Town of Mansfield received a public assistance reimbursement of $31,221.93 related to the heavy snow in January and February 2011. Both private damage and municipal damage was reported, with most of the damage being minor in nature. All work was repaired with inspections completed by the building department.

The public assistance reimbursement following Winter Storm "Alfred" in late October 2011 was $66,100.96. The public assistance reimbursement for Winter Storm "Nemo" in February 2013 was $50,321.48. Damages to town-owned buildings were not reported for these latter storms. Other notable losses were not reported to the Town, but were expected to have been incurred by property owners (including the University of Connecticut) on some scale during these severe winter storm events.

Mitigation Efforts (see also flooding and tornado/wind damage)

Some of the greatest damage from winter storms is caused by flooding and high winds, and mitigation measures for such hazards are discussed under those headings.

It is particularly important to encourage people to stay indoors and out of harm's way when severe winter weather threatens. Such conditions increase the frequency of traffic accidents and emergency responders take longer to reach accident scenes because of vehicles unnecessarily on the roads.

Power outages can cause a number of problems, from loss of heat and the risk of frozen pipes to fire hazards. Tree-trimming programs can lessen the risk of power outages to some extent. Putting utility wires underground can lessen the risk even further. In any event, the municipality should work with utility companies to restore power as quickly as possible.

The National Weather Service's Early Warning System is an important mitigation measure for winter storms. Other hazard-specific mitigation efforts that should be considered include:

- Educating the public on
  - The risks of hypothermia,
  - The risks of carbon monoxide poisoning in motor vehicles and from portable heaters and power generators in homes,
  - The risk of fires from portable heaters and candles,
  - The importance of staying off the roads,
  - Landscaping practices that encourage the planting of species that are less susceptible to damage from ice storms to reduce the risk of damage to structures;
- Implementing a tree trimming maintenance program;

- Encouraging underground utility wires; and
- Providing emergency shelters before, during, and after the event.

The Town maintains shelters and provides plowing services through Public Works. The Town also requires locations for snow storage to be considered in the design of parking lots. The Town's capabilities are considered to be effective in regards to response to severe winter storms, although the Town's capability to mitigate severe winter storm damage is relatively limited to town-owned facilities. Overall, the Town of Mansfield's capability to mitigate for severe winter storms and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted because a reverse 9-1-1 program has been implemented and the local plow trucks have been upgraded.

Thunderstorms

Risk & Vulnerability:

Thunderstorm risk and vulnerability is discussed in Section II.B. As with droughts, one of the potential impacts of climate change identified for Connecticut is a possible increase in the frequency of severe storms. The overall risk of Mansfield to thunderstorms is considered to be moderate.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of thunderstorm losses by county in Table 2-19. This data was developed based on damages reported in the NCDC database. Based on the data provided in Table 2-19 of the State Plan, the predicted annualized loss for Tolland County due to thunderstorm damage is $55,581.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Mansfield. Based on the 2010 Census data in Section II.A., Mansfield has approximately 17.4% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Mansfield for thunderstorm damage is estimated at $9,662.

Note that this estimate does not take into account site specific details or particular thunderstorm damages that may have affected the Town of Mansfield in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to thunderstorm damage.

The Town of Mansfield reports that the cost to respond to a downed branches incident could be several thousand dollars depending on the scale of the event. Private losses are not typically reported to the Town, but are expected to be incurred by property owners on some scale during severe thunderstorm events.

Mitigation Efforts (see also wildfires, flooding and tornado/wind damage)

Some of the greatest damage from thunderstorms is caused by fires, flooding, high winds, and (on occasion) tornadoes. Mitigation measures for such hazards are discussed under those headings.

The National Weather Service's Early Warning System is an important mitigation measure for thunderstorms. Other hazard-specific mitigation efforts that should be considered include:

- Educating the public on how to minimize risk of injury both indoors and outdoors (more specific);
  - When to turn off gas, electricity, and water; and
  - When and how to avoid contact with water and metal.
- Clearing dead or rotting tree branches;
- Securing outdoor objects that could become projectiles; and
- Installing lightning rods.

The Town notifies the public when a severe thunderstorm is to occur, and performs debris management through Public Works with the assistance of the local electrical utility when necessary. The Town's capabilities are considered to be effective in regards to response to thunderstorms, although the Town's capability to mitigate thunderstorm damage is relatively limited to town-owned facilities and right-of-ways. Overall, the Town of Mansfield's capability to mitigate for thunderstorms and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted because the Town implemented a reverse 9-1-1 system, and because the local electrical utility has performed an intensive trimming program near electrical lines following the severe storms in 2011.

<u>Tornado/Wind Damage</u>

Risk & Vulnerability:

Tornado/Wind Damage risk and vulnerability is discussed in Section II.B. The overall risk of Mansfield to tornadoes is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of tornado losses for a variety of events by county in Table 2-30. This data was developed based on damages reported in the NCDC database. Based on the data provided in Table 2-30 of the State Plan, the predicted annualized loss for Tolland County due to tornado damage is $44,371.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Mansfield. Based on the 2010 Census data in Section II.A., Mansfield has approximately 17.4% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Mansfield for tornado damage is estimated at $7,713.

Note that this estimate does not take into account site specific details or particular tornado damages that may have affected the Town of Mansfield in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to tornado damage.

The Town of Mansfield reports that the cost to respond to the July 10, 2013 EF-1 tornado cost $11,900. This is generally consistent with the annualized loss estimate presented above. Higher costs could likely be incurred depending on the severity of the storm and the location affected.

Mitigation Efforts

While the region has a very low risk of experiencing a tornado with great destructive potential, basic measures to minimize damage from high winds can be implemented and public education efforts can help to prepare residents. Owners of older mobile homes should be particularly aware of mitigation measures that could protect their homes from damage.

The National Weather Service's Early Warning System is an important mitigation measure for tornado/wind damage events. Other hazard-specific mitigation efforts that should be considered include:

- Being aware of, and educating the public through pamphlets and web-based information on
  - The warning signs for a tornado,
  - The importance of securing outdoor objects that could become projectiles,
  - What kinds of buildings are most vulnerable to damage from tornadoes or high winds (such as manufacture housing),
  - Structural alterations to protect against wind damage,
  - When and where to seek shelter;
- Encouraging upgrading of existing buildings to meet current building codes;
- Enforcing and updating building code standards for light frame construction, especially wind resistant roofs. FEMA articles on bracing for gable trussed roofs and bracing for doors and windows are available for review. Information is also available on placement of HVAC systems and electrical utilities to resist both wind and flood damage; and
- Encouraging underground utility wires.

The Town's policies for mitigating tornado damage are response-oriented and include maintaining shelters and debris cleanup equipment, and notifying residents when a tornado could occur. The Town's capabilities are considered to be effective in regards to response to tornadoes. Overall, the Town of Mansfield's capability to mitigate for tornadoes and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted because the Town implemented a reverse 9-1-1 program.

Wildfire Hazards

Risk & Vulnerability (Extent, Impact):

Wildfire Hazard risk and vulnerability is discussed in Section II.B. If there is an increase in drought periods due to climate change, it is expected that the potential for wildfires/brush fires will similarly increase, particularly given the extensive forested areas existing in Town. The overall risk of Mansfield to wildfires is considered to be low.

The Town of Mansfield reports that recent brush fires have been relatively small. In 2013, a total of 16 wildfires occurred which burned approximately five acres. In 2012, a total of 17 wildfires occurred which burned approximately six acres. In 2011, a total of six wildfires occurred which burned approximately eight acres.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update does not provide loss estimates by county for wildfires except on Figure 2-52, where the reported annualized loss for the county is reported as being less than $56,040. Table 2-61 of the 2014 State Plan indicates that Tolland County experienced 387 wildfire events that burned an average of 1.53 acres per fire from 1991 to 2013. The number of annualized events is therefore 17.6, and the average acres burned in Tolland County is therefore 26.9 acres per year.

Town staff report that wildfires cost the Mansfield Fire Department approximately $2,000 per acre affected in terms of personnel, apparatus, and equipment. Based on this assessment, the annualized loss over the last three years due to wildfires in Mansfield has been approximately $13,000.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized events to Mansfield. Based on the 2010 Census data in Section II.A., Mansfield has approximately 17.4% of the population of Tolland County. Based on this percentage, the number of annualized events in the Town of Mansfield is estimated to be 3.1, which would be equivalent to an average of 4.74 acres burnt per year. Assuming a total cost of $2,000 per acre affected as discussed above, the estimated annualized loss based on long-term wildfire statistics is estimated at $9,480.

Note that this estimate does not take into account site specific details or particular wildfire damages that may have affected the Town of Mansfield in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to wildfire damage.

Mitigation Efforts

Long periods of drought are one of the primary natural causes of wildfires. Mitigation measures for drought are discussed under that heading. Other mitigation efforts that should be considered include:

- Educating the public on safe fire practices;
- Using fire-resistant material when renovating, building, and retrofitting structures;
- Moving shrubs and other landscaping away from structures;
- Periodically clearing brush and dead grass from property; and
- Acquiring land susceptible to wildfires to maintain it as open space.

The Town uses a variety of regulatory, preparedness, and public information programs to mitigate the effect of wildfires, including the Open Burning Program, maintenance of hydrants, dry hydrants and cisterns, and educational programs on fire safety. The Town's capabilities are considered to be effective in regards to response to wildfires. Overall, the Town of Mansfield's capability to mitigate for wildfires and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted. The Town implemented a reverse 9-1-1 program and implemented Connecticut DEEP's updated Open Burning Program (see Section II.B.)

Mitigation Strategies

The Town of Mansfield has reviewed the "Risk and Vulnerability Assessment," the strengths and weaknesses of its existing mitigation strategies, and developed proposed mitigation strategies. Based upon internal resources, discussions and meetings with local officials and the general public, this section presents goals, objectives and proposed mitigation strategies. These mitigation strategies guide future efforts to reduce the loss of life and property as a result of natural disasters and attempt to break the expensive cycle of repeated damage and reconstruction. The proposed mitigation strategies are further prioritized to help guide the implementation schedule.

The goal of the Town of Mansfield continues to be "to reduce the loss of life and property and economic consequences as a result of natural disasters". The Town identified eight objectives in the initial plan to meet this goal:

1. To reduce the likelihood of flooding by improving existing natural and artificial drainage systems.
2. To reduce the likelihood of flooding by improving bridge conditions.

3. To reduce the likelihood of flooding, evaluate property prone to flooding.
4. Reduce costs associated with providing emergency services and other public services in the event of a natural disaster.
5. Reduce the amount of debris from severe storms through preventative tree maintenance.
6. Expand activities related to emergency preparedness and improve natural hazard response capabilities.
7. Whenever practical, incorporate natural hazard mitigation strategies into existing town projects.
8. To reduce the likelihood of wildfire hazards by improving water availability.

A total of 22 specific tasks were identified in the initial plan to meet these objectives. These tasks are discussed in more detail in the table below:

Status of Strategies and Actions for Mansfield from Initial Hazard Mitigation Plan

Obj.	Task	Priority	Responsible Department*	Comment	Status
1	Purchase or rehabilitate Vac-all equipment for silt removal	Medium	Public Works	This was not completed due to lack of funding	Carried Forward
1	Study catch basin silt capacity to determine quickest filling catch basins to upgrade	Low	Public Works	This was not completed due to lack of funding	Carried Forward
2	Improve Bassett Bridge Road crossing the Naubesatuck Lake; this structure is in the floodplain and gets closed frequently in high water events	Low	Public Works, Contracted	This was not completed due to lack of funding	Carried Forward
2	Examine Laurel Lane bridge crossing the Mount Hope River (scour bridge)	High	Public Works, Contracted	The structure was examined and it was determined that further monitoring was needed. The bridge was recently replaced but is still scour prone.	Completed
2	Examine Hillyndale Road bridge crossing the Eagleville Brook	High	Public Works, Contracted	The structure was examined and it was determined that further monitoring was needed	Completed
2	Examine Shady Lane bridge crossing the Eagleville Brook	High	Public Works, Contracted	The structure was examined and it was determined that further monitoring was needed	Completed
2	Examine Old Turnpike Road bridge crossing the Fenton River (scour bridge)	High	Public Works, Contracted	The structure was examined and it was determined that further monitoring was needed	Completed

Status of Strategies and Actions for Mansfield from Initial Hazard Mitigation Plan (Continued)

Obj.	Task	Priority	Responsible Department*	Comment	Status
2	Construct new Stone Mill Road #1 bridge crossing the Fenton River (scour bridge)	High	Public Works, Contracted	A new bridge was constructed in 2012. Further monitoring for scour is needed	Completed
2	Examine Gurleyville Road bridge crossing the Fenton River (scour bridge)	High	Public Works, Contracted	The structure was examined and it was determined that further monitoring was needed	Completed
2	Examine Depot Road bridge crossing the Willimantic River (scour bridge for 10-year flow events)	High	Public Works, Contracted	The structure was examined and it was determined that further monitoring was needed	Completed
2	Examine Plains/Brigham Road bridge crossing the Willimantic River (scour bridge from 10-year flow events)	High	Public Works, Contracted	The structure was examined and it was determined that further monitoring was needed	Completed
3	Home on Laurel Lane is isolated during flooding events (evaluate situation)	Low	Emergency Managers	Evaluation determined that property should be considered for acquisition	Updated
3	Seven homes on Thornbush Road are in the flood zone and at times become inundated during high water events	Low	Emergency Managers	Evaluation determined that five homes continue to be at risk and should be considered for grant opportunities	Updated
4	Upgrade all eight of the town's front-line plows with liquid spreaders (including brine maker)	Medium	Public Works	This work has been completed.	Completed
5	Budget appropriate money necessary to maintain and remove dead, dying, dangerous, or diseased trees from the town rights-of-ways	High	Public Works	Additional money has been added to the budget for tree maintenance (approx. $45,000 per year). This is now a capability.	Completed
5	Increase the amount of preventative tree maintenance	High	Public Works	This work has been completed and is now a capability.	Completed
6	Implement a reverse 911 or similar system to alert residents of natural phenomenon and if necessary, evacuation procedures	High	CT DEP and CT DPS	CodeRED was implemented locally by Emergency Management and Information Technology in 2014.	Completed

Status of Strategies and Actions for Mansfield from Initial Hazard Mitigation Plan (Continued)

Obj.	Task	Priority	Responsible Department*	Comment	Status
6	Obtain additional cots and bedding to adequately serve the emergency shelters in the event of an emergency or natural disaster	High	Emergency Management Director	This work has been completed.	Completed
6	Ensure that emergency shelters have adequate supplies to respond to natural emergencies	High	Emergency Management Director	Supplies are evaluated at least annually or following each event. This is now a capability.	Completed
6	Develop a GIS application to assist town personnel in the event of an emergency or natural disaster (including planimetrics and work stations)	High	Public Works, Engineers	Public Works, Fire Department, and Planning & Development developed the basic GIS application identified in the previous task, but improvements could enhance it	Completed, Updated
7	Use the Government Access Channel to inform the Mansfield public about how to prepare and respond to hazards and emergencies and to encourage residents to be prepared to help others in need	High	Town Manager, Emergency Management Director	Efforts were made to use the channel, although the success of this outreach is unknown. This task has been updated to also include the use of other media to inform the public	Partially Completed, Updated
8	Identify places in need throughout town and add dry hydrants as necessary	Low	Fire Department	This was not completed due to lack of funding (2013 estimate is $4,000 per dry hydrant).	Carried Forward

*Identifying that a task will be "Contracted out" is no longer allowed by FEMA, but is provided in the above table because this is how it was worded in the initial plan. New strategies (below) will not have this identifier. For a similar reason, the term DEP is still used in the above table even though the agency is now known as DEEP.

During the Plan Update process, the Town of Mansfield identified two additional objectives to help meet the stated hazard mitigation planning goal:

- To minimize the impact of droughts.
- To minimize the impact of major winter storms.

The Town of Mansfield also determined that Objective 4 in the original plan (reduce costs associated with providing emergency services and other public services in the event of a natural disaster) was no longer necessary because it is accomplished through other objectives and strategies. The nine current objectives of the Town of Mansfield therefore include:

1. To reduce the likelihood of flooding by improving existing natural and artificial drainage systems.
2. To reduce the likelihood of flooding by improving bridge conditions.
3. To reduce the likelihood of flooding, evaluate property prone to flooding.
4. Reduce the amount of debris from severe storms through preventative tree maintenance.
5. Expand activities related to emergency preparedness and improve natural hazard response capabilities.
6. Whenever practical, incorporate natural hazard mitigation strategies into existing town projects.
7. To reduce the likelihood of wildfire hazards by improving water availability.
8. To minimize the impact of droughts.
9. To minimize the impact of major winter storms.

Current mitigation strategies for the Town of Mansfield are presented below. The STAPLEE method was used to assign priority to each strategy as discussed in Section III.B. The STAPLEE analysis scoring is presented in Appendix IV. Scores ranged from 3.5 to 9.0, with a higher STAPLEE score being representative of a higher priority project. Scores less than 5.5 were considered to be "Low" priority, while scores greater than 6.5 were considered to be "High" priority. The intermediate scores were considered to have "Medium" priority.

Based on the STAPLEE methodology, "high" priority projects mitigate the most significant natural hazards that affect the town or multiple natural hazards, are considered feasible, would be effective in avoiding or reducing future losses, seem reasonable for the size of the problem and likely benefits, have political and public support, and improve upon existing programs or support other municipal priorities. All other supporting tasks were assigned a "Medium" or "Low" priority rating based on the same criteria. Estimated costs for capital projects are included for those specific tasks.

Mitigation Strategies for the Town Of Mansfield:

Goal: **To reduce the loss of life and property and economic consequences as a result of natural disasters.**

Objective 1:	**To reduce the likelihood of flooding by improving existing natural and artificial drainage systems.**

Task	Who	Timeframe:	Priority
Develop a list of quick-filling catch basins with low silt capacity for placement on a priority list for monitoring and more frequent cleaning.	Public Works	7/2015-6/2017	Medium

Purchase or rehabilitate Vac-all equipment for silt removal. (2013 Cost Estimate: $150,000)	Public Works	7/2017-6/2018	Low
Adopt new regulations requiring greater use of Green Infrastructure and Low Impact Development (LID) stormwater management practices.	Town Planner; Public Works	7/2015-6/2016	High
Incorporate LID stormwater management practices into town projects as funding allows.	Public Works	7/2015-6/2020	Low

Objective 2:	**To reduce the likelihood of flooding by improving road, bridge and dam conditions.**

Task	Who	Timeframe:	Priority
Improve north side of Bassetts Bridge Road west of the bridge crossing the Naubesatuck Lake; this section of road is frequently washed out in high water events. (2013 Cost Estimate: $250,000)	Public Works,	7/2017-6/2018	Medium
Prepare Emergency Operations Plans (EOPs) for Town-owned and maintained dams.	Public Works, Emergency Management	7/2015-6/2016	Medium
Implement recommendations resulting from inspections of Town-owned dams.	Public Works	7/2015-6/2020	Medium
Encourage owners of private dams to develop EOPs and share with Town.	Emergency Management	7/2015-6/2020	Medium
Encourage owners of private dams to implement recommendations resulting from dam inspections.	Emergency Management	7/2015-6/2020	Medium
Advocate for federal and state agencies to allow dam repair as eligible grant activity for properties acquired by the Town for open space purposes.	Town Planner; Emergency Management	7/2015-6/2020	Low

Objective 3: To reduce the likelihood of flooding, evaluate property prone to flooding.

Task	Who	Timeframe:	Priority
Consider acquiring property on Laurel Lane that is isolated during flooding events.	Emergency Management; Town Planner; Open Space Preservation Committee	7/2015-6/2020	Low
Continue to monitor and work with property owners of five homes on Thornbush Road for possibilities to eliminate risk, including potential use of FEMA grants (these homes are in the flood zone and at times become inundated during high water events).	Emergency Management	7/2015-6/2020	Low
Monitor and evaluate areas on Higgins Highway (Route 31) that have flooded during large events for possible mitigation actions.	Emergency Management, Public Works	7/2015-6/2020	Medium
Continue to update zoning regulations for flood hazard areas to reflect best practices.	Town Planner; Planning and Zoning Commission	7/2015-6/2020	High

Objective 4: Reduce the amount of debris from severe storms through preventative tree maintenance.

Task	Who	Timeframe:	Priority
Develop public education programming with regard to tree planting and maintenance on private property.	Emergency Management, Town Planner	7/2015-6/2018	Medium
Update regulations to encourage use of native species and reflect best practices in hazard mitigation.	Town Planner Planning & Zoning Commission	7/2015-6/2016	Medium
Continue to require underground installation of new utility lines in new subdivisions and encourage property owners to work with utility companies to explore possibilities for undergrounding existing lines.	Town Planner; Planning & Zoning Commission	7/2015-6/2020	High

Objective 5:	**Expand activities related to emergency preparedness and improve natural hazard response capabilities**

Task	Who	Timeframe:	Priority
Ensure that the emergency shelters have adequate supplies to respond to natural emergencies.	Emergency Management; Human Services	7/2015-6/2020	Medium
Continue to work with state and local partners for regional shelter planning and emergency response.	Emergency Management; Human Services	7/2015-6/2020	Medium
Acquire and install generators at critical local facilities (2013 Cost Estimate: $125,000 for two facilities).	Emergency Management	7/2016-6/2019	Low
Improve and expand the Town's GIS system to assist town personnel in the event of an emergency of natural disaster. (Estimated Annual Cost: $50,000)	Public Works; Emergency Management; Town Planner	7/2016-6/2018	Low
Continue to improve communication technologies and efficiencies between the Emergency Operations Center (EOC) and other services including the University of Connecticut	Emergency Management	7/2015-6/2020	Low
Use various communication technologies including social media, town website, government access channel and standard media to educate and inform the public on how to prepare and respond to hazards and emergencies and to encourage them to be prepared to help others in need.	Emergency Management; Eastern Highlands Health District; Human Services	7/2015-6/2020	Medium
Maintain working relationships with utility companies to coordinate planning, response and recovery efforts.	Emergency Management	7/2015-6/2020	High
Make available literature on natural disasters and preparedness at Town Hall and the Library	Emergency Management	7/2016-6/2018	Low
Make available information on natural disasters and preparedness on the Town's website with links to state and federal resources.	Emergency Management	7/2016-6/2018	High

Consider creation of microgrids that can be disconnected from the main power grid that utilize renewable energy sources such as for the Town Hall, Community Center, and E.O. Smith High School which are important for storm recovery and shelter operations	Emergency Management, Sustainability Committee	7/2015-6/2020	Low

Objective 6: Whenever practical, incorporate natural hazard mitigation strategies into existing town projects and programs

Task	Who	Timeframe:	Priority
Monitor best practices with regard to sustainable and resilient design and incorporate into town projects when feasible.	Town Planner; Public Works	7/2015-6/2020	Low

Objective 7: To reduce the likelihood of wildfire hazards by improving water availability and managing combustible materials.

Task	Who	Timeframe:	Priority
Identify places in need, throughout town, and add alternative water sources. (2013 Estimated Cost: $4,000/dry hydrant)	Emergency Management; Town Planner	7/2015-6/2017	Medium
Encourage developers to install water sources for fire protection and explore potential for a water source ordinance.	Emergency Management; Town Planner	7/2015-6/2020	Medium
Educate property owners on vegetation clearing techniques that will reduce water runoff and reduce the amount of combustible fuel.	Emergency Management	7/2015-6/2020	Medium

Objective 8: To minimize the impacts of droughts.

Task	Who	Timeframe:	Priority
Develop a public education program encouraging water conservation.	Sustainability Committee; UConn Water / Wastewater Advisory Committee	7/2015-6/2017	Low
Adopt water use restrictions during drought periods for public water supply customers based on stream flow conditions.	Town Planner; Town Council	7/2015-6/2016	Low

Objective 9: To minimize the impacts of major winter storms.

Task	Who	Timeframe:	Priority
Develop communication strategy to better inform public of parking restrictions during snow events.	Public Works;	7/2015-6/2016	Low
Establish protocols for evaluation of snow loads on Town buildings.	Emergency Management; Building and Housing Inspection	7/2015-6/2016	High
Consider snow storage needs when updating street design specifications	Public Works; Town Planner	7/2015-6/2020	Medium

Willington Mitigation:

Scope/Overview

The Risk and Vulnerability Assessment portion of this plan looked at the historical and potential impacts of the following hazards throughout the region: dam failures, droughts, earthquakes, floods, hurricanes, ice jams, severe winter weather, thunderstorms, tornadoes and wind damage, and wildfires. A review of the historical occurrences of each hazard provided valuable information used in assessing potential future risk. A review of each of Willington's resources provided the basis for an analysis of the community's vulnerability to each hazard – the extent to which the community might suffer loss of human life, injuries, and/or property damage.

With an understanding of its risk and vulnerability to natural disasters, Willington can take steps prior to such an event to reduce its impacts (loss of property and life). The Connecticut Department of Energy and Environmental Protection (DEEP) has provided guidance in the form of a comprehensive list of possible mitigation measures for each hazard (see Appendix III). In the context of the community's risk and vulnerability assessment, only some of these measures will be cost-effective. The purpose of the Natural Hazard Mitigation Plan (NHMP) is to identify reasonable and appropriate mitigation measures for each hazard.

Certain mitigation practices are beneficial for any disaster, and the following measures are recommended for the community:

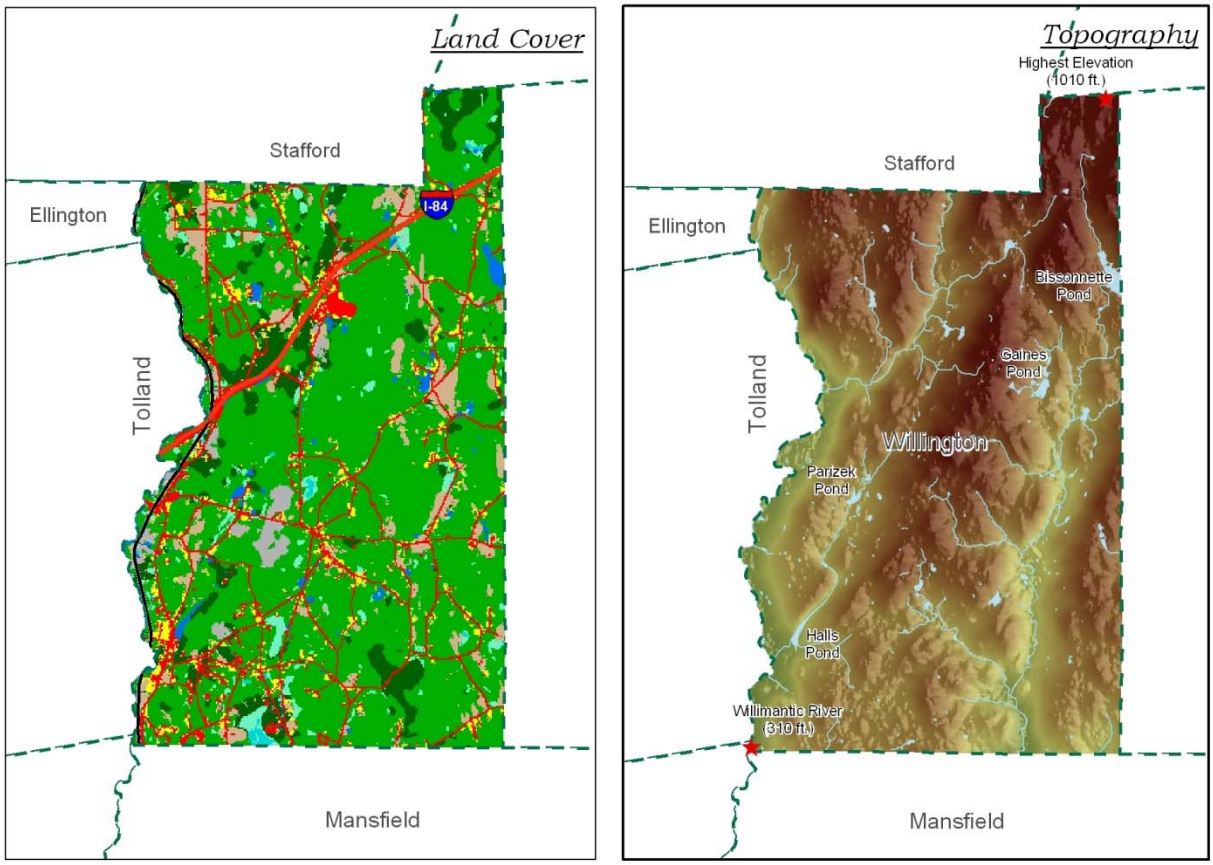
- Encourage all buildings to be improved to meet current building codes. Changes in building codes apply only to new constructions and renovations.
- Educate the public about disaster preparedness and the benefits of mitigation measures. Increasing the public's awareness of possible consequences of natural disasters and how they might better prepare to safeguard their lives and property is an important part of every community's mitigation plan.

General Town Description

Willington is located in Tolland County in northeastern Connecticut and lies in the northernmost section of the former WINCOG Region. Willington has a total area of 34.8 square miles (22,272 acres) and is bounded on the east by Ashford, on the south by Mansfield, on the north by Stafford, and on the west by Tolland. The 2010 Census population was 6,041 persons, a 5.7% increase from 2000 (5,959). Willington is rural and about 10% developed (See Figure 38), a figure that has not appreciably increased from the addendum to the initial plan in 2008. Any influx of population and associated development would increase the town's overall vulnerability to natural hazards. However, new buildings are constructed to more recent building codes (and generally away from floodplains) and are considered to be less vulnerable to natural hazards than older buildings.

Figure 38

Town of Willington Overview



Willington Land Cover Breakdown

QUICK TOWN STATS:

Town Area -
33.5 sq. miles
(21,465 acres)

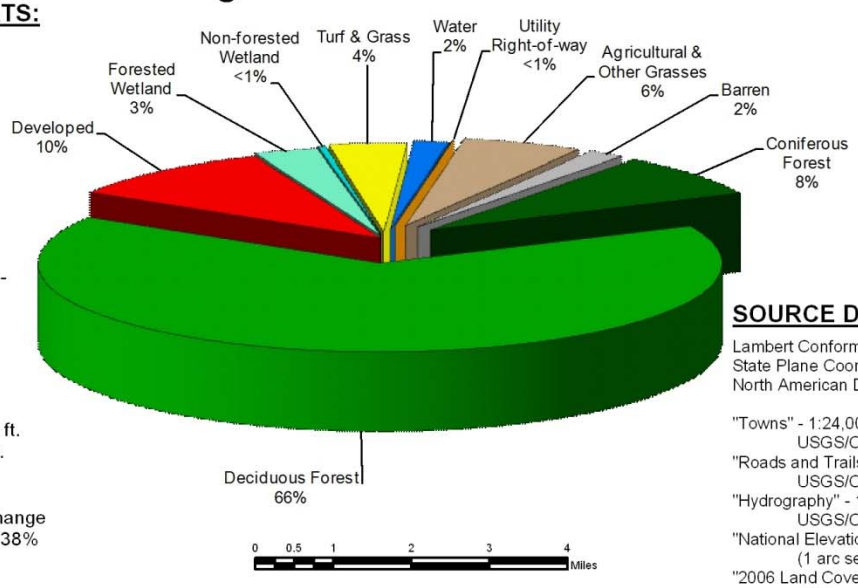
Water body area -
359 acres

Water bodies > 10 acres -
Bissonnette Pond
Gaines Pond
Halls Pond
Parizek Pond

Elevation -
Maximum = ~1010 ft.
Minimum = ~310 ft.

Population -

2000	2010	Change
5,959	6,041	1.38%



Scale: 1:156,000

SOURCE DATA:

Lambert Conformal Conic,
State Plane Coordinate System
North American Datum of 1983 (NAD83)

"Towns" - 1:24,000, 1969-1984,
USGS/CT DEP.
"Roads and Trails" - 1:24,000, 1969-1984,
USGS/CT DEP.
"Hydrography" - 1:24,000, 1969-1984,
USGS/CT DEP.
"National Elevation Dataset" - 30 meter
(1 arc second).
"2006 Land Cover Greater Connecticut" -
100 ft sq., 2006, UConn, CLEAR.

October 2012

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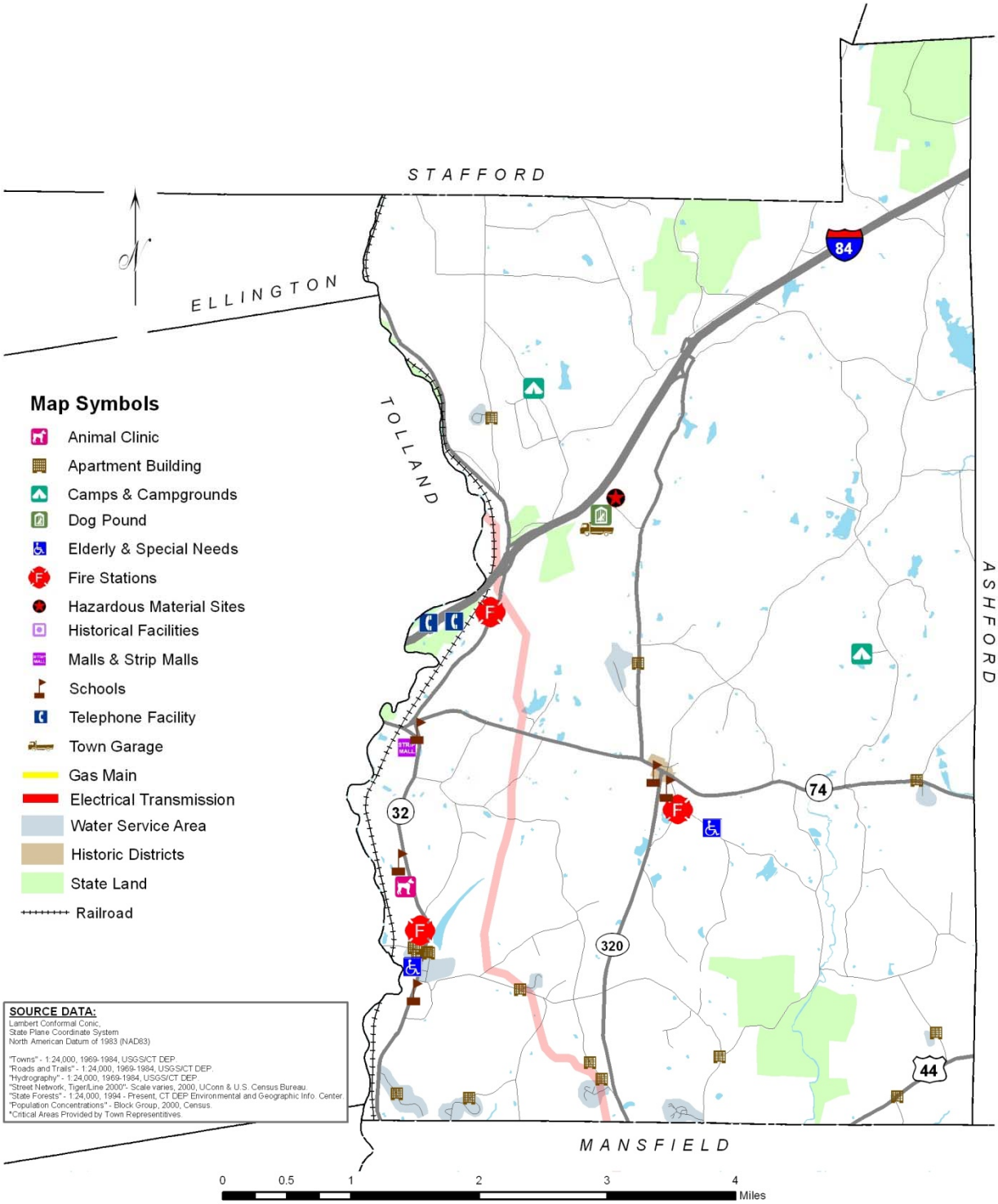
Critical facilities and cultural resources in Willington include: (see Figure 39)

- Two volunteer fire departments: one with two stations located on 426 River Road and 143 River Road and the other located at 24 Old Farms Road;
- Five schools: Center School at 12 Old Farms Road; Hall Memorial School at 111 River Road; Willington Nursery School at Routes 320 & 74; Kids Kingdom, LLC at 330 River Road; and Kids Express Learning Center & Daycare, LLC at 215 River Road;
- One hazardous material storage site, Mid-NEROC Haz-Mat Recycling Facility, at the end of Hancock Road adjacent to the Willington Transfer Station;
- One animal clinic, Willington Veterinary Clinic, located at 195 River Road;
- One dog pound on Hancock Road;
- Two elderly and special needs housing areas: Willington Senior Center & Senior Housing at 60 old Farms Road and Lyon Manor at 140 River Road;
- Sixteen apartment buildings located throughout the town: Cedar Ridge Apartments at 43 Burt Latham Road, Deer Park Apartments at 87 Ruby Road, Laurel pond Apartments at 47 Boston Turnpike, Natural Park Apartments at 72 Marsh Road, North Willington Village Condos at 63 Schofield Road, Pinewood Apartments at 62 Cisar Road, River's Edge Apartments at 11 Depot Road, River's Edge Condos at 10 Depot Road, Ridgeview Heights Apartments at 450 Tolland Turnpike, South Willington Village at 10 Village Street, Walden Apartments at 70 Pinney Hill Road, Willington Oaks Apartments at 43 Baxter Road, Willington Village Apartments at 9 Village Street, and Woodhaven Apartments at 80 Cisar Road;
- Two camps and campgrounds: Moose Meadow Camp Resort, 28 Kechkes Road and Wilderness Lake Campground & Resort at 150 Village Hill Road;
- Three churches: The Federated Church of Willington at 132 River Road, St. Jude Church at 25 Old Farms Road, and Willington bamptist Church at 33 Rube Road;
- One library: Willington Public Library at 7 Ruby Road;
- Two public telephone facilities at the ConnDOT Rest Areas on Interstate 84 (EB and WB between exits 69 and 70)
- Two commercially developed areas: Phelps Plaza at 11 Phelps Way and Truck Stop on Ruby Road at Rt I-84;
- One historic district at the intersection of Route 74 and Route 320, including Town Hall at 11 Common Road;
- Town Office Building at 40 Old Farms Road;
- A town garage on Hancock Road;
- One water facility operation, town owned but privately maintained, at the Town's Senior Housing Complex off Old Farms Road; and, several privately owned water operations serving apartment complexes in various areas of the Town; and
- Five significant hazard dams.

Willington Critical Areas of Concern

Figure 39



Scale: 1:72,000

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Willington also has two local seasonal campgrounds which boost the town's population in the summer months. The Moose Meadow Camp Resort and the Wilderness Campground and Resort both cater to individual and family campers. These areas may be of concern and vulnerable due to potential flooding during severe storm or hurricane events. Moose Meadow Campground is located on the west side of the Fenton River on a dead-end road, leaving it potentially vulnerable during flood events and the Wilderness Campground has a pond with a significant hazard dam which if it failed during a storm event, could impede access. Additional small concentrations of people reside in the area of Bissonette Pond. Once seasonal, this area now has year-round residents.

Though the population of Willington has not increased greatly in recent years, traffic on major transportation routes has increased. This increase is a matter of concern for the town. Though a portion of Interstate 84 crosses the town, re-routing plans are in place all along this major highway should a disaster affect any portion of the corridor. Of great concern are increases in traffic along state Route 44 and Route 74 over the years, which includes an increase in commercial trucks using these routes to travel to Rhode Island. There are no re-routing plans for these highways, and a disaster could cause a major disruption in transportation.

Another concern in the town is the fact that Willington is predominantly forested with large wooded areas, including a portion of the Nipmuck and Nye-Holman State Forests. These large wooded areas are potential wildfire or brushfire areas, but given the widespread forested areas throughout the town, no one area is considered more vulnerable to this threat than another. Because of a reduction in maintenance to some of the state forests and private wooded areas in more recent years, fuel build-up in these regions makes them an increasing threat to the town. Though homes are scattered within forested areas, small cleared areas around these structures generally provide enough of a barrier to stop brushfires from reaching them.

Largely forested, Willington is made up of approximately 66% deciduous forest, 8% coniferous forest and 3% forested wetlands. Other land cover in the town includes: developed (10%), agricultural and other grasses (6%), turf and grass (4%), water (2%), barren (2%), non-forested wetlands (<1%), and utility right-of-way (<1%). The approximately 900 acres of the town occupied by water bodies includes Halls Pond, Parizek Pond, Bissonette Pond, Drobney Pond, Wilderness Lake, Ruby Lake, Pelican Pond and many smaller ponds. Willington's elevations range from about 310 feet in the southwest corner of town on the Willimantic River to about 1010 feet in the northeast corner of town. In addition to all the natural hazards described previously in this plan on a regional level, Willington is also at risk of damage caused by flooding and dam failures.

Authorities in the Town of Willington who play advisory, supervisory, or direct roles in hazard mitigation for the Town include:

Authorities	Role			Hazard Mitigated
	Advisory	Supervisory	Direct	
Board of Selectmen		X	X	All
Building Official	X		X	All except drought
Conservation Commission	X			Flooding
Fire Department			X	Wildfire
Emergency Services Efficiency Committee	X			All
Inland Wetlands & Watercourses Commission			X	Flooding
Fire Marshall / Burning Official	X		X	Wildfire
First Selectman		X		All
Land Use Department	X		X	Flooding
Planning and Zoning Commission	X		X	Flooding
Public Works Department	X	X	X	All except drought
Zoning Board of Appeals			X	Flooding

Evaluation of Risks & Vulnerability

Dam Failure

Risks & Vulnerability:

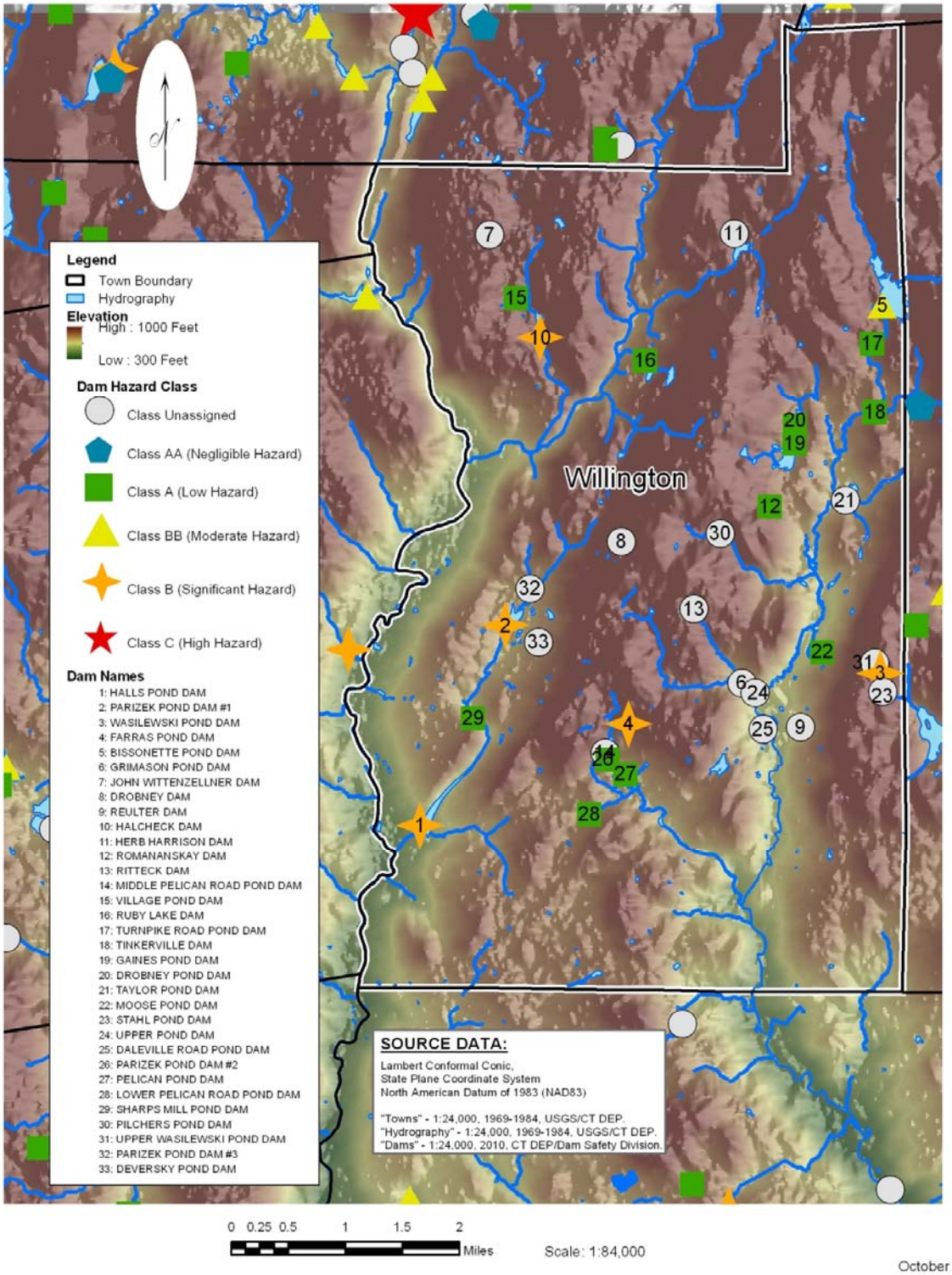
Dam failure risk and vulnerability is discussed on a regional level in Section II.B. The overall risk of Willington to dam failure is considered to be low.

Risk (Extent)

There are 37 dams in Willington ranging from unassigned classes to Hazard Class B (significant hazard). Twenty seven dams in Town are either unclassified or classified as low hazard (Class A); failure of any of these dams would hardly be of concern. A total of seven dams are classified as moderate hazard (Class BB) and their failure would cause some damage, but no major disruptions. The failure of any of the three dams classified as significant hazard (Class B) could cause serious damage. Dams in Willington are shown on Figure 40.

Town of Willington Dams

Figure 40



October 2012

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Vulnerability (Location, Impact)

The failure of any Class B dam brings with it damages, economic loss and the potential for loss of life. The three significant hazard dams include Halls Pond Dam (off Route 32), Wasilewski Pond Dam (off Route 74), and Halchek Pond Dam (off Village Hill Road). Their classification as significant hazard means that their failure is likely to result in the loss of property, significant economic losses, damage to primary roadways and a possibility for loss of life. Except for Halchek Pond Dam, these dams are located either adjacent to or in close proximity to major roadways (either State or local) where bridges and traffic could be disrupted. Halchek Pond Dam, although located well off Village Hill Road, could impact downstream residential areas (such as the subdivision on Pinecrest Road) and road bridge crossings at Village Hill Road and Route 32.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides loss estimates by county for dam failure in Table 2-54. The period of record for these loss estimates is 136 years (1877 through 2013). Based on the data provided in Table 2-54 of the State Plan, the annualized loss for Tolland County for dam failure is $9,385.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Willington. Based on the 2010 Census data in Section II.A., Willington has approximately 4.0% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Willington for dam failure is estimated at $371.

Note that this estimate does not take into account site specific details or particular dam failure damages that may have affected the Town of Willington in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to dam failure.

Town staff did not indicate that there has not been any damage to municipal and private structures and infrastructure due to dam failure in recent memory. This is consistent with the relatively low annualized loss estimate based on information in the 2014 State Plan.

Mitigation Efforts

Current state mitigation measures are described on a regional level in Section II.B of the Natural Hazards Mitigation Plan. Among these mitigation measures are periodic dam inspections. Periodic inspections help to determine if dams are structurally sound. If a dam's structural integrity is questioned, recommendations made to ensure the safety of the structure may include:

- Any emergency measures or actions, if required to assure the immediate safety of the structure;
- Remedial measures and actions related to design, construction, operation, maintenance and inspection of the structure; additional detailed studies, investigations and analyses; or
- Recommendations for routine maintenance and inspection by the owner.

A total of 36 privately-owned dams are in Willington. Private owners of dams are generally reluctant to make repairs, which tend to be costly. In these instances, needed repairs may not be done in a timely manner. One dam is owned by the Connecticut DOT (Lower Pelican Road Pond Dam) and is rated Class BB. State-owned dams are typically maintained in good condition.

Whether it is a structurally sound dam or a weak dam, Emergency Operation Plans (EOPs) / Emergency Action Plans (EAPs) are very important mitigation measures. A detailed discussion of these plans is provided in Section II.B. The DEEP works with owners of dams at greatest risk to make certain EOPs are in place and up-to-date. Hurricanes, flooding, ice jams and tornadoes may breach even a well-built dam, given a destructive enough event. Having a plan that lays out how to respond to a disaster, prior to the disaster occurring, is a very important tool in reducing loss of property and life. Mitigation measures for flooding (see below), which is a risk commonly associated with a dam failure, should also be encouraged.

While the state is assuming less responsibility for routine inspection of dams, DEEP will continue recommending measures to lessen the risk of dam failure, and the municipality can take the following mitigation actions:

- For municipally-owned dams, make sure that EOPs/EAPs are in place and current, and implement recommendations resulting from state inspections; and
- For privately-owned dams, encourage each dam owner to have an EOP/EAP in place and current, and implement recommendations resulting from inspections; monitor compliance as possible.

Private dam owners must do inspections. The state recommends measures to lessen the risk of dam failure. For privately-owned dams, the municipality may encourage each dam owner to have an EOP in place and current, and implement recommendations resulting from state inspections; monitor compliance. An EOP is required for all class B and C dams and they must be registered with the state.

The Town of Willington has limited policies, programs, and resources dedicated to dam failure since most of these efforts are performed at the State level. The Town of Willington does not own any dams. The Town's ability to mitigate dam failure is considered to be limited for privately owned dams and efforts are instead focused on preparedness for response. Overall, the Town of Willington's capability to mitigate for dam failure and

prevent loss of life and property has increased since the initial hazard mitigation plan was adopted, mainly as a result of recent statewide legislative actions described above and in Section II.B. Over the next few years, it is expected that dam safety programs will continue to strengthen in Connecticut.

Drought

Risk & Vulnerability:

Drought risk and vulnerability is discussed in Section II.B. The overall risk of Willington to drought is considered to be low.

Loss Estimates (Impact)

The Town of Willington did not report any recent losses due to drought. The 2014 Connecticut Natural Hazard Mitigation Plan Update provides loss estimates by county for drought in Table 2-69. However, no damages are reported. Therefore, the estimated annualized loss for drought in Willington would also be $0. The number of annualized events for Tolland County is reported at 0.05.

Mitigation Efforts

As with any rural community that depends on aquifers and local well systems, Willington's vulnerability to drought increases with population growth and the accompanying increased demands for water. Good land use planning and helping the community to understand the importance of water conservation can reduce the threat of drought. Other specific measures that should be considered include:

- Completing a town-wide groundwater study, including recharge into existing aquifers to develop recommendations for future land use patterns;
- Implementing site design techniques and criteria such as strict regulation of vegetative buffers for stream and river corridors, rain gardens for site drainage, and prohibition of wetlands alteration;
- Studying effectiveness of conservation measures; and
- Implementing water conservation awareness programs.

The Town does not perform mitigation measures for drought. Overall, the Town of Willington's capability to mitigate for drought and prevent loss of life and property is limited and generally unchanged since the initial hazard mitigation plan was adopted, mainly because drought planning and response occurs at the State level and local public water supply is limited.

Earthquake

Risk & Vulnerability:

Earthquake risk and vulnerability is discussed in Section II.B. The overall risk of Willington to earthquakes is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides a range of annualized loss estimates by county for earthquakes in Figure 2-66. Based on the data provided in Figure 2-66 of the State Plan, the annualized loss for Tolland County lies between zero and $56,050. To be conservative, the maximum county-wide annualized loss value of $56,050 is utilized herein.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Willington. Based on the 2010 Census data in Section II.A., Willington has approximately 4.0% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Willington for earthquakes is estimated at $2,218.

Note that this estimate does not take into account site specific details or particular earthquake damages that may have affected the Town of Willington in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to earthquakes.

The Town of Willington did not report any municipal or private damages or losses due to recent earthquakes. The annualized loss estimate of $2,218 based on the values in the 2014 State Plan is therefore likely high but is reasonable enough to use for planning purposes.

Mitigation Efforts

Occurrences of large earthquakes in the region are infrequent. While many mitigation measures may not be cost-effective, the community should consider the following:

- Enforcing effective building codes and local ordinances;
- Encouraging emergency facilities such as hospitals to be constructed to withstand seismic events; and
- Encouraging a low-cost earthquake rider for homeowners and businesses.

The Town does not specifically mitigate for earthquake hazards. Overall, the Town of Willington's capability to mitigate for earthquakes and prevent loss of life and property is limited and generally unchanged since the initial hazard mitigation plan was adopted, mainly because it is not a high priority because earthquake damage is so infrequent.

Flooding

The overall risk of Willington to flooding is considered to be moderate.

Risk (Extent)

The Town of Willington is at risk of flooding because of a number of streams, brooks and ponds in the town. According to the 1981 Federal Emergency Management Agency's (FEMA's) updated Flood Insurance Study (FIS) for the town:

> "Floods in Willington have occurred in every season of the year. Spring floods are common and are caused by rainfall in combination with snowmelt. Floods in late summer and fall are usually the result of hurricanes or other storms moving northeast along the Atlantic coast. Winter floods result from occasional thaws, particularly in years of heavy snowfall.
>
> Major floods of the past 50 years occurred in Willington in March 1936, September 1938, and August 1955. The hurricane-caused flood of August 1955 was by far the most severe in terms of amount of runoff. On August 19, 1955, at the U.S. Geological Survey (USGS) gaging station (No. 01119500) just upstream of State Route 31 in Coventry, a peak discharge of 24,200 cubic feet per second was recorded on the Willimantic River. This is equivalent to a flood having a recurrence interval of more than 200 years"

A map of flood risk areas is provided on Figure 41.

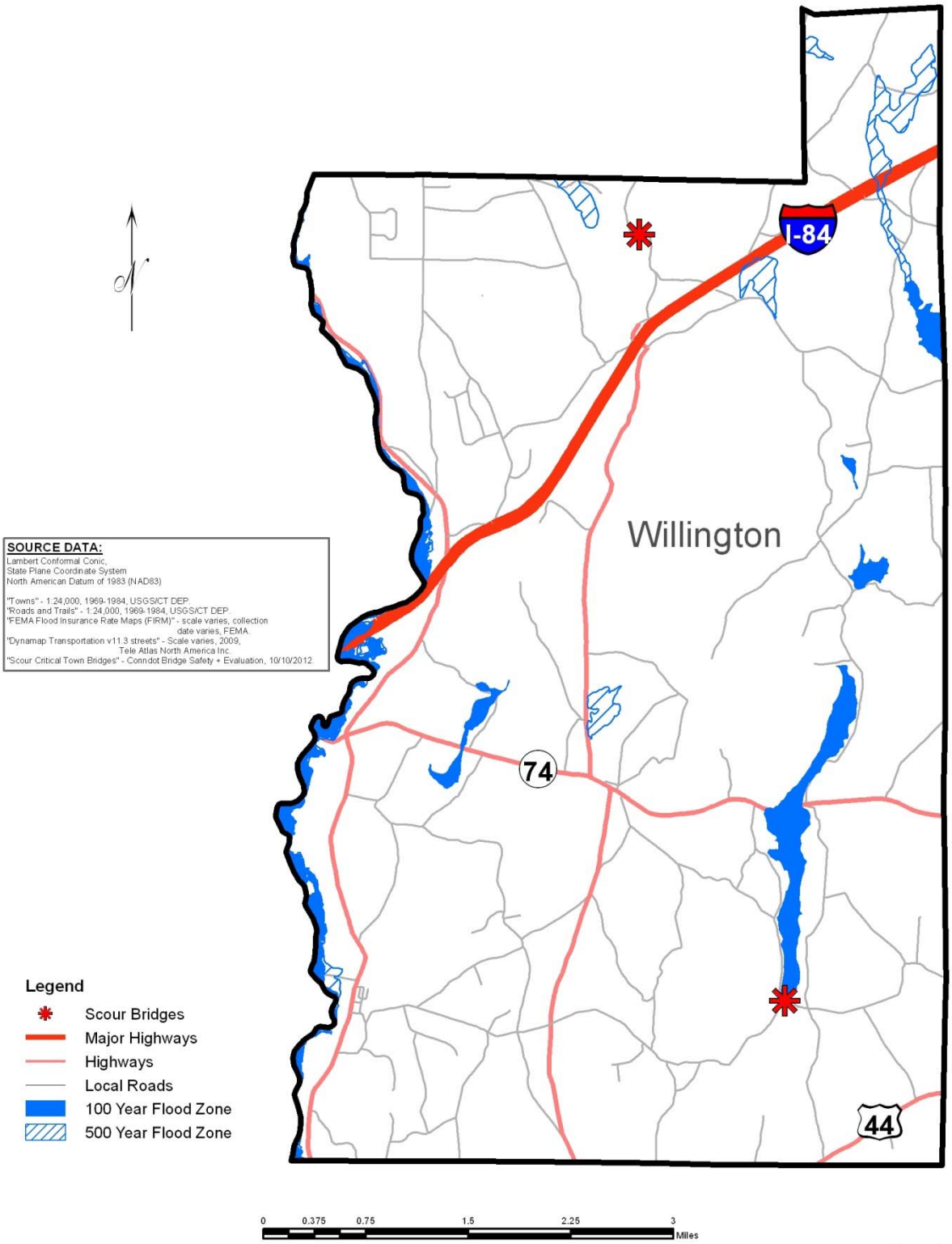
To this FEMA information can be added the recent event of October 2005, during which storm flooding impacted (by closure) several roads in or through the Town, including Route 74 on both the Willimantic and Fenton Rivers, Daleville Road (at the intersection with Daleville School Road) on the Fenton River, Polster Road at Roaring Brook and Turnpike Road at its intersection with Route 320 at Ruby Brook.

Vulnerability (Location, Impact)

Areas studied for detailed vulnerability, as noted in FEMA's 1981 FIS for the Town, included the Willimantic River from the Town's corporate limits in the south (Coventry and Mansfield) to its corporate limits in the north (adjacent to Stafford). Other flood areas, notably along the Fenton River, were assessed by more approximate methodologies.

Flood Risk Zones of Willington

Figure 41



Scale: 1:72,000

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In addition to the flooding areas of concern on Willington's FIRM, the town also has two "scour bridges" which are flooding concerns. These are bridges which, by ConnDOT's standards, may be undermined by soil erosion during certain rainfall or stream flow events, thus affecting their stability and safety. One structure crosses the Fenton River on Daleville School Road, and the other structure crosses Roaring Brook on Polster Road. As of 1/1/2014, the scour bridge crossing Roaring Brook on Polster Road has been closed due to structural deterioration, per the Town Engineer.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of annualized loss by county for flooding in Table 2-44. Based on the data provided in Table 2-44 of the State Plan, the annualized loss for Tolland County based on the historic record through the National Climatic Data Center through the past 20 years is $255,828.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Willington. Based on the 2010 Census data in Section II.A., Willington has approximately 4.0% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Willington for flooding is estimated at $10,121.

Note that this estimate does not take into account site specific details or particular flooding damages that may have affected the Town of Willington in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to flooding.

The Town of Willington did not report any recent flooding damages other than the recent closing of the Polster Road bridge over Roaring Brook. According to FEMA, the Town of Willington does not have any repetitive loss properties or severe repetitive loss properties. Based on the above, the annualized loss estimate of $10,121 for flooding may be high but is considered reasonable for the Town of Willington.

Mitigation Efforts

The Town of Willington has consistently participated in the NFIP since June 15, 1982. The most recent FIRM was published on June 15, 1982. The current Town of Willington FIS was published on December 15, 1981. The original FIS and FIRMs for flooding sources in the Town are based on work completed in October 1980. Many of the local flooding problems are consistent with the floodplains mapped by FEMA.

Flooding may result from a number of natural disasters. Dam failures, hurricanes, ice jams, thunderstorms, and winter storms all bring the risk of flooding. Proper land use planning is an important part of mitigating for floods. Keeping structures out of areas at risk of flooding greatly reduces the risk of damage to property and the loss of life, should a flood occur.

Section 4.17 of the Town of Willington's current zoning regulations are the Town's Flood Hazard Regulations and were most recently updated on August 1, 1996. These include, but are not limited to, the following limitations in the flood zone[7]:

- That all new construction and substantial improvements of residential structures, including prefabricated buildings and manufactured homes, shall have the lowest floor, including the basement, elevated to one (1) foot or more above the base flood level (100-year flood level). (See Section 4.17.07.03)

- New construction or substantial improvement of any commercial, industrial, or non-residential structure located in Zones A1-30, AE and AH shall have the lowest floor, including basement, elevated at least one (1') foot or more above the level of the base flood elevation; or Nonresidential structures located in all A-Zones may be flood-proofed in lieu of being elevated provided that together with all attendant utilities and sanitary facilities the areas of the structure below the required elevation are water tight with walls substantially impermeable to the passage of water, and use structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effect of buoyancy. A registered professional engineer or architect shall review and/or develop structural design, specifications, and plans for the construction, and shall certify that the design and methods of construction are in accordance with acceptable standards of practice for meeting the provisions of this Section 4.17. Such certification shall be provided to the Zoning Agent. (See Section 4.17.07.04)

- New construction or substantial improvements of elevated buildings that include fully enclosed areas formed by foundation and other exterior walls below the base flood elevation shall be designed to preclude finished living space and designed to allow for the entry and exit of flood waters to automatically equalize hydrostatic flood forces on exterior walls. Designs for complying with this requirement must either be certified by a professional engineer or architect.

- That all development proposals, including utilities and drainage, are located and designed to be consistent with the need to minimize flood damage. (See Section 4.17.07.06)

- That new construction, including prefabricated buildings and manufactured homes, and substantial improvements are designed and anchored to prevent floatation collapse or lateral movement and constructed with flood-resistant materials and methods. The placement of manufactured homes and subdivisions shall meet the location, anchoring and other construction standards and evacuation requirements contained in the National Flood Insurance Program Rules and Regulations. (See Section 4.17.07.08)

[7] The flood zone being the Floodplain Zone, hereby specifically defined to be the area designated as Zone A (areas of the 100-year flood). (Willington Zoning Regulations Section 4.17)

- All manufactured homes and recreational vehicles (including "mobile" homes placed on a site for one hundred eighty (180) consecutive days or longer) to be placed, or substantially improved, shall be elevated so that the lowest floor is above the base flood elevation; and shall be placed on a permanent foundation which itself is securely anchored and to which the structure is securely anchored so that it will resist floatation, lateral movement, and hydrostatic and hydrodynamic pressures. Anchoring may include, but not be limited to, the use of over-the-top or frame ties to ground anchors. (See Section 4.17.07.11)

The degree of flood protection established by the variety of regulations in the Town exceeds the minimum reasonable for regulatory purposes under the NFIP. The Town plans to remain compliant with the NFIP and will continue to participate in the NFIP.

Additional mitigation measures recommended for all towns in the region include:

- Educating the public on:
  - Risks of flooding,
  - Risks of building in hazard-prone areas,
  - Federal Emergency Management Agency (FEMA) floodplain maps (and making these maps easily available to the public);
- Implementing a maintenance program to clear debris from storm water drainage areas;
- Developing sediment control to prevent clogged drainage systems, such as street sweeping, curb and gutter cleaning, paving dirt roads, and planting vegetation on bare ground;
- Investigating the use of flood-prone areas as open spaces;
- Encouraging individuals in flood-prone areas to purchase flood insurance;
- Elevating structures above the 100-year flood level; and
- Considering the conservation of open space by acquisition of repetitive loss structures.

The Town's capabilities are considered to be effective in regards to response to flood damage, and the Town's capability to mitigate flood hazard damage is also considered effective for preventing damage to new development and substantial improvements. Overall, the Town of Willington's capability to mitigate for flooding and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted. This is because the Town has implemented a culvert replacement on Turnpike Road Extension to reduce flood damages in the area, and had Connecticut DOT evaluate the capacity of the Route 74 bridge over the Fenton River. The Town also participates in the statewide CT Alert Reverse 9-1-1 system for emergency notification and response.

Stormwater

Stormwater runoff can significantly exacerbate flooding; therefore, managing stormwater runoff is a priority mitigation measure. Residential and commercial

development increases impervious land area, reduces the infiltration of stormwater runoff into the ground, and increases the volume and velocity of stormwater runoff causing flooding. Enforcing appropriate maintenance programs for stormwater facilities will therefore help reduce the impact of these events and subsequently reduce the damage caused by flooding. A good stormwater management system promotes groundwater recharge and controls peak flows, while reducing local flooding and maintaining stream bank integrity. An example of a good stormwater management system would be one that calls for removing sediment accumulation from catch basins yearly. This may make the difference in whether or not flooding occurs. Willington is encouraged to develop a municipal stormwater management plan. All towns within the region are also encouraged to consider the effects of proposed future development on stormwater runoff.

Hurricanes

Risk & Vulnerability:

Hurricane risk and vulnerability is discussed in Section II.B. The overall risk of Willington due to hurricanes is considered to be high.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of hurricane wind losses for a variety of hurricane wind events by county in Table 2-21. This data was developed using HAZUS-MH. Based on the data provided in Table 2-21 of the State Plan, the predicted annualized loss for Tolland County due to hurricane wind damage is $10,347,317.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Willington. Based on the 2010 Census data in Section II.A., Willington has approximately 4.0% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Willington for hurricane wind damage is estimated at $409,377.

Note that this estimate does not take into account site specific details or particular hurricane wind damages that may have affected the Town of Willington in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to hurricane wind damage.

The Town of Willington did not report any specific losses due to hurricanes. Private losses were not reported by the Town, but were expected to have been incurred by property owners on some scale during these strong wind events.

Mitigation Efforts

Some of the greatest damage from hurricanes is caused by flooding, high winds and tornadoes. Mitigation measures for these events are looked at separately in the flooding and tornado/wind damage sections. Other mitigation efforts that should be considered include:

- Providing emergency shelters;
- Implementing a tree hazard management program, which would encourage responsible planting practices and minimize future storm damage to buildings, utilities, and streets;
- Practicing a tree trimming maintenance program; and
- Relandscaping with native species.

The Town maintains shelter facilities and performs debris management through Public Works with the assistance of the local electrical utility when necessary. Tree work is contracted out by Public Works when as necessary. The Town's capabilities are considered to be effective with regard to mitigating hurricane damage. Overall, the Town of Willington's capability to mitigate for hurricanes and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted because the State building code has been updated and locally adopted and other flooding mitigation measures have been completed.

<u>Ice Jams</u>

Risk & Vulnerability:

Ice jam risk and vulnerability is discussed in Section II.B. The overall risk of Willington to ice jams is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update indicates that ice jams have not occurred in Connecticut since 2010. Due to the infrequency of the hazard and the limited information available regarding damages, it is no longer considered a separate hazard from flooding. The potential annualized loss estimate due to ice jams in Willington is therefore included in the annualized loss estimate for flooding presented above.

The Town of Willington did not report any recent damages due to ice jams.

Mitigation Efforts

During ice jams the biggest concern is the risk of flooding. See mitigation measures under flooding (above).

Severe Winter Storms

Risk & Vulnerability Impact):

Severe winter storm risk and vulnerability is discussed in Section II.B. Key risks are the relative isolation of the rural communities from emergency services; loss of electrical power to large areas from ice accumulation or high winds, and fire from improper use of alternative heating sources, candles and gas stoves. The leading cause of death is from automobile and other transportation accidents. Property damage can also occur from frozen water pipes and falling trees or branches from ice accumulation and/or wind. The overall risk of Willington to severe winter storms is considered to be high.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of severe winter storm losses for a variety of events by county in Table 2-35. This data was developed based on damages reported in the NCDC database. Based on the data provided in Table 2-35 of the State Plan, the predicted annualized loss for Tolland County due to severe winter storm damage is $532,131.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Willington. Based on the 2010 Census data in Section II.A., Willington has approximately 4.0% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Willington for severe winter storm damage is estimated at $21,053.

Note that this estimate does not take into account site specific details or particular severe winter storm damages that may have affected the Town of Willington in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to severe winter storm damage.

The Town of Willington did not report any recent damages due to severe winter storms. Private losses were not reported by the Town, but were expected to have been incurred by property owners on some scale during these severe winter storm events.

Mitigation Efforts (see also flooding and tornado/wind damage)

Some of the greatest damage from winter storms is caused by flooding and high winds, and mitigation measures for such hazards are discussed under those headings.

It is particularly important to encourage people to stay indoors and out of harm's way when severe winter weather threatens. Such conditions increase the frequency of traffic

accidents and emergency responders take longer to reach accident scenes because of vehicles unnecessarily on the roads.

Power outages can cause a number of problems, from loss of heat and the risk of frozen pipes to fire hazards. Tree-trimming programs can lessen the risk of power outages to some extent. Putting utility wires underground can lessen the risk even further. In any event, the municipality should develop a plan to restore power as quickly as possible.

The National Weather Service's Early Warning System is an important mitigation measure for winter storms. Other hazard-specific mitigation efforts that should be considered include:

- Educating the public on
  - The risks of hypothermia,
  - The risks of carbon monoxide poisoning in motor vehicles and from portable heaters and power generators in homes,
  - The risk of fires from portable heaters and candles,
  - The importance of staying off the roads,
  - Landscaping practices that encourage the planting of species that are less susceptible to damage from ice storms to reduce the risk of damage to structures;
- Implementing a tree trimming maintenance program;
- Encouraging underground utility wires; and
- Providing emergency shelters before, during, and after the event.

The Town maintains shelters and provides plowing services through Public Works. The Town's capabilities are considered to be effective in regards to response to severe winter storms, although the Town's capability to mitigate severe winter storm damage is relatively limited to town-owned facilities. Overall, the Town of Willington's capability to mitigate for severe winter storms and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted because of recent intensive tree-trimming work along electrical lines conducted by the local electrical utility.

Thunderstorms

Risk & Vulnerability:

Thunderstorm risk and vulnerability is discussed in Section II.B. The overall risk of Willington to thunderstorms is considered to be moderate.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of thunderstorm losses by county in Table 2-19. This data was developed based on damages

reported in the NCDC database. Based on the data provided in Table 2-19 of the State Plan, the predicted annualized loss for Tolland County due to thunderstorm damage is $55,581.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Willington. Based on the 2010 Census data in Section II.A., Willington has approximately 4.0% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Willington for thunderstorm damage is estimated at $2,199.

Note that this estimate does not take into account site specific details or particular thunderstorm damages that may have affected the Town of Willington in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to thunderstorm damage.

The Town of Willington did not report any recent losses due to severe thunderstorms. Recent private losses were not reported by the Town, but are expected to be incurred by property owners on some scale during severe thunderstorm events.

Mitigation Efforts (see also wildfires, flooding and tornado/wind damage)

Some of the greatest damage from thunderstorms is caused by fires, flooding, high winds, and (on occasion) tornadoes. Mitigation measures for such hazards are discussed under those headings.

The National Weather Service's Early Warning System is an important mitigation measure for thunderstorms. Other hazard-specific mitigation efforts that should be considered include:

- Educating the public on how to minimize risk of injury both indoors and outdoors (more specific);
- When to turn off gas, electricity, and water; and
- When and how to avoid contact with water and metal.
- Clearing dead or rotting tree branches;
- Securing outdoor objects that could become projectiles; and
- Installing lightning rods.

The Town performs debris management through Public Works with the assistance of the local electrical utility when necessary. The Town's capabilities are considered to be effective in regards to response to thunderstorms, although the Town's capability to mitigate thunderstorm damage is relatively limited to town-owned facilities and right-of-ways. Overall, the Town of Willington's capability to mitigate for thunderstorms and prevent loss of life and property is slightly improved since the initial hazard mitigation plan

was adopted because the local electrical utility has performed an intensive trimming program near electrical lines following the severe storms in 2011.

Tornado/Wind Damage

Risk & Vulnerability:

Tornado/Wind Damage risk and vulnerability is discussed in Section II.B. The overall risk of Willington to tornadoes is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of tornado losses for a variety of events by county in Table 2-30. This data was developed based on damages reported in the NCDC database. Based on the data provided in Table 2-30 of the State Plan, the predicted annualized loss for Tolland County due to tornado damage is $44,371.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Willington. Based on the 2010 Census data in Section II.A., Willington has approximately 4.0% of the population of Tolland County. Based on this percentage, the annualized loss in the Town of Willington for tornado damage is estimated at $1,755.

Note that this estimate does not take into account site specific details or particular tornado damages that may have affected the Town of Willington in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to tornado damage.

The Town of Willington did not report any recent damages due to tornadoes. The last recorded tornado activity in Willington occurred in the 1950's.

Mitigation Efforts

While the region has a very low risk of experiencing a tornado with great destructive potential, basic measures to minimize damage from high winds can be implemented and public education efforts can help to prepare residents. Owners of older mobile homes should be particularly aware of mitigation measures that could protect their homes from damage.

The National Weather Service's Early Warning System is an important mitigation measure for tornado/wind damage events. Other hazard-specific mitigation efforts that should be considered include:

- Being aware of, and educating the public through pamphlets and web-based information on
  - The warning signs for a tornado,
  - The importance of securing outdoor objects that could become projectiles,
  - What kinds of buildings are most vulnerable to damage from tornadoes or high winds (such as manufacture housing),
  - Structural alterations to protect against wind damage,
  - When and where to seek shelter;
- Encouraging upgrading of existing buildings to meet current building codes;
- Enforcing and updating building code standards for light frame construction, especially wind resistant roofs. FEMA articles on bracing for gable trussed roofs and bracing for doors and windows are available for review. Information is also available on placement of HVAC systems and electrical utilities to resist both wind and flood damage; and
- Encouraging underground utility wires.

The Town's policies for mitigating tornado damage are response-oriented and include maintaining shelters and debris cleanup equipment. The Town's capabilities are considered to be effective in regards to response to tornadoes. Overall, the Town of Willington's capability to mitigate for tornadoes and prevent loss of life and property is essentially unchanged from the initial plan, as mitigation measures were not completed that would mitigate the effects of a tornado event.

Wildfire Hazards

Risk & Vulnerability:

Wildfire Hazard risk and vulnerability is discussed in Section II.B. The overall risk of Willington to wildfires is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update does not provide loss estimates by county for wildfires except on Figure 2-52, where the reported annualized loss for the county is reported as being less than $56,040. Table 2-61 of the 2014 State Plan indicates that Tolland County experienced 387 wildfire events that burned an average of 1.53 acres per fire from 1991 to 2013. The number of annualized events is therefore 17.6, and the average acres burned in Tolland County is therefore 26.9 acres per year.

The Town of Willington did not report any recent losses due to wildfires. It is estimated that the annualized loss due to wildfires in Willington is less than $500 per year.

Mitigation Efforts

Long periods of drought are one of the primary natural causes of wildfires. Mitigation measures for drought are discussed under that heading. Other mitigation efforts that should be considered include:

- Educating the public on safe fire practices;
- Using fire-resistant material when renovating, building, and retrofitting structures;
- Moving shrubs and other landscaping away from structures;
- Periodically clearing brush and dead grass from property; and
- Acquiring land susceptible to wildfires to maintain it as open space.

The Town uses a variety of regulatory, preparedness, and public information programs to mitigate the effect of wildfires, including the Open Burning Program, maintenance of dry hydrants and cisterns, and educational programs on fire safety. The Town's capabilities are considered to be effective in regards to response to wildfires. Overall, the Town of Willington's capability to mitigate for wildfires and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted. The Town implemented Connecticut DEEP's updated Open Burning Program (see Section II.B.)

Mitigation Strategies

The Town of Willington has reviewed the "Risk and Vulnerability Assessment," the strengths and weaknesses of its existing mitigation strategies, and developed proposed mitigation strategies. Based upon internal resources, discussions and meetings with local officials and the general public, this section presents goals, objectives and proposed mitigation strategies. These mitigation strategies guide future efforts to reduce the loss of life and property as a result of natural disasters and attempt to break the expensive cycle of repeated damage and reconstruction. The proposed mitigation strategies are further prioritized to help guide the implementation schedule.

The goal of the Town of Willington continues to be "to reduce the loss of life and property and economic consequences as a result of natural disasters". The Town identified seven objectives in its addendum to the initial plan (locally adopted August 18, 2008) to meet this goal:

1. To reduce the likelihood of flooding by improving existing road conditions.
2. To reduce the likelihood of wildfire hazards by improving water availability.
3. To reduce the likelihood of flooding damage by improving bridge conditions.
4. To reduce the likelihood of flooding, evaluate property prone to flooding.
5. Expand activities related to emergency preparedness and improve natural hazard response capabilities.
6. Wherever practical, incorporate natural hazard mitigation strategies into existing town projects.
7. Reduce the amount of debris from severe storms through preventative tree maintenance.

A total of 15 specific tasks were identified in the addendum to the initial plan to meet these objectives. These tasks are discussed in more detail in the table below:

Status of Strategies and Actions for Willington from Initial Hazard Mitigation Plan Addendum

Obj.	Task	Priority	Responsible Department*	Comment	Status
1	Improve Route 74 across the Fenton River near Moose Meadow Road and Daleville Road to prevent flooding	High	ConnDOT	This work was not completed by ConnDOT due to lack of resources.	Carried Forward, Updated
1	Improve Route 74 at the Willimantic River, where periodic flooding of the river causes neighborhood flooding and closes the road	High	ConnDOT	This work was not completed by ConnDOT due to lack of resources.	Carried Forward, Updated, Consolidated
1	Improve drainage culverts and road grading on Route 320 to prevent periodic flooding and icing at the intersection of Hancock Road, at the culvert crossing of Ruby Pond discharge south of the Truck Stop facility just off I-84, at the culvert just south of the Town bus parking area, at the wetland beaver areas north of Cisar Road and north of Eldredge and Pinney Hill Roads, and at the culvert crossing at the north side of the Cosgrove Road intersection.	High	Conn DOT	This work was not completed by ConnDOT due to lack of resources.	Carried Forward, Updated
1	Improvement of drainage culverts and installation of drainage facilities along Turnpike and Village Hill Roads to reduce flooding and icing problems	High	Public Works	This was not completed due to lack of funding	Carried Forward
1	Replacement of culvert on Turnpike Road Extension to reduce flooding and isolation of houses on dead-end road	High	Public Works	This work was completed in 2011	Completed
2	Add dry hydrants near wildfire susceptible areas of the Nipmuck State Forest and municipal woodlands within the central portion of the Town	Medium	Fire, Public Works	This work was not completed due to lack of funding. Cisterns should also be considered.	Carried Forward, Updated

Status of Strategies and Actions for Willington from Initial Hazard Mitigation Plan Addendum (Continued)

Obj.	Task	Priority	Responsible Department*	Comment	Status
3	Replace the Route 74 bridge over the Willimantic River to reduce flood impact during severe storm events to the road and to adjacent dwellings	High	ConnDOT	This work was not completed due to lack of resources.	Carried Forward, Updated
3	Examine the capacity of the Route 74 bridge over the Fenton River just west of Moose Meadow Road	High	ConnDOT	This work has been completed. The bridge and road should be raised to increase capacity.	Completed
3	Replace the Kechkes Road bridge over the Fenton River on Kechkes Road	High	ConnDOT, Public Works	This work has not been completed due to lack of funds.	Carried Forward
4	Examine properties at the intersection of the Willimantic River and Route 74 where flooding occurs during severe storm situations	High	Public Works, CT DEP	Properties were evaluated, but additional monitoring is needed during and following severe flooding	Completed, Carried Forward
5	Ensure that the emergency shelters have adequate supplies to respond to natural emergencies	Medium	Selectmen, Fire	This was not completed due to lack of funding	Carried Forward
5	Develop a GIS application to assist town personnel in the event of an emergency or natural disaster	Low	Contracted Planners	This was not completed due to lack of funding	Carried Forward
6	Publish all Town ordinances and regulations on the Town's website, particularly those dealing with hazard mitigation for storms, flood events, and other natural hazards or disasters	Medium	Selectmen	This has been partially completed, as some regulations now appear on the Town's website. Work proceeds as local resource levels allow.	Partially Completed, Carried Forward
7	Procure tree bucket to help maintain and remove dead, dying, dangerous, or diseased trees	Medium	Contracted out	This was not completed due to lack of funding	Carried Forward
7	Remove dead, dying, dangerous, or diseased trees throughout Willington	Medium	Contracted out	Public Works contracts out tree work as necessary. This is a capability.	Carried Forward

*Identifying that a task will be "Contracted out" or given to "Contracted planners" is no longer allowed by FEMA, but is provided in the above table because this is how it was worded in the initial plan. New strategies (below) will not have this identifier. For a similar reason, the term DEP is still used in the above table even though the agency is now known as DEEP.

During the Plan Update process, the Town of Willington did not identify additional objectives to help meet the stated hazard mitigation planning goal.

Current mitigation strategies for the Town of Willington are presented below. The STAPLEE method was used to assign priority to each strategy as discussed in Section III.B. The STAPLEE analysis scoring is presented in Appendix IV. Scores ranged from 2.5 to 7.5, with a higher STAPLEE score being representative of a higher priority project. Scores less than 6.0 were considered to be "Low" priority, while scores greater than 6.0 were considered to be "High" priority. The intermediate scores of 6.0 were considered to have "Medium" priority.

Based on the STAPLEE methodology, "high" priority projects mitigate the most significant natural hazards that affect the town or multiple natural hazards, are considered feasible, would be effective in avoiding or reducing future losses, seem reasonable for the size of the problem and likely benefits, have political and public support, and improve upon existing programs or support other municipal priorities. All other supporting tasks were assigned a "Medium" or "Low" priority rating based on the same criteria.

Mitigation Strategies for the Town Of Willington:

Goal: **To reduce the loss of life and property and economic consequences as a result of natural disasters.**

Objective 1: To reduce the likelihood of flooding by improving existing road conditions.

Task: Encourage ConnDOT to improve drainage culverts and road grading on Route 320 to prevent periodic flooding and icing at the intersection of Hancock Road, at the culvert crossing of Ruby Pond discharge south of the Truck Stop facility just off I-84, at the culvert just south of the Town bus parking area, at the wet**l**and beaver areas north of Cisar Road and north of Eldredge and Pinney Hill Roads, and at the culvert crossing at the north side of the Cosgrove Road intersection.

Who: First Selectman Timeframe: 7/2015-6/2020 Priority: Low

Task: Improvement of drainage culverts and installation of drainage facilities along Turnpike and Village Hill Roads to reduce flooding and icing problems.

Who: Public Works Timeframe: 7/2015-6/2017 Priority: Medium

Task: Install new catch basins and drainage system along Village Hill Road.

Who: Public Works Timeframe: 7/2015-6/2017 Priority: Low

Objective 2: To reduce the likelihood of wildfire hazards.

Task: Add dry hydrants or underground cisterns near wildfire susceptible areas of State forest and municipal woodlands within the central portion of the Town.

Who: Public Works, Fire Timeframe: 7/2016-6/2018 Priority: Medium

Task: Add dry hydrants in close proximity to new developments.

Who: Public Works, Fire Timeframe: 7/2015-6/2020 Priority: High

Objective 3: To reduce the likelihood of flooding damage by improving bridge and road conditions.

Task: Encourage ConnDOT to replace and upgrade the capacity of the Route 74 bridge over the Willimantic River, to reduce flood impact during severe storm events to the road and to adjacent dwellings.

Who: First Selectman Timeframe: 7/2015-6/2020 Priority: High

Task: Replace the Kechkes Road Bridge over the Fenton River on Kechkes Road. This bridge has been placed on the ConnDOT high priority list under the local bridge program and is eligible for funding.

Who: Public Works Timeframe: 7/2015-6/2018 Priority: Low

Objective 4: To reduce the likelihood of flooding by evaluating property prone to flooding.

Task: Examine properties at the intersection of the Willimantic River and Route 74, where flooding occurs severe storm situations.

Who: Land Use Timeframe: 7/2015-6/2020 Priority: Low

Objective 5: Expand activities related to hazard mitigation, emergency preparedness and natural hazard response capabilities.

Task: Ensure that the emergency shelters have adequate capability to respond to natural emergencies.

Who: Selectmen, Fire Timeframe: 7/2015-6/2020 Priority: Medium

Task: Develop a GIS application to assist town personnel in the event of an emergency or natural disaster, including mitigation plan maps as layers.

Who: Land Use When: 7/2017-6/2019 Priority: Low

Task: Install generators at critical facilities.

Who: Selectmen Timeframe: 7/2015-6/2020 Priority: Medium

Objective 6: Whenever practical, incorporate natural hazard mitigation strategies into existing town projects.

Task: Publish all Town ordinances and regulations on Selectmen the Town's website, particularly those dealing with hazard mitigation for storms, flood events, and other natural hazards or disasters.

Who: Selectmen Timeframe: 7/2015-6/2020 Priority: High

Objective 7: Reduce the amount of debris from severe storms through preventative tree management.

Task: Procure tree bucket to help remove dead, dying, dangerous or diseased trees.)

Who: Public Works Timeframe: 7/2016-6/2019 Priority: High

Task: Education on planting trees using Eversource Energy literature.

Who: Land Use Timeframe: 7/2015-6/2017 Priority: Medium

Windham Mitigation:

Scope/Overview

The Risk and Vulnerability Assessment portion of this plan looked at the historical and potential impacts of the following hazards throughout the region: dam failures, droughts, earthquakes, floods, hurricanes, ice jams, severe winter weather, thunderstorms, tornadoes and wind damage, and wildfires. A review of the historical occurrences of each hazard provided valuable information used in assessing potential future risk. A review of each community's resources provided the basis for an analysis of the community's vulnerability to each hazard – the extent to which the community might suffer loss of human life, injuries, and/or property damage.

With an understanding of its risk and vulnerability to natural disasters, the community can take steps prior to such an event to reduce its impacts (loss of property and life). The Connecticut Department of Energy and Environmental Protection (DEEP) has provided guidance in the form of a comprehensive list of possible mitigation measures for each hazard (see Appendix III). In the context of the community's risk and vulnerability assessment, only some of these measures will be cost-effective. The purpose of the Natural Hazard Mitigation Plan (NHMP) is to identify reasonable and appropriate mitigation measures for each hazard.

Certain mitigation practices are beneficial for any disaster, and the following measures are recommended for all communities:

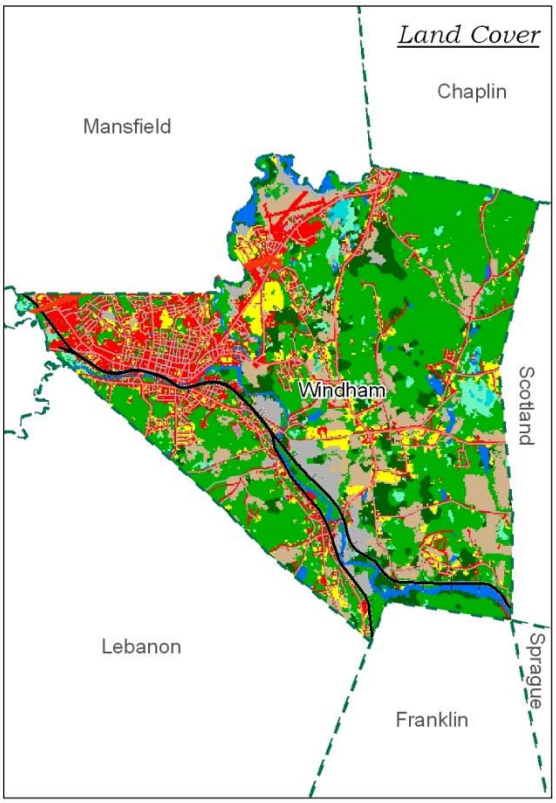
- Encourage all buildings to be improved to meet current building codes. Changes in building codes apply only to new constructions and renovations.
- Educate the public about disaster preparedness and the benefits of mitigation measures. Increasing the public's awareness of possible consequences of natural disasters and how they might better prepare to safeguard their lives and property is an important part of every community's mitigation plan.

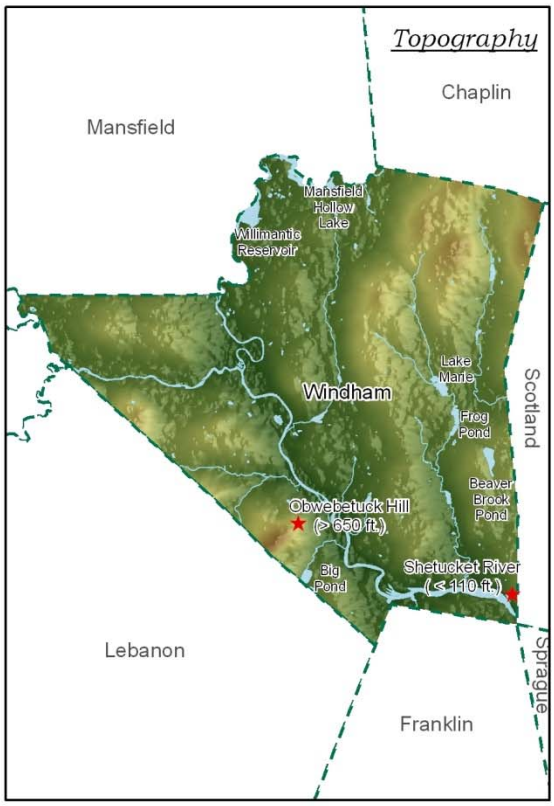
General Town Description

Windham is located in Windham County in northeastern Connecticut and lies in the south central section of the former WINCOG Region. Windham has a total area of 27.7 square miles (17,749 acres) and is bounded on the east by Scotland, on the south by Franklin and Lebanon, on the north by Chaplin and Mansfield, and on the west by Columbia and Coventry. The 2010 Census population count was 25,268 persons, a 10.5% increase from 2000 (22,857). Windham is part urbanized and part rural with some agriculture. About 21% of the town is developed (See Figure 42), an increase of 0.3% from the figure reported in the initial plan. The recent influx of population and residential and non-residential development increases the town's overall vulnerability to natural hazards. However, new buildings are constructed to more recent building codes (and generally away from floodplains) and are considered to be less vulnerable to natural hazards than older buildings.

Figure 42

Town of Windham Overview





Windham Land Cover Breakdown

QUICK TOWN STATS:

Town Area -
27.7 sq. miles
(17,773 acres)

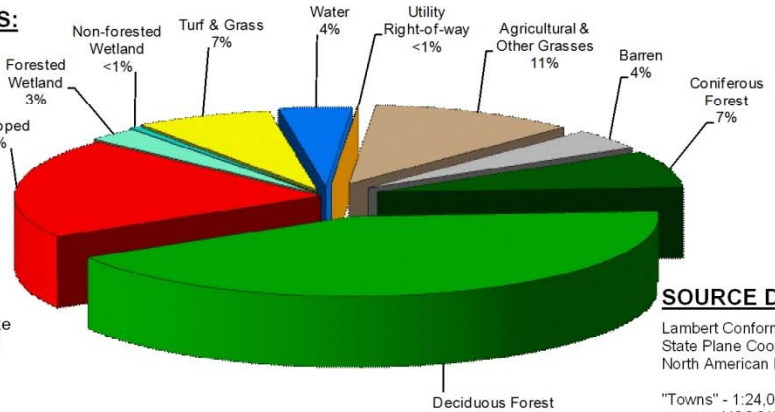
Water body area -
685 acres

Water bodies > 10 acres -
Beaver Brook Pond
Big Pond
Frog Pond
Lake Marie
Mansfield Hollow Lake
Willimantic Reservoir

Elevation -
Maximum = > 650 ft.
Minimum = < 110 ft.

Population -

2000	2010	Change
22,857	25,268	10.5%



Scale: 1:156,000

SOURCE DATA:

Lambert Conformal Conic,
State Plane Coordinate System
North American Datum of 1983 (NAD83)

"Towns" - 1:24,000, 1969-1984, USGS/CT DEP.
"Roads and Trails" - 1:24,000, 1969-1984, USGS/CT DEP.
"Hydrography" - 1:24,000, 1969-1984, USGS/CT DEP.
"National Elevation Dataset" - 30 meter (1 arc second).
"2006 Land Cover Greater Connecticut" - 100 ft sq., 2006, UConn, CLEAR.

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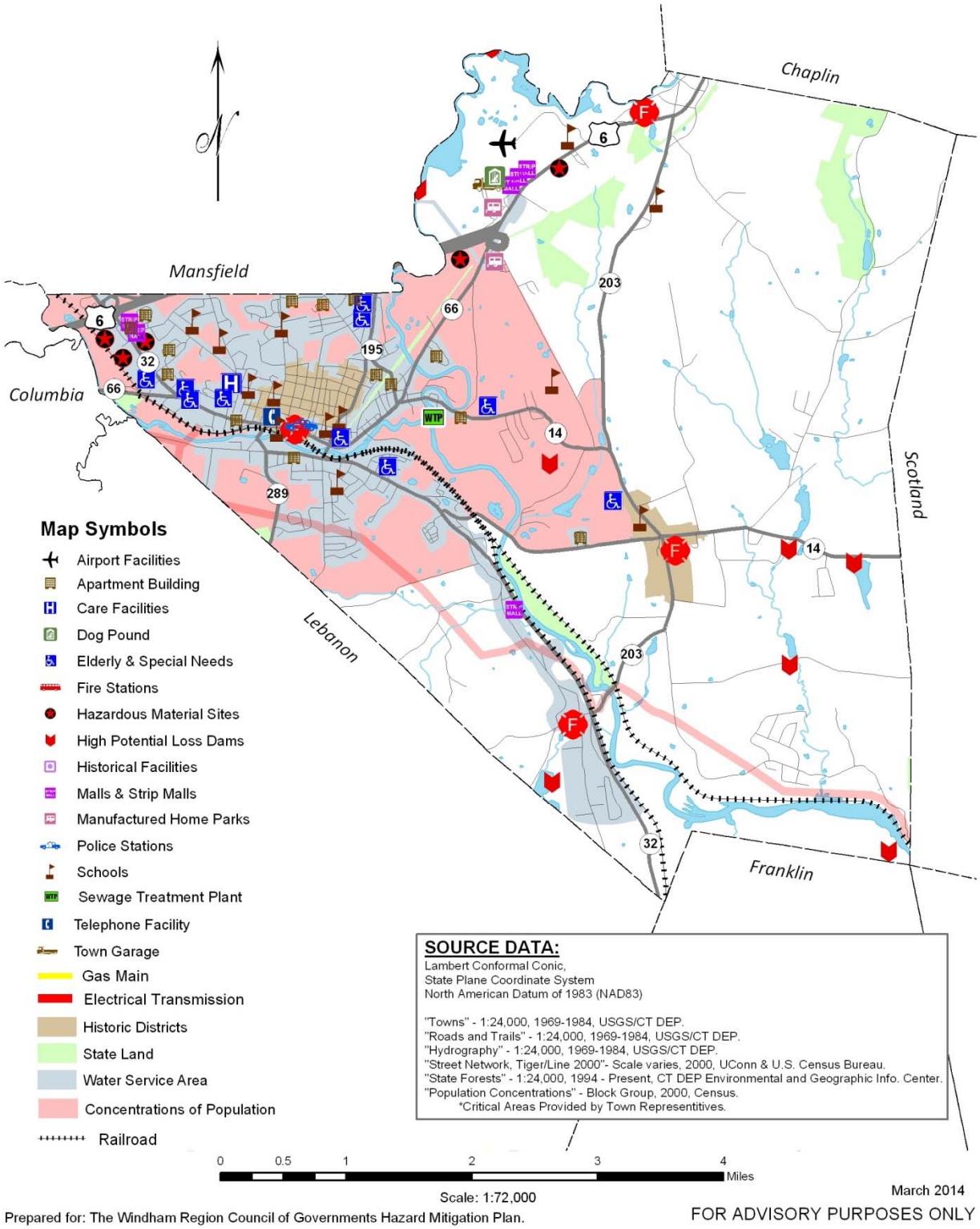
Critical facilities and cultural resources in Windham include: (see Figure 43)

- Four fire departments: one volunteer department in Windham Center, one volunteer department in South Windham, one volunteer department in North Windham and one career department on Bank Street in Willimantic;
- Three hazardous material sites: one off Route 6 and two off Route 32;
- Two other hazardous material concerns: Wal*Mart off Route 6 and BJs off
- Route 32 (both facilities store propane in large supply);
- Two police departments: one on Meadow Street in Willimantic and one on the Eastern Connecticut State University's campus;
- Thirteen primary and secondary schools: one pre-kindergarten school, seven elementary schools (two of which are private and one which is a STEM school), one middle school, one high school, one high school education program, one technical high school, and one secondary arts magnet school (Note: a charter high school will be opening on Main Street in August, 2014, bringing the total number of schools up to fourteen);
- One hospital, on Mansfield Ave;
- One airport, off Boston Post Road (Route 6), on Airport Road;
- Several notable historic structures: the former American Thread Company, the Jillson House Museum, the Windham Textile and History Museum, the town hall, and several historic homes dispersed throughout town;
- Eastern Connecticut State University Campus and a branch of Quinebaug Valley Community College in Willimantic;
- Three convalescent homes: one on Club Road, one on North Road, and one on Valley Street;
- Five elderly and special needs housing areas;
- Several apartment buildings, among which fifteen structures house large populations;
- Five strip malls: three across from Wal*Mart off Route 6, one on Rt 32, and one in the BJs plaza off West Main Street;
- One telephone facility, the SBC switch station located on High Street next to the town hall;
- Two manufactured home parks off Route 6 and a number of additional manufactured homes dispersed through town; and
- Seven high potential loss dams.

Windham Critical Areas of Concern

Figure 43



The Town of Windham also has water and sewer facilities. The municipal water utility, Windham Water Works, owns and operates the Willimantic Reservoir along the Natchaug River for public water supply. As with any such water supply, these reservoirs have their own emergency procedures and are closely monitored.

With the largest individual population concentration in town, Eastern Connecticut State University's campus, located in Willimantic, had over 4500 undergraduates and several hundred graduates enrolled in the 2012 school year. ECSU's housing facilities allow the campus to accommodate approximately two thirds of the entire student body while the university is in session. The seasonal increase in population in this area creates an elevated concern. It should be noted that the University has its own police protection, but given a disaster of a large enough scale the University would require further assistance besides that which they can provide for themselves.

Other areas of concern in the town include bridges over the Willimantic River, commercial development in North Windham, and the railroad. The Bridge Street bridge is a low-lying bridge with frequent structural damage. This bridge could easily become impassible in a high water event or potentially in any disaster. Thread City Crossing (known locally as The Frog Bridge) off Route 32 is a newer, better-built structure over the River. However, should a disaster reduce its functionality, traffic would be greatly hampered. Along Route 6 in North Windham there is an area of concern near the Windham Airport, where there is commercial development and an upward-lying dam. Representing not only an economic vulnerability, but also a hazardous material concern, the freight railroad, which cuts through the western part of town, is another important area of concern.

Largely forested, Windham is made up of approximately 42% deciduous forest, 7% coniferous forest and 3% forested wetlands. Other land cover in the town includes: developed (21%), agricultural and other grasses (11%), turf and grass (7%), barren land (4%), water (4%), non-forested wetlands (<1%) and utility rights-of-way (<1%). The approximate 633 acres of the town occupied by water bodies includes: Beaver Brook Pond, Big Pond, Frog Pond, Lake Marie, Mansfield Hollow Lake and the Willimantic Reservoir. Windham's elevation ranges from about 110 feet in the southeast corner of town at the Shetucket River to 650 feet at the peak of Obwebetuck Hill in the southwest section. In addition to all the natural hazards described previously in this plan on a regional level, Windham is also at risk of damage caused by flooding and dam failures.

Authorities in the Town of Windham who play advisory, supervisory, or direct roles in hazard mitigation for the Town include:

Authorities	Role			Hazard Mitigated
	Advisory	Supervisory	Direct	
Building Department	X		X	All except drought
Code Enforcement and Zoning Office	X		X	Flooding
Conservation, Open Space, and Agriculture Commission	X			Flooding, Drought
Fire Department			X	Wildfire
Fire Marshal / Emergency Management Director	X	X	X	All
Inland Wetlands & Watercourses Commission			X	Flooding
Mayor / Town Council	X	X	X	All
Planning	X		X	Flooding
Planning and Zoning Commission	X		X	Flooding
Public Works Department	X	X	X	All except drought
Town Engineer	X	X	X	Flooding
Water Commission / Windham Water Works	X	X		Wildfire
Zoning Board of Appeals			X	Flooding

Evaluation of Risks & Vulnerability

Dam Failure

Risks & Vulnerability:

Dam failure risk and vulnerability is discussed on a regional level in Section II.B. The overall risk of Windham to dam failure is considered to be low.

Risk (Extent)

There are 27 dams in Windham ranging from Hazard Class AA (negligible hazard) to Hazard Class C (high hazard). A total of 13 dams in the town are classified as negligible or low hazard (Class AA or Class A); failure of any of these dams would hardly be of concern. Two dams are classified as moderate hazard (Class BB) and their failure would cause some damage, but no major disruptions. The failure of any of the seven dams classified as significant hazard (Class B), or the two high hazard (Class C) dams could cause serious damage. The failure of the significant hazard (Class B) dams could cause severe damage and is of great concern in the town; however the greatest concern would be the failure of the high hazard dams in the town, Big Pond Dam or Scotland Dam. There are also three unassigned dams in the town, but the fact that close watch is kept over significant and high hazard dams suggests that these structures are either moderate, low, or negligible hazards.

Vulnerability (Location, Impact)

The failure of any Class B or Class C dam brings with it damages, economic loss and the potential for loss of life. One of the Class C dams is located on the north end of Big Pond and the other is located on a portion of the Shetucket River. Their high hazard classification means that in the event of their failure, besides the definite loss of property and economic losses, the loss of life is probable. Figure 44 shows the placement of dams in the town plus two Class C dams which are within 100 feet of the town's border. One of the Class C dams is located on the south end of the Willimantic Reservoir spanning the boundary of Mansfield and Windham while the second Class C dam is located on a portion of the Mansfield Hollow Dam; both dams are located just outside the north central portion of town and have the potential of causing damage within the town in the event of a failure.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides loss estimates by county for dam failure in Table 2-54. The period of record for these loss estimates is 136 years (1877 through 2013). Based on the data provided in Table 2-54 of the State Plan, the annualized loss for Windham County for dam failure is $47,978.

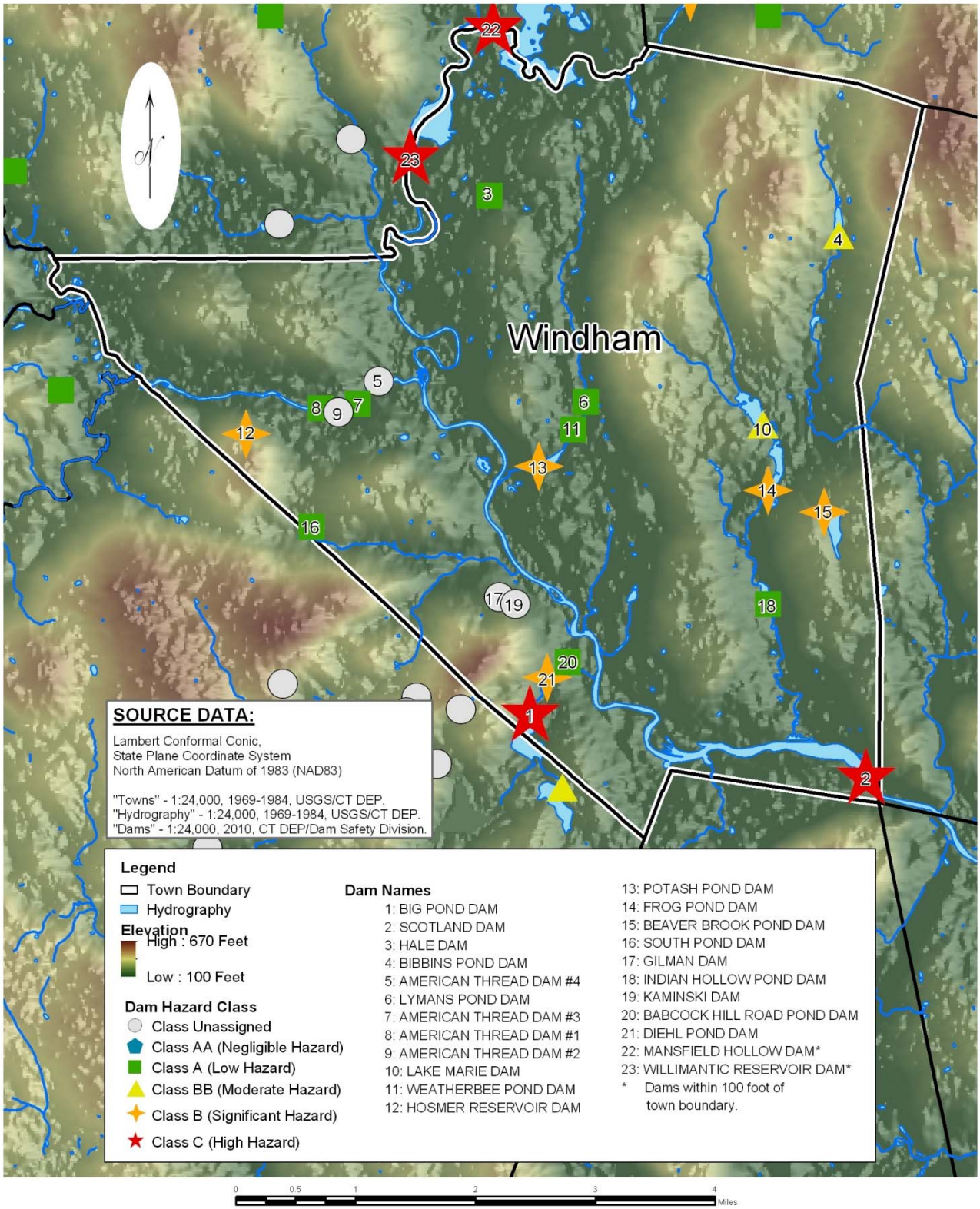
The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Windham. Based on the 2010 Census data in Section II.A., Windham has approximately 21.3% of the population of Windham County. Based on this percentage, the annualized loss in the Town of Windham for dam failure is estimated at $10,237.

Note that this estimate does not take into account site specific details or particular dam failure damages that may have affected the Town of Windham in the historic record. For example, Bibbins Pond Dam (Class BB) was estimated by the Connecticut DEP (now DEEP) to have experienced $2,000 in damage from the June 1982 flood. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to dam failure.

Town staff did not indicate that there has not been any damage to municipal and private structures and infrastructure due to dam failure in recent memory. Given the condition and classification of dams within and upstream of Windham, as well as the structures and infrastructure located downstream, it is likely that the annualized loss for dam failure is consistent with the estimated annualized loss from the State Plan.

Town of Windham Dams

Figure 44



Scale: 1:78,000

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Mitigation Efforts

Current state mitigation measures are described on a regional level on page 16, section II.B of the Natural Hazards Mitigation Plan. Among these mitigation measures are periodic dam inspections. Periodic inspections help to determine if dams are structurally sound. If a dam's structural integrity is questioned, recommendations made to ensure the safety of the structure may include:

- Any emergency measures or actions, if required to assure the immediate safety of the structure;
- Remedial measures and actions related to design, construction, operation, maintenance and inspection of the structure; additional detailed studies, investigations and analyses; or
- Recommendations for routine maintenance and inspection by the owner.

A total of 24 privately-owned dams are in Windham. Private owners of dams are generally reluctant to make repairs, which tend to be costly. In these instances, needed repairs may not be done in a timely manner. Two state-owned dams are located in Windham. These are the Hale Dam owned by Connecticut DOT (Class A), and the Bibbins Pond Dam owned by Connecticut DEEP (Class BB). State-owned dams are typically maintained in good condition.

Whether it is a structurally sound dam or a weak dam, Emergency Operation Plans (EOPs)/Emergency Action Plans (EAPs) are very important mitigation measures. A detailed discussion of these plans is provided in Section II.B. The DEEP works with owners of dams at greatest risk to make certain EOPs are in place and up-to-date. Hurricanes, flooding, ice jams and tornadoes may breach even a well-built dam, given a destructive enough event. Having a plan that lays out how to respond to a disaster, prior to the disaster occurring, is a very important tool in reducing loss of property and life. Mitigation measures for flooding (see below), which is a risk commonly associated with a dam failure, should also be encouraged.

While the state is assuming less responsibility for routine inspection of dams, DEEP will continue recommending measures to lessen the risk of dam failure, and the municipality can take the following mitigation actions:

- For municipally-owned dams, make sure that EOPs/EAPs are in place and current, and implement recommendations resulting from state inspections; and
- For privately-owned dams, encourage each dam owner to have an EOP/EAP in place and current, and implement recommendations resulting from inspections; monitor compliance as possible.

The Town of Windham has limited policies, programs, and resources dedicated to dam failure since most of these efforts are performed at the State level. The Town of Windham

owns one dam (Hosmer Mountain Reservoir Dam) that is rated Class B. The Town's ability to mitigate dam failure is considered to be good for the town-owned dam but limited for privately owned dams. Overall, the Town of Windham's capability to mitigate for dam failure and prevent loss of life and property has increased since the initial hazard mitigation plan was adopted, mainly as a result of recent statewide legislative actions described above and in Section II.B. Over the next few years, it is expected that dam safety programs will continue to strengthen in Connecticut.

Drought

Risk & Vulnerability:

Drought risk and vulnerability is discussed in Section II.B. The overall risk of Windham to drought is considered to be low.

Loss Estimates (Impact)

The Town of Windham did not report any losses due to drought. The 2014 Connecticut Natural Hazard Mitigation Plan Update provides loss estimates by county for drought in Table 2-69. However, no damages are reported. Therefore, the estimated annualized loss for drought in Windham would also be $0. The number of annualized events for Windham County is reported at 0.05.

Mitigation Efforts

As with any rural community that depends on aquifers and local well systems, Windham's vulnerability to drought increases with population growth and the accompanying increased demands for water. Good land use planning and helping the community to understand the importance of water conservation can reduce the threat of drought. Other specific measures that should be considered include:

- Completing a town-wide groundwater study, including recharge into existing aquifers to develop recommendations for future land use patterns;
- Implementing site design techniques and criteria such as strict regulation of vegetative buffers for stream and river corridors, rain gardens for site drainage, and prohibition of wetlands alteration;
- Studying effectiveness of conservation measures; and
- Implementing water conservation awareness programs.

The Town of Windham public water supply comes from Windham Water Works. This utility has procedures in place to mitigate the effects of drought. Other than that, the Town of Windham does not specifically mitigate for drought. Overall, the Town of Windham's capability to mitigate for drought and prevent loss of life and property is limited and

generally unchanged since the initial hazard mitigation plan was adopted, mainly because drought planning and response occurs at the State level.

Earthquake

Risk & Vulnerability:

Earthquake risk and vulnerability is discussed in Section II.B. The overall risk of Windham to earthquakes is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides a range of annualized loss estimates by county for earthquakes in Figure 2-66. Based on the data provided in Figure 2-66 of the State Plan, the annualized loss for Windham County lies between zero and $56,050. To be conservative, the maximum county-wide annualized loss value of $56,050 is utilized herein.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Windham. Based on the 2010 Census data in Section II.A., Windham has approximately 21.3% of the population of Windham County. Based on this percentage, the annualized loss in the Town of Windham for earthquakes is estimated at $11,959.

Note that this estimate does not take into account site specific details or particular earthquake damages that may have affected the Town of Windham in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to earthquakes.

The Town of Windham did not report any municipal or private damages or losses due to recent earthquakes. The annualized loss estimate of $11,959 based on the values in the 2014 State Plan is therefore likely high but is reasonable enough to use for planning purposes.

Mitigation Efforts

Occurrences of large earthquakes in the region are infrequent. While many mitigation measures may not be cost-effective, the community should consider the following:

- Enforcing effective building codes and local ordinances;
- Encouraging emergency facilities such as hospitals to be constructed to withstand seismic events; and
- Encouraging a low-cost earthquake rider for homeowners and businesses.

The Town does not specifically mitigate for earthquake hazards. Overall, the Town of Windham's capability to mitigate for earthquakes and prevent loss of life and property is limited and generally unchanged since the initial hazard mitigation plan was adopted, mainly because it is not a high priority because earthquake damage is so infrequent.

Flooding

The overall risk of Windham to flooding is considered to be moderate.

Risk (Extent)

The Town of Windham is at risk of flooding because of a number of streams, brooks and ponds in the town. According to the 1998 Federal Emergency Management Agency's (FEMA's) updated Flood Insurance Study (FIS) for the town:

> "Floods in the Town of Windham can occur in any season of the year. Spring floods are common due to a combination of rainfall and snowmelt. Floods in late summer are usually the result of hurricanes or other storms moving northeast along the Atlantic coast. Winter floods result from occasional thaws, particularly in years of heavy snowfall.
>
> Major floods of the past 50 years have occurred in March 1936 (a 20-year frequency event), September 1938, and August 1955 (in excess of a 100-year event). The operation of Mansfield Hollow Lake aided the downstream basin in avoiding serious flooding. The Shetucket River at the USGS gaging station (No. 01122500, with 70 years of operation), located at Plains Road, recorded a peak discharge of 52,200 cubic feet per second (cfs) on September 21, 1938. This same quantity of runoff, occurring today, would produce a significantly lower flow at the gage, due to the operation of the Mansfield Hollow Dam.
>
> The Willimantic River, at the USGS gaging station No. 0111950, just upstream of State Route 31 in Coventry, Connecticut, recorded a peak discharge of 24,200 cfs on August 19, 1955. The recurrence interval of the flood, at this gaging station, was in excess of a 200-year flood (4)."

Vulnerability (Location, Impact)

Areas studied for vulnerability, as noted in FEMA's 1998 FIS for the town, are as follows:

> "For the 1981 Windham FIS, the Natchaug and Shetucket Rivers were studied by detailed methods for their entire lengths within the town.
>
> For the 1982 Willimantic FIS, the Natchaug, Shetucket, and Willimantic Rivers were studied for their entire lengths within the city.

> All or portions of the following streams were studied by approximate methods; Willimantic Reservoir, Potash Brook, Ballymark Brook, Beaver Brook, Lake Marie, Bibbins Pond, Lymans Pond, Chestnut Hill Brook, Frog Pond, Jordan Brook, Indian Hollow Pond, Big Pond, a swamp east of Main Street, a swamp east of State Route 289, and a small pond west of Chestnut Hill Brook.
>
> The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction for the next five years, through June 1985. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA (2)."

A map of the flood risk areas is provided on Figure 45.

In addition to these areas noted by the FIS, Windham also has a "scour bridge". This is a term used by ConnDOT to describe a bridge whose structure may be undermined by soil erosion during certain rainfall or stream flow events, thus affecting its stability and safety. This structure is located on Plains Road and crosses the Shetucket River.

Tyler Square is a commercial development that was developed in the late 1980s. The building is located in the 1% annual chance floodplain of the Willimantic River off of Main Street. The finished floor of the building is approximately 245.9 feet, and the 1% annual chance flood elevation is approximately 251 feet. This building is floodprone and of concern to local officials. It houses the State of Connecticut Judicial Branch and the US Social Security Administration, among other businesses. Recent flood damages are not immediately available.

Loss Estimates (Impact)

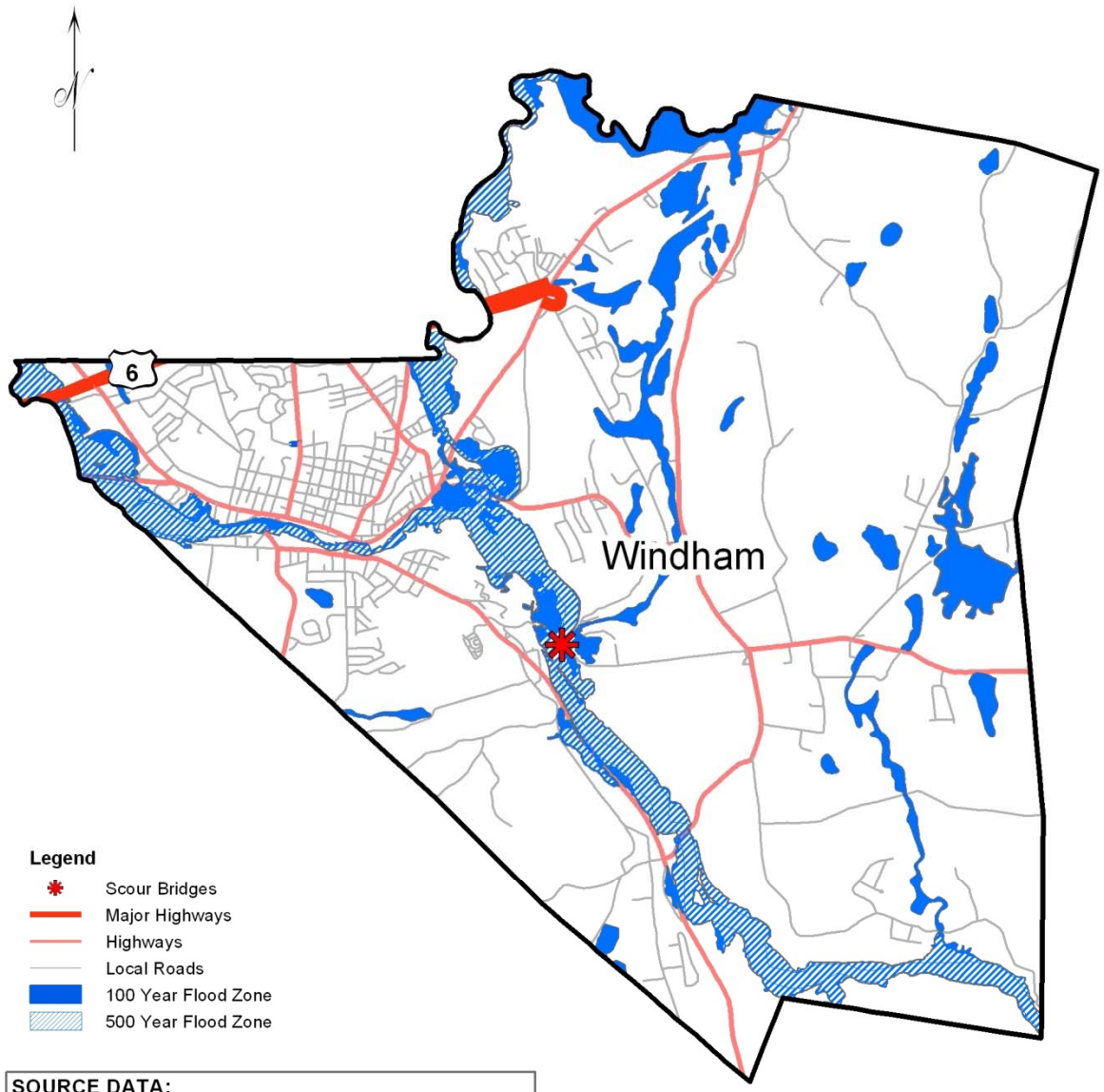
The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of annualized loss by county for flooding in Table 2-44. Based on the data provided in Table 2-44 of the State Plan, the annualized loss for Windham County based on the historic record through the National Climatic Data Center through the past 20 years is $53,168.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Windham. Based on the 2010 Census data in Section II.A., Windham has approximately 21.3% of the population of Windham County. Based on this percentage, the annualized loss in the Town of Windham for flooding is estimated at $11,344.

Note that this estimate does not take into account site specific details or particular flooding damages that may have affected the Town of Windham in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to flooding.

Flood Risk Zones of Windham

Figure 45



SOURCE DATA:

Lambert Conformal Conic,
State Plane Coordinate System
North American Datum of 1983 (NAD83)

"Towns" - 1:24,000, 1969-1984, USGS/CT DEP.
"Roads and Trails" - 1:24,000, 1969-1984, USGS/CT DEP.
"FEMA Flood Insurance Rate Maps (FIRM)" - scale varies, collection date varies, FEMA.
"Dynamap Transportation v11.3 streets" - Scale varies, 2009, Tele Atlas North America Inc.
"Scour Critical Town Bridges" - Conndot Bridge Safety + Evaluation, 10/10/2012.

0 0.5 1 2 3 4 Miles

Scale: 1:72,000

October 2012

Prepared for: The Windham Region Council of Governments Hazard Mitigation Plan.

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The Town of Windham did not report any recent flooding problems other than the Tyler Square area. According to FEMA, the Town of Windham does not have any repetitive loss properties or severe repetitive loss properties. However, there are several areas in the community that are considered floodprone based on the FIRM. Based on the above, the annualized loss estimate of $11,344 for flooding is considered reasonable for the Town of Windham.

Mitigation Efforts

The Town of Windham has consistently participated in the NFIP since February 3, 1982. The most recent FIRM was published on November 6, 1998. The current Town of Windham FIS was published on November 6, 1998. The original FIS and FIRMs for flooding sources in the Town are based on work completed in June 1980 (Town), July 1980 (City of Willimantic), and May 1996 (Willimantic River update). Many of the local flooding problems are consistent with the floodplains mapped by FEMA.

Section 52 of the Town of Windham's current zoning regulations are the Town's Special Flood Hazard Area regulations which were most recently updated on June 23, 2011. These include, but are not limited to, the following limitations in the flood zone[l]:

- Where disturbance of one acre or more, or removal or addition of more than 1,000 cubic yards but less than 5,000 cubic yards, the Commission may require more detailed information on the likely impacts of the proposed development on flood flow and the effect on abutting properties (Section 52.7(b)). When the proposed development may result in disturbance of more than five acres or the removal or addition of more than 5,000 cubic yards of material, the Commission shall process the application as a Special Permit in accordance with Section 62 (Section 52.7(c)).

- All new construction and substantial improvements, including prefabricated or manufactured buildings or structures shall have the lowest floor, including the basement, elevated to or above the base flood level (100 year flood level) (Section 52.7.3.b).

- Non-residential structures located in all A-Zones may be flood-proofed in lieu of being elevated provided that together with all attendant utilities and sanitary facilities, the areas of the structure below the required elevation are water tight with walls substantially impermeable to the passage of water, and structural components are used

[l] The flood zone being the Area of Special Flood Hazard, designated as the land in the flood plain within a community subject to a one percent or greater chance of flooding in any given year. The areas of Special Flood Hazard contain all A Zones (areas of the 100-year flood) as designated on the Flood Insurance Rate Map. (Windham Zoning Regulations Section 52.5.1)

which have the capability of resisting hydrostatic and hydrodynamic loads and the effect of buoyancy (Section 52.7.3.c).

- Any new construction, including prefabricated buildings and manufactured homes, and substantial improvements shall be designed and anchored to prevent flotation collapse or lateral movement and constructed with flood-resistant materials and methods. The placement of manufactured homes or manufactured home parks and subdivisions shall be prohibited within any Special Flood Hazard Area of an 'A' or 'B' zone. New construction and substantial improvements shall be constructed using methods and practices that minimize flood damage (Section 52.7.3.g).

- Any development or activity within the floodway must be capable of conveying the base flood without increasing the water surface elevation more than one foot at any point (Section 52.8.a).

- Encroachments, including fill, new construction, substantial improvements and any other development is prohibited unless certification (with supporting technical data) is provided by a Registered Professional Engineer demonstrating that such encroachments will not result in any increase in flood levels during occurrence of the base flood discharge (Section 52.8.b).

- If the proposal involves development within an 'A' Zone, and a floodway has not been identified, no new construction, substantial improvements to existing structures, or other development (including fill) shall be permitted unless it is demonstrated by the applicant that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point in the town (Section 52.8.1).

Windham's regulations prohibit manufactured (mobile) homes within any special flood hazard area of an 'A' or 'B' zone. Other proposed structures within the flood plain are required to meet elevation requirements and strict construction demands. Structures may be required to be constructed with certain materials, elevated, flood proofed, watertight or anchored. It must be shown with not only proposed structures, but with any activity in the 100-year flood plain that encroachment will not alter the flood levels in the floodway. Also any development or activity within the floodway must not increase the water surface elevation more than one foot at any point. These types of regulations help to keep structures out of areas at risk of flooding. Structures that are allowed in the flood plain must meet requirements put in place to greatly reduce the risk of damage to property and the loss of life, should a flood occur.

The degree of flood protection established by the variety of regulations in the Town meets the minimum reasonable for regulatory purposes under the NFIP. The Town plans to remain compliant with the NFIP and will continue to participate in the NFIP.

Additional mitigation measures recommended for all towns in the region include:

- Educating the public on
  - Risks of flooding,
  - Risks of building in hazard-prone areas,
  - Federal Emergency Management Agency (FEMA) floodplain maps (and making these maps easily available to the public);
- Implementing a maintenance program to clear debris from storm water drainage areas;
- Developing sediment control to prevent clogged drainage systems, such as street sweeping, curb and gutter cleaning, paving dirt roads, and planting vegetation on bare ground;
- Investigating the use of flood-prone areas as open spaces;
- Encouraging individuals in flood-prone areas to purchase flood insurance;
- Elevating structures above the 100-year flood level; and
- Considering the conservation of open space by acquisition of repetitive loss structures.

The Town of Windham monitors scour bridges such as the Plains Road bridge that crosses the Willimantic River. The Town's capabilities are considered to be effective in regards to response to flood damage, and the Town's capability to mitigate flood hazard damage is also considered effective for preventing damage to new development and substantial improvements. Overall, the Town of Windham's capability to mitigate for flooding and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted. This is because new flooding problems were not identified and the CodeRED emergency notification system was enacted by the Town.

Stormwater

Stormwater runoff can significantly exacerbate flooding; therefore, managing stormwater runoff is a priority mitigation measure. Residential and commercial development increases impervious land area, reduces the infiltration of stormwater runoff into the ground, and increases the volume and velocity of stormwater runoff causing flooding. Enforcing appropriate maintenance programs for stormwater facilities will therefore help reduce the impact of these events and subsequently reduce the damage caused by flooding. A good stormwater management system promotes groundwater recharge and controls peak flows, while reducing local flooding and maintaining stream bank integrity. An example of a good stormwater management system would be one that calls for removing sediment accumulation from catch basins yearly. This may make the difference in whether or not flooding occurs. Windham is encouraged to develop a municipal stormwater management plan. All towns within the region are also encouraged to consider the effects of proposed future development on stormwater runoff.

Hurricanes

Risk & Vulnerability:

Hurricane risk and vulnerability is discussed in Section II.B. The overall risk of Windham to hurricanes is considered to be high.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of hurricane wind losses for a variety of hurricane wind events by county in Table 2-21. This data was developed using HAZUS-MH. Based on the data provided in Table 2-21 of the State Plan, the predicted annualized loss for Windham County due to hurricane wind damage is $11,233,193.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Windham. Based on the 2010 Census data in Section II.A., Windham has approximately 21.3% of the population of Windham County. Based on this percentage, the annualized loss in the Town of Windham for hurricane wind damage is estimated at $2,396,733.

Note that this estimate does not take into account site specific details or particular hurricane wind damages that may have affected the Town of Windham in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to hurricane wind damage.

The Town of Windham did not report any specific losses due to hurricanes. Private losses were not reported by the Town, but are expected to have been incurred by property owners on some scale during these strong wind events.

Mitigation Efforts

Some of the greatest damage from hurricanes is caused by flooding, high winds and tornadoes. Mitigation measures for these events are looked at separately in the flooding and tornado/wind damage sections. Other mitigation efforts that should be considered include:

- Providing emergency shelters;
- Implementing a tree hazard management program, which would encourage responsible planting practices and minimize future storm damage to buildings, utilities, and streets;
- Practicing a tree trimming maintenance program; and
- Relandscaping with native species.

The Town maintains shelter facilities and performs debris management through Public Works with the assistance of the local electrical utility when necessary. The Town's capabilities are considered to be effective with regard to mitigating hurricane damage. Overall, the Town of Windham's capability to mitigate for hurricanes and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted because the State building code has been updated and locally adopted.

Ice Jams

Risk & Vulnerability:

Ice jam risk and vulnerability is discussed in Section II.B. The overall risk of Windham to ice jams is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update indicates that ice jams have not occurred in Connecticut since 2010. Due to the infrequency of the hazard and the limited information available regarding damages, it is no longer considered a separate hazard from flooding. The potential annualized loss estimate due to ice jams in Windham is therefore included in the annualized loss estimate for flooding presented above.

The Town of Windham did not report any recent damages due to ice jams.

Mitigation Efforts

During ice jams the biggest concern is the risk of flooding. See mitigation measures under flooding (above).

Severe Winter Storms

Risk & Vulnerability:

Severe winter storm risk and vulnerability is discussed in Section II.B. Key risks are the relative isolation of the rural communities from emergency services; loss of electrical power to large areas from ice accumulation or high winds, and fire from improper use of alternative heating sources, candles and gas stoves. The leading cause of death is from automobile and other transportation accidents. Property damage can also occur from frozen water pipes and falling trees or branches from ice accumulation and/or wind. The overall risk of Windham to severe winter storms is considered to be high.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of severe winter storm losses for a variety of events by county in Table 2-35. This data was developed based on damages reported in the NCDC database. Based on the data provided in Table 2-35 of the State Plan, the predicted annualized loss for Windham County due to severe winter storm damage is $432,441.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Windham. Based on the 2010 Census data in Section II.A., Windham has approximately 21.3% of the population of Windham County. Based on this percentage, the annualized loss in the Town of Windham for severe winter storm damage is estimated at $92,266.

Note that this estimate does not take into account site specific details or particular severe winter storm damages that may have affected the Town of Windham in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to severe winter storm damage.

The Town of Windham did not report any recent damages due to severe winter storms. Private losses were not reported by the Town, but were expected to have been incurred by property owners on some scale during these severe winter storm events.

Mitigation Efforts (see also flooding and tornado/wind damage)

Some of the greatest damage from winter storms is caused by flooding and high winds, and mitigation measures for such hazards are discussed under those headings.

It is particularly important to encourage people to stay indoors and out of harm's way when severe winter weather threatens. Such conditions increase the frequency of traffic accidents and emergency responders take longer to reach accident scenes because of vehicles unnecessarily on the roads.

Power outages can cause a number of problems, from loss of heat and the risk of frozen pipes to fire hazards. Tree-trimming programs can lessen the risk of power outages to some extent. Putting utility wires underground can lessen the risk even further. In any event, the municipality should develop a plan to restore power as quickly as possible.

The National Weather Service's Early Warning System is an important mitigation measure for winter storms. Other hazard-specific mitigation efforts that should be considered include:

- Educating the public on

  - The risks of hypothermia,
  - The risks of carbon monoxide poisoning in motor vehicles and from portable heaters and power generators in homes,
  - The risk of fires from portable heaters and candles,
  - The importance of staying off the roads,
  - Landscaping practices that encourage the planting of species that are less susceptible to damage from ice storms to reduce the risk of damage to structures;
- Implementing a tree trimming maintenance program;
- Encouraging underground utility wires; and
- Providing emergency shelters before, during, and after the event.

The Town maintains shelters and provides plowing services through Public Works. The Town's capabilities are considered to be effective in regards to response to severe winter storms, although the Town's capability to mitigate severe winter storm damage is relatively limited to town-owned facilities. Overall, the Town of Windham's capability to mitigate for severe winter storms and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted because of recent intensive tree-trimming work along electrical lines conducted by the local electrical utility.

<u>Thunderstorms</u>

Risk & Vulnerability:

Thunderstorm risk and vulnerability is discussed in Section II.B. The overall risk of Windham to thunderstorms is considered to be moderate.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of thunderstorm losses by county in Table 2-19. This data was developed based on damages reported in the NCDC database. Based on the data provided in Table 2-19 of the State Plan, the predicted annualized loss for Windham County due to thunderstorm damage is $47,026.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Windham. Based on the 2010 Census data in Section II.A., Windham has approximately 21.3% of the population of Windham County. Based on this percentage, the annualized loss in the Town of Windham for thunderstorm damage is estimated at $10,034.

Note that this estimate does not take into account site specific details or particular thunderstorm damages that may have affected the Town of Windham in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to thunderstorm damage.

The Town of Windham did not report any recent losses due to severe thunderstorms. Recent private losses were not reported by the Town, but are expected to be incurred by property owners on some scale during severe thunderstorm events.

Mitigation Efforts (see also wildfires, flooding and tornado/wind damage)

Some of the greatest damage from thunderstorms is caused by fires, flooding, high winds, and (on occasion) tornadoes. Mitigation measures for such hazards are discussed under those headings.

The National Weather Service's Early Warning System is an important mitigation measure for thunderstorms. Other hazard-specific mitigation efforts that should be considered include:

- Educating the public on how to minimize risk of injury both indoors and outdoors (more specific);
  - When to turn off gas, electricity, and water; and
  - When and how to avoid contact with water and metal.
- Clearing dead or rotting tree branches;
- Securing outdoor objects that could become projectiles; and
- Installing lightning rods.

The Town performs debris management through Public Works with the assistance of the local electrical utility when necessary. The Town's capabilities are considered to be effective in regards to response to thunderstorms, although the Town's capability to mitigate thunderstorm damage is relatively limited to town-owned facilities and right-of-ways. Overall, the Town of Windham's capability to mitigate for thunderstorms and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted because the local electrical utility has performed an intensive trimming program near electrical lines following the severe storms in 2011.

<u>Tornado/Wind Damage</u>

Risk & Vulnerability:

Tornado/Wind Damage risk and vulnerability is discussed in Section II.B. The overall risk of Windham to tornadoes is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update provides estimates of tornado losses for a variety of events by county in Table 2-30. This data was developed based on damages reported in the NCDC database. Based on the data provided in Table 2-30 of the

State Plan, the predicted annualized loss for Windham County due to tornado damage is $84,862.

The ratio of the Town's population to the county population was utilized to attribute a portion of the county-wide annualized loss to Windham. Based on the 2010 Census data in Section II.A., Windham has approximately 21.3% of the population of Windham County. Based on this percentage, the annualized loss in the Town of Windham for tornado damage is estimated at $18,068.

Note that this estimate does not take into account site specific details or particular tornado damages that may have affected the Town of Windham in the historic record. Therefore, this number should be used with caution. Nevertheless, it provides a useful planning number to consider the overall vulnerability of the Town to tornado damage.

The Town of Windham did not report any recent damages due to tornadoes.

Mitigation Efforts

While the region has a very low risk of experiencing a tornado with great destructive potential, basic measures to minimize damage from high winds can be implemented and public education efforts can help to prepare residents. Owners of older mobile homes should be particularly aware of mitigation measures that could protect their homes from damage.

The National Weather Service's Early Warning System is an important mitigation measure for tornado/wind damage events. Other hazard-specific mitigation efforts that should be considered include:

- Being aware of, and educating the public through pamphlets and web-based information on
  - The warning signs for a tornado,
  - The importance of securing outdoor objects that could become projectiles,
  - What kinds of buildings are most vulnerable to damage from tornadoes or high winds (such as manufacture housing),
  - Structural alterations to protect against wind damage,
  - When and where to seek shelter;
- Encouraging upgrading of existing buildings to meet current building codes;
- Enforcing and updating building code standards for light frame construction, especially wind resistant roofs. FEMA articles on bracing for gable trussed roofs and bracing for doors and windows are available for review. Information is also available on placement of HVAC systems and electrical utilities to resist both wind and flood damage; and
- Encouraging underground utility wires.

The Town's policies for mitigating tornado damage are response-oriented and include maintaining shelters and debris cleanup equipment. The Town's capabilities are considered to be effective in regards to response to tornadoes. Overall, the Town of Windham's capability to mitigate for tornadoes and prevent loss of life and property is essentially unchanged from the initial plan, as mitigation measures were not completed that would mitigate the effects of a tornado event.

Wildfire Hazards

Risk & Vulnerability:

Wildfire Hazard risk and vulnerability is discussed in Section II.B. The overall risk of Windham to wildfires is considered to be low.

Loss Estimates (Impact)

The 2014 Connecticut Natural Hazard Mitigation Plan Update does not provide loss estimates by county for wildfires except on Figure 2-52, where the reported annualized loss for the county is reported as being less than $56,040. Table 2-61 of the 2014 State Plan indicates that Windham County experienced 564 wildfire events that burned an average of 2.08 acres per fire from 1991 to 2013. The number of annualized events is therefore 25.6, and the average acres burned in Windham County is therefore 53.2 acres per year.

The Town of Windham did not report any recent losses due to wildfires. Given the slight similarity between Windham and Mansfield (both have a concentrated urban core with rural outlying areas), it is estimated that the annualized loss due to wildfires in Windham is similar to that of Mansfield (approximately $9,000 per year).

Mitigation Efforts

Long periods of drought are one of the primary natural causes of wildfires. Mitigation measures for drought are discussed under that heading. Other mitigation efforts that should be considered include:

- Educating the public on safe fire practices;
- Using fire-resistant material when renovating, building, and retrofitting structures;
- Moving shrubs and other landscaping away from structures;
- Periodically clearing brush and dead grass from property; and
- Acquiring land susceptible to wildfires to maintain it as open space.

The Town uses a variety of regulatory, preparedness, and public information programs to mitigate the effect of wildfires, including the Open Burning Program, maintenance of hydrants, dry hydrants and cisterns, and educational programs on fire safety. The Town's capabilities are considered to be effective in regards to response to wildfires. Overall, the

Town of Windham's capability to mitigate for wildfires and prevent loss of life and property is slightly improved since the initial hazard mitigation plan was adopted. The Town implemented Connecticut DEEP's updated Open Burning Program (see Section II.B.)

Mitigation Strategies

The Town of Windham has reviewed the "Risk and Vulnerability Assessment," the strengths and weaknesses of its existing mitigation strategies, and developed proposed mitigation strategies. Based upon internal resources, discussions and meetings with local officials and the general public, this section presents goals, objectives and proposed mitigation strategies. These mitigation strategies guide future efforts to reduce the loss of life and property as a result of natural disasters and attempt to break the expensive cycle of repeated damage and reconstruction. The proposed mitigation strategies are further prioritized to help guide the implementation schedule.

The goal of the Town of continues to be "to reduce the loss of life and property and economic consequences as a result of natural disasters". The Town identified four objectives in the initial plan to meet this goal:

1. To reduce the likelihood of flooding by improving existing natural and artificial drainage systems.
2. To reduce the likelihood of flooding and natural disaster related damages by improving bridge conditions.
3. To reduce the likelihood of flooding and icy conditions by improving existing road conditions.
4. Expand activities related to emergency preparedness and improve natural hazard response capabilities.

Five specific tasks were identified in the initial plan to meet these objectives. One additional task was identified and completed after the initial plan was adopted. These tasks are discussed in more detail in the table below:

Status of Strategies and Actions for Windham from Initial Hazard Mitigation Plan

Obj.	Task	Priority	Responsible Department	Comment	Status
1	Procure silt removal equipment to assist public works in keeping up to date with the removal of silt from the town's storm drain catch basin system	High	Public Works	This was not completed due to lack of funding	Carried Forward

Status of Strategies and Actions for Windham from Initial Hazard Mitigation Plan (Continued)

Obj.	Task	Priority	Responsible Department	Comment	Status
2	Examine Plains Road bridge crossing the Shetucket River (scour bridge for 10-year flood)	Medium	Public Works	This bridge was examined and further monitoring is needed following each 10-year flood event. This is now a capability.	Completed
2	Improve low-lying Bridge Street bridge crossing the Willimantic River (this bridge is an important rerouting structure which floods numerous times per year	Medium	Public Works, ConnDOT	This was not completed due to lack of resources. Updated to include study to consider whether to upgrade structure or dredge/blast channel	Updated
3	Improve Lovers Lane where catch basin issues cause flooding	Low	ConnDOT	This was not completed due to lack of funding. Updated to include upgrading dry wells	Updated
4	Obtain the necessary equipment to provide adequate heat at emergency shelters, specifically acquire new generators for the Windham Middle School and North Windham Elementary School	Medium	Emergency Management Director	This was not completed due to lack of funding. Updated to provide a priority list for these schools and additional locations	Updated
4	Implement an Emergency Notification System	Medium	Emergency Management Director	Windham has contracted with CodeRED to provide emergency notification.	Completed

During the Plan Update process, the Town of Windham did not identify any additional objectives to help meet the stated hazard mitigation planning goal.

Current mitigation strategies for the Town of Windham are presented below. The STAPLEE method was used to assign priority to each strategy as discussed in Section III.B. The STAPLEE analysis scoring is presented in Appendix IV. Scores ranged from 3.5 to 7.0, with a higher STAPLEE score being representative of a higher priority project. Scores less than 5.0 were considered to be "Low" priority, while scores greater than 5.5 were considered to be "High" priority. The intermediate scores were considered to have "Medium" priority.

Based on the STAPLEE methodology, "high" priority projects mitigate the most significant natural hazards that affect the town or multiple natural hazards, are considered feasible, would be effective in avoiding or reducing future losses, seem reasonable for the size of the problem and likely benefits, have political and public support, and improve upon existing

programs or support other municipal priorities. All other supporting tasks were assigned a "Medium" or "Low" priority rating based on the same criteria.

Mitigation Strategies for the Town Of Windham:

Goal: **To reduce the loss of life and property and economic consequences as a result of natural disasters.**

Objective 1: **To reduce the likelihood of flooding by improving existing natural and artificial drainage systems.**

Task: Procure silt removal equipment to remove silt from the town's storm drainage system.

Who: Public Works Timeframe: 7/2015-6/2017 Priority: Medium

Task: Upgrade stone box culvert on Old Brooklyn Turnpike.

Who: Public Works Timeframe: 7/2017-6/2019 Priority: Low

Objective 2: **To reduce the likelihood of flooding and natural disaster-related damages by improving bridge conditions.**

Task: Improve low lying Bridge St. bridge crossing the Willimantic River; this bridge is an important rerouting structure which floods numerous times a year. Study whether to upgrade or blast and dredge.

Who: Public Works Timeframe: 7/2015-6/2020 Priority: Low

Objective 3: **To reduce the likelihood of flooding and icy conditions by improving existing road conditions.**

Task: Upgrade dry wells on Lovers Lane to larger capacity, upgrade drainage system, and improve roads.

Who: Public Works Timeframe: 7/2016-6/2018 Priority: Medium

Objective 4: Expand activities related to, emergency preparedness and improve natural hazard response capabilities.

Task: Upgrade or acquire generators at critical facilities, prioritizing: Public Works (critical need), Water Works, the Police/Fire Complex, and all Windham Public Schools.

Who: Emergency Management Director Timeframe: 7/2015-6/2020 Priority: High

Task: Install Roller Doors to protect windows in TOWN EOC from damage.

Who: Emergency Management Director Timeframe: 7/2017-6/2018 Priority: High

Task: Continue to improve and upgrade communication system between the EOC and other service providers, including Eastern Connecticut State University.

Who: Emergency Management Director Timeframe: 7/2015-6/2020 Priority: Medium

Task: Use a multitude of communication methods – social media, town web site, government & local media channels, radio stations – to inform and update town residents on what to prepare for before, during and after an emergency event.

Who: Emergency Management Director Timeframe: 7/2015-6/2020 Priority: High

Task: Provide pamphlets and literature on natural disasters and preparedness at the Town Hall and Library.

Who: Emergency Management Director Timeframe: 7/2015-6/2017 Priority: Medium

IV. Plan Maintenance and Incorporation:

A. Plan Maintenance Process:

The plan maintenance process includes Monitoring, Evaluating and Updating the Plan. This process is detailed below.

Plan Maintenance Oversight

The former WINCOG towns were reassigned to other COGs in 2014, so future monitoring, evaluating and updating of each town's plan will be coordinated by the new COGs. The towns have been distributed as follows:

Columbia: Capitol Region Council of Governments
Coventry: Capitol Region Council of Governments
Lebanon: Southeastern Connecticut Council of Governments
Mansfield: Capitol Region Council of Governments
Willington: Capitol Region Council of Governments
Windham: Southeastern Connecticut Council of Governments

Local Coordinator

As individual strategies of the hazard mitigation plan are implemented, they must be implemented by the municipal departments that oversee these activities. The local Chief Executive Officer will primarily be responsible for supervising the development and implementation of selected projects. A "local coordinator" will be selected as the primary individual in charge. This will vary by community based on the list below:

- Columbia: Mark Paquette, Town Administrator
- Coventry: Noel Waite, Fire Marshall / Emergency Management Director
- Lebanon: Brandon Handfield, Public Works Director/Town Engineer
- Mansfield: Fran Raiola, Emergency Management Director and Linda Painter, Town Planner (co- local coordinators)
- Willington: Stuart Cobb, Emergency Management Director
- Windham: James Finger, Town Planner

The local coordinator will be responsible for obtaining a current list of repetitive loss properties (RLPs) in the community each year, although it is understood that some of the communities do not currently have any RLPs. This list is available from the State NFIP Coordinator with Connecticut DEEP. 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.

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 (such as culvert and bridge replacements, home elevations, vegetation clearing areas, etc.). This will ensure that the suggested actions remain viable and appropriate. The worksheet in Appendix IV will be filled out for specific project-related actions as appropriate. This worksheet is taken from the *Local Mitigation Planning Handbook*.

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 at least two months before the annual application cycle for grants under the HMA program (currently such applications are due in the summer meaning a spring meeting would be ideal). 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.

Post-Disaster Reporting and Meeting

Subsequent to federally-declared disasters in the State of Connecticut that covers the county of the participating community (New London County for Lebanon, Windham County for Windham, or Tolland County for the remaining communities), 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 that could be combined with a community meeting to discuss the hazard mitigation plan (see Section IV. C. below).

Updating the Plan

The information in this plan update will be subsumed into the existing multi-jurisdictional hazard mitigation plans for the Capitol Region Council of Governments and the Southeastern Connecticut Council of Governments. FEMA has indicated that CRCOG's hazard mitigation plan update expires on December 5, 2019 and that SCCOG's hazard mitigation plan update expires on October 24, 2017. CRCOG and SCCOG will be responsible

for securing the funding required to update their member communities' respective hazard mitigation plans in a timely manner such that the current plan will not expire while the plan update is being developed. Each local coordinator is expected to remind their respective council of governments with the need to update the plan based on the schedule below:

Table 9
Schedule for Hazard Mitigation Plan Update

Task	CRCOG Timeframe	SCCOG Timeframe
Local annual meetings to review plan content and progress	Spring 2015; Spring 2016; Spring 2017; Spring 2018; Spring 2019	Spring 2015; Spring 2016; Spring 2017
Begin plan update process	May 2018	April 2016
Forward draft updated plan to State of Connecticut for review	May 2019	April 2017
Process edits from State and submit to FEMA and obtain "Approvable Pending Adoption"	July – October 2019	May – August 2017
Adopt updated plan	November 2019	September 2017

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 plan update. 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.

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.

B. Incorporation into Existing Planning Mechanisms:

Whenever practical and appropriate, the municipalities will utilize the mitigation strategies outlined in this Plan in conjunction with the following existing programs and activities:

- FEMA's Community Rating System – Many existing and proposed mitigation strategies also contribute positively toward a community's score in this program, which impacts flood insurance rates.

- Connecticut State Building Code – The State Building code is enforced by the municipality's building inspectors and includes provisions for emergency shelters and structures in floodplains.

- Regional Plan of Conservation and Development – Each municipality is included in the development and update of the regional plan, which is intended to guide future development throughout each town in the region. Municipalities should take steps to ensure consistency between the regional plan of conservation and development and this Plan.

- Local Emergency Operations Plans – These Plans are part of an overall emergency management program and provide specific details on how a community will respond to emergencies. These plans are updated annually. Information contained within this Plan will help to inform specific strategies and actions within local Emergency Operations Plans.

- Regional Transportation Plan – Each municipality is included in the development and update of the regional plan, which is intended to help meet the needs of the region's residents for safety, mobility, and a healthy economy effectively and efficiently, while preserving the region's quality of life and its historical, man-made, and natural/environmental resources. Municipalities should take steps to ensure

consistency between roads and bridges in need of repair in the regional transportation plan and this Plan.

- Local Bridge Program – This program provides for State financial assistance to municipalities for the removal, replacement, reconstruction or rehabilitation of local bridges. Municipalities should take steps to ensure consistency between bridges in need of repair listed in the local bridge program and in this Plan.

- Capital Improvement Program (CIP) – Each municipality should consider including projects identified in this Plan in its municipal Capital Improvement Program.

- Plan of Conservation and Development – Each municipality has a Plan of Conservation and Development that guides development in the community. Information contained within this Plan should be utilized to encourage growth and development in areas that are less susceptible to natural hazards and to encourage safe development practices. Information in this Plan Update must be incorporated or referenced in the next Plan of Conservation and Development update in each community.

- Water Conservation Plans and Emergency Contingency Plans – Water systems that serve more than 1,000 people are required by State law to develop these plans. They provide existing information regarding long-term supply and demand management as well as short-term emergency planning for the utility, including instructions on how to proceed when water supplies are curtailed by drought.

It is not believed that any specific incorporation of the information in the initial plan to these types of plans listed above occurred, although as noted previously elements of this plan are being integrated into the ongoing Plan of Conservation and Development update for Mansfield. In general, the initial hazard mitigation plan was utilized as an additional reference to provide guidance to town staff.

Appendix IV incorporates an implementation strategy and schedule as part of the STAPLEE, detailing the responsible department and anticipated time frame for the specific recommendations listed throughout this document.

Upon adoption, the Plan will be made available to all Town departments and agencies as a planning tool to be used in conjunction with existing documents. It is expected that revisions to other Town plans and regulations, such as the Plan of Conservation and Development, department annual budgets, and the Zoning and Subdivision Regulations, will reference this plan and its updates. The local coordinator and Chief Executive Officer 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 the Chief Executive Officer will be responsible for assigning appropriate Town officials to update the Plan of Conservation and Development, Zoning Regulations, Subdivision Regulations, Inland Wetlands Regulations, and Emergency Operations Plan to include the provisions in this plan. Should a general revision be too cumbersome or cost prohibitive, simple addendums to these documents will be added that include the provisions of this plan. The Plan of Conservation and Development and the Emergency Operations Plan are the two documents most likely to benefit from the inclusion of the Plan in the Town's library of planning documents, and as discussed the next Plan of Conservation and Development must reference this hazard mitigation plan update and its subsequent updates.

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 Public Works Department.

C. Continued Public Involvement:

After adoption, copies of the Plan will be provided to each town hall and public library in each participating community. The existence and location of these copies will be publicized in newspapers in the region. This will further promote the goals and objectives of this Plan by increasing awareness about natural disasters and natural hazard mitigation.

Continued public involvement will be sought regarding the monitoring, evaluating, and updating of this Plan. First, the public is invited to send written comments about the Plan for consideration for future Plan updates. Written comments should be addressed to the Emergency Management Director in each member town. Second, each community will seek public involvement regarding Plan maintenance through a combination of community meetings, presentations on local cable access channels, and/or input to web-based information gathering tools. Each Town will be responsible for publicizing the request for public comment via a public notice and notifications posted on the Town's web site. Finally, each town will be responsible for making public comments available for consideration during the Plan review process.

Educational Resources for Public Distribution

American Red Cross

Mailing Address: Charter Oak Chapter of Connecticut, 209 Farmington Ave, Farmington, CT 06001
Phone: (860) 678-2700; Website: http://CharterOak.RedCross.org
Resource: American Red Cross Community Disaster Education Materials: http://www.disasterrelief.org/Library/Prepare/resource.html, July 2004

Eversource

Mailing Address: Eversource, P.O. Box 270, Hartford, CT 06141-0270
Phone: (800) 286-2000; Website: http://www.eversource.com
Resource: Plan Before You Plant and List of Trees Compatible with Utility Lines: https://www.cl-p.com/Home/AboutCLP/Publications/Publications/

Federal Emergency Management Agency (FEMA)

Mailing Address: FEMA, P.O. Box 2012, Jessup, MD 20794-2012
Phone: 1-800-480-2520; Website: www.fema.gov
Resource: A Guide to Citizen Preparedness: http://www.fema.gov/areyouready/.

Special Thanks to the Following Individuals:

Acimovic, Karl, Engineer (Town of Willington – 2014 Update)*
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Clark, James, Council Chairman (Town of Coventry)
Cobb, Stuart, Emergency Management Director (Town of Willington – 2014 Update)*
Davies, Jean, (Connecticut River Estuary Regional Planning Agency) General hazard mitigation risk and vulnerability planning assistance.
DeCaprio, Mark, Emergency Management Director (Town of Lebanon – 2014 Update)*
Elsesser, John, Town Manager (Town of Coventry – 2007 Plan)
Finger, James, Town Planner (Town of Windham – 2014 Update)*
Gofstein, David, Public Works Director (Town of Coventry – 2014 Update)*
Glowacki, Douglas, (Department of Energy and Environmental Protection, Inland Wetlands Division, Flood Management Section) Weather data assistance.
Handfield, Brandon, Town Engineer & Public Works Director (Town of Lebanon – 2014 Update)*
Ifkovic, Diane, (Department of Energy and Environmental Protection, Inland Wetlands Division, Flood Management Section) General hazard mitigation risk and vulnerability planning assistance.
Jackman, John, Emergency Management Director (Town of Mansfield – 2007 Plan)*
James, Jerry, Emergency Management Director (Town of Columbia – 2007 Plan and 2014 Update)*
Lennox, Byron, Emergency Management Director (Town of Lebanon –2014 Update)*
Licata, Michael, Emergency Management Director (Town of Windham – 2014 Update)*
Luiz, Jonathan, Town Administrator (Town of Columbia– 2014 Update)*
Lyon, John, Deputy Emergency Management Director (Town of Lebanon – 2007 Plan)*
Marsh, Wesley, (Department of Energy and Environmental Protection, Inland Wetlands Division, Dam Safety Section) Dam data assistance.
McGuire, Daniel, First Selectman and Emergency Management Director (Town of Lebanon – 2007 Plan)*
McHone, Nancy, (Department of Energy and Environmental Protection, Natural Resources Division) Geology data assistance.
Michaels, Karen, (Department of Energy and Environmental Protection, Inland Wetlands Division, Flood Management Section) General hazard mitigation risk and vulnerability planning assistance.
Muirhead, Donald, Emergency Management Director (Town of Windham – 2007 Plan)
Murphy, George, Public Works Director (Town of Columbia – 2014 Update)*
Nichols, Lynn, Public Works Director (Town of Willington – 2014 Update)*
Norman, Wayne, (WILI-AM Radio) Weather data assistance.
Okonuk, Joyce, First Selectman (Town of Lebanon – 2014 Update)*
Painter, Linda, Town Planner (Town of Mansfield – 2014 Update)*
Paterson, Elizabeth, Mayor (Town of Mansfield)
Paulhus, Michael, First Selectman (Town of Windham – 2007 Plan)
Painter, Linda, Town Planner (Town of Mansfield – 2014 Update)*
Piper, Roy, (Office of Emergency Management) Disaster Declaration information assistance.
Raiola, Fran, Emergency Management Director (Town of Mansfield – 2014 Update)*
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Sangivanni, Jim, (Department of Energy and Environmental Protection, Inland Wetlands Division, Dam Safety Section) Dam data assistance.
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Appendix I: Historical Weather Data for Risk & Vulnerability Assessment

Appendix I
Historical Weather Data

Data Provider	Date	Event	Comments	Geog. Extent	Deaths	Injuries	# NU customers lost power	Cost of Damage
DEP 322 Plan	06/04/1982 to 06/07/1982	Dam Failure	Failure or partial breach of 30 dams in CT	CT				
DEP 322 Plan	1957	Drought	An agricultural drought was the most disastrous to the State's agricultural interest. CT also had a severe meteorological drought for small reservoirs.	CT				
DEP 322 Plan	mid 1960s	Drought	Serious meteorological drought occurred which severely restricted the ability of a number of water utilities throughout the State to continue to provide unlimited service to their customers.	CT				
DEP 322 Plan	1980s	Drought	Droughts occurred which caused the disruption of local and regional water supplies due to water shortages.	CT				
ncdc.noaa	4/12/2012	Drought	Precipitation levels half of normal between January 2012 and April 2012.	CT				
DEP 322 Plan	last 400 years	Earthquake	Over 125 earthquakes of intensity 3.0 or above on the Richter scale have occurred over the last 400 yrs in CT.	CT				
ncdc.noaa, DEP, OEM & WILI	Yearly	Flood	Damage due to localized flooding from thunderstorms and spring thaw.	CT				
WILI	06/30/1683	Flood	Flood in CT from Hurricane	CT				
WILI	05/01/1854	Flood	"Great New England Flood"	NE				
DEP 322 Plan	March of 1936	Flood	“Great Connecticut River Flood” left 10,000 families homeless, contaminated drinking water supplies, brought the threat of typhoid and resulted in curfews in the flood ravaged communities.	CT	several			$20 million (1936 dollars)
cslib.org	3/12/1936	Flood	Major CT flood	CT				
DEP 322 Plan	08/12/1955 to 08/19/1955	Flood	Hurricanes “Connie” and “Diane”.	CT	70	4,700		Combination of both flooding events from 1955: $1 million (1955
DEP 322 Plan	10/15/1955 to 10/17/1955	Flood	4,200 families need to be evacuated.	CT	3			
WILI	6/6/1982	Flood	16" of rain in CT	CT	11			$230 million
DEP 322 Plan	06/04/1982 to 06/07/1982	Flood	Flood damage including failure or partial breach of 30 dams. Thirty-seven homes destroyed and 1,500 damaged.	CT	12			$270 million (1982 dollars)
OEM	05/27/1984 to 06/07/1984	Flood	Federally Declared Disaster.	CT				$38 million (1984 dollars)
ncdc.noaa	10/28/2006	Flood	Significant urban flooding was reported in and around Willimantic.	Willimantic				$2k
ncdc.noaa	2/13/2008	Flood	Rte 32 and Rte 6 were flooded.	Windham				$20k

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ncdc.noaa	3/8/2008	Flood	Several streets were flooded, Rte 32 was partially closed.	Windham			
ncdc.noaa	6/27/2009	Flash Flood	Many roads were impassable as streams overflowed their banks due to heavy rainfall.	Mansfield/ Windham/ Lebanon			$30k
ncdc.noaa	6/23/2011	Flash Flood	Heavy thunderstorms caused road flooding.	New London County			
ncdc.noaa	8/8/2008	Hail	0.75 inch hail.	West Willington			
ncdc.noaa	6/26/2009	Hail	1 inch hail.	Windham			
ncdc.noaa	5/29/2010	Hail	Reports of 1 inch hail.	Tolland County			
ncdc.noaa	6/5/2010	Hail	0.75 inch hail.	Tolland County			
ncdc.noaa	6/1/2011	Hail	1 inch hail.	New London County			
ncdc.noaa	7/6/2010	Excessive Heat	Heat index at Windham Airport reached 105-106 degrees.	CT			
ncdc.noaa	7/7/2010	Heat	Heat index at Windham Airport reached 100-102 degrees.	CT			
ncdc.noaa	7/22/2011	Excessive Heat	Heat index at Windham Airport reached 105-108 degrees over a seven hour period.	CT			
CRREL	3/7/1920	Ice Jam	Willimantic, Shetucket River	CT			
CRREL	3/5/1934	Ice Jam	Columbia, Hop River	CT			
CRREL	3/12/1936	Ice Jam	Columbia, Willimantic River	CT			
CRREL	2/27/1945	Ice Jam	Columbia, Hop River	CT			
CRREL	12/26/1945	Ice Jam	South Coventry, Willimantic River	CT			
CRREL	12/26/1945	Ice Jam	Willimantic, Shetucket River	CT			
CRREL	2/20/1948	Ice Jam	Columbia, Hop River	CT			
CRREL	2/4/1970	Ice Jam	Willimantic, Shetucket River	CT			
WILI	03/22/1837	Ice Storm	Ice storm	NE			$100,000
WILI	2/7/1920	Ice Storm	Ice, snow and sleet storm drops 15-20" in New England	NE			
WILI	11/28/1921	Ice Storm	New England Ice storm	NE			$20 million
WILI	12/17/1973	Ice Storm	1/2" ice, Northeast CT declared disaster area	CT		278,742	
DEP 322 Plan	12/18/1973	Ice Storm	Most severe ice storm "Felix" caused widespread power outages.	CT	2		

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WILI	11/14/1997	Ice Storm	Ice Storm hits CT	CT				
WILI	11/17/2002	Ice Storm	Western CT Ice Storm	NE			130,000	
ncdc.noaa	11/16/2002 to 11/17/2002	Ice Storm	Hit Tolland and Hartford County	CT			100,000	$2.5 million
ncdc.noaa	3/13/1993	High Winds	Hit Fairfield, Hartford, Litchfield, New Haven, Tolland, and Windham counties.	CT				$500 thousand
ncdc.noaa	3/14/1993	High Winds	Hit Fairfield, Hartford, Litchfield, New Haven, Tolland, and Windham counties, blizzard like conditions.	CT			Over 40,000	$50 thousand
WILI	11/11/1995	High Winds	Windy Rainstorm	NE			175,000	
ncdc.noaa	11/12/1995	High Winds	Hit Hartford, Tolland, and Windham counties.	CT			100,000	$1 million
ncdc.noaa	2/25/1996	High Winds	Hit Hartford, Tolland, and Windham counties.	CT	2	3	120,000	$500 thousand
ncdc.noaa	10/29/2006	High Winds	Winds of 50 kts.	Windham County				$8k
ncdc.noaa	4/15/2007	Strong Winds	Winds of 40 kts.	Tolland County				$5k
ncdc.noaa	3/8/2008	High Winds	Winds of 51 kts.	Windham County				
ncdc.noaa	3/8/2008	Strong Winds	Winds of 42 kts.	Tolland County				$10k
ncdc.noaa	10/25/2008	Strong Winds	Winds of 43 kts.	Tolland County				
ncdc.noaa	12/3/2009	High Winds	Winds of 50 kts.	Windham County				$5k
ncdc.noaa	3/13/2010	High Winds	Winds of 50 kts.	Tolland County				$50k
ncdc.noaa	12/1/2010	Strong Winds	Winds of 40 kts. Trees and wires downed.	Tolland County				$30k
ncdc.noaa	2/19/2011	High Winds	Winds of 51 kts.	Tolland County				$20k
ncdc.noaa	12/27/2011	High Winds	Winds of 53 kts.	Windham County				$3k
ncdc.noaa, DEP, OEM & WILI	Yearly	High Winds	High Winds either alone or due to Hurricanes, Blizzards, Thunderstorms or Tornados cause damage yearly.	CT				
WILI	10/23/1761	Hurricane	Hurricane hits southeast New England	NE				
WILI	09/08/1776	Hurricane	"Hurricane of Independence"	USA & Canada	4170			
WILI	09/10/1804	Hurricane	"Snow Hurricane"	NE				
WILI	09/23/1815	Hurricane	"Great September Gale"	NE	6			major damage
WILI	06/04/1825	Hurricane	Great shipping losses due to Hurricane.	NE				
WILI	9/3/1921	Hurricane	"Long Island"	CT				
DEP 322 Plan	9/21/1938	Hurricane	Most intense hurricane to strike CT.	CT	125			$53 million (1938 dollars)
DEP 322 Plan	09/14/1944 to 09/15/1944	Hurricane	Severe hurricane struck CT.	CT	7			$3-$5 million (1944 dollars)
WILI	09/14/44	Hurricane	"Great Atlantic Hurricane" moved from North Carolina to New England	NC to NE	46			
WILI	08/31/54	Hurricane	"Carol" hits CT	CT				
WILI	10/15/54	Hurricane	"Hazel" hits CT after hitting NC coast	NC to CT				
FEMA	1954	Hurricane	Category III hurricane "Carol"	NE	60			
DEP 322 Plan	08/12/1955 to 08/19/1955	Hurricane	Hurricanes “Connie” and “Diane”.	CT	70	4,700		
WILI	8/18/1955	Hurricane	Hurricane "Diane"	NE	184	4,700		$182 million
DEP 322 Plan	1955	Hurricane	Both 1955 flooding events combined.	CT				$1 billion (1955 dollars)
WILI	9/12/1960	Hurricane	Hurricane "Donna"	NE	36			$100 million

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DEP 322 Plan	1976, 1985, 1991	Hurricane	1976 category I hurricane "Belle", 1985 category II hurricane "Gloria" and 1991 category III hurricane "Bob" weakened causing only minor damage to the Windham Region.	CT			
WILI	8/10/1976	Hurricane	Hurricane "Belle"	NE		196,031	
WILI	9/6/1979	Hurricane	Hurricane "David"	NE		132,200	
WILI	9/27/1985	Hurricane	Hurricane "Gloria" drops 1.5" of rain	NE		534,485	
WILI	8/19/1991	Hurricane	Hurricane "Bob"	NE		300,000	
WILI	9/7/1996	Hurricane	Hurricane "Fran" drops 2" of rain in CT	CT			
WILI	9/16/1999	Hurricane	Hurricane "Floyd"	CT			
FEMA	9/23/1999	Hurricane	Hurricane "Floyd" downgraded to tropical storm when it hit CT	CT			$1.2 Million
ncda.noaa	8/28/2011	Hurricane	Hurricane "Irene" downgraded to tropical storm when it hit CT. (Major Disaster Declaration declared 9/2/11, Emergency Declaration declared 8/27/11. - FEMA)	CT		500,000	$68 Million
ncdc.noaa, DEP, OEM & WILI	Yearly	Severe Winter Storm	Winter storms hit CT yearly from blizzards, Nor'easters, ice storms and hailstorms to yearly snowstorms, causing extensive damages.	CT			
WILI	02/27/1717 to 03/07/1717	Severe Winter Storm	3-5 feet of snow fell	CT			
WILI	03/23/1765	Severe Winter Storm	2-2.5 feet of snow in Northeast US	NE			
cslib.org	11/17/1798 to 11/21/1798	Severe Winter Storm	1978 New England Blizzard	NE			
WILI	12/25/1811	Severe Winter Storm	"Great Christmas Blizzard" in CT	CT			
WILI	03/30/1823	Severe Winter Storm	Heavy Snow in Northeast US	NE			
WILI	01/16/1831	Severe Winter Storm	20-30" of snow in Southern New England	NE			
WILI	03/25/1843	Severe Winter Storm	Huge East Coast Snowstorm	NE			
WILI	12/26/1883	Severe Winter Storm	Snow 10 feet deep in Mansfield	CT			
WILI	03/12/1888	Severe Winter Storm	"Blizzard of 1888" dropped up to 50" of snow on parts of CT	CT			
WILI	2/20/1934	Severe Winter Storm	One of CT's worst blizzards dropped 20" of snow on parts of CT	CT			
WILI	03/03/1947, 1971, 1991, 1994	Severe Winter Storm	Major winter storms hit Northeast US.	NE			
WILI	4/19/1961	Severe Winter Storm	Southern New England Blizzard	NE	20		
WILI	2/9/1969	Severe Winter Storm	"Blizzard of 1969" drops 25" of snow in CT	CT			
DEP 322 Plan	since 1973	Severe Winter Storm	Severe winter storms have occurred 7 times since 1973 in state.	CT			

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WILI	2/6/1978	Severe Winter Storm	"Blizzard of 1978" dropped 2 feet of snow in CT	NE	99		$600 million
OEM	02/06/1978 to 02/07/1978	Severe Winter Storm	Severe blizzard hit CT closing all roads to routine traffic from February 6-8, 1978.	CT			Approximately $5,000,000
DEP 322 Plan	1979, 1983, 1988, 1992, 1996, 2003	Severe Winter Storm	In the last 25 years there have been six major Nor'easters in CT.	CT			
WILI	4/6/1982	Severe Winter Storm	"Blizzard of 1982" drops 8-14" of snow in CT	CT			
WILI	2/11/1983	Severe Winter Storm	"Blizzard of 1983" drops 21" of snow in Hartford	CT			
WILI	3/29/1984	Severe Winter Storm	New England Nor'easter	NE			
DEP 322 Plan	12/10/1992 to 12/13/1992	Severe Winter Storm	Most intense major storm to hit CT in the 1990s, damaged over six thousand homes and resulted in the destruction of 26 homes.	CT	3	50,000	Over $4.3 million (1992 dollars)
WILI	12/11/1992	Severe Winter Storm	"The Great Nor'easter", Windham 15" of snow, 5 3/4" in Lebanon	CT			
OEM	03/12/1993 to 03/14/1993	Severe Winter Storm	Blizzard hit CT causing 111 cars towed from state highways and 84 shelters opened	CT		30,000	$5,966,359
WILI	3/13/1993	Severe Winter Storm	"Storm of the Century" dropped 15" of snow at Bradley, 14" of snow in Mansfield	NE	318		$600 billion
WILI	1/7/1996	Severe Winter Storm	"Blizzard of 1996", 1 foot of snow in Windham	CT			
DEP 322 Plan	01/08/1996 to 01/09/1996	Severe Winter Storm	In terms of snowfall "Ginger" was the largest winter storm to hit the U.S. East Coast since 1888.	CT			$16.1 million
WILI	4/9/1996	Severe Winter Storm	"Blizzard of 1996 Part Two" drops 22" of snow in Storrs	CT			
DEP 322 Plan	Feb 2001, Feb 2003	Severe Winter Storm	Two other major snowstorms hit CT.	CT			
OEM	February of 2003	Severe Winter Storm	"Blizzard of 2003"	CT			
ncdc.noaa	2/13/2007	Winter Storm	2"-3.5" of snow with light icing, sleet and freezing rain.	Windham County			
ncdc.noaa	3/16/2007	Winter Storm	Snowfalls of 5 - 8 inches.	Windham County			
ncdc.noaa	12/13/2007	Heavy Snow		CT			
ncdc.noaa	1/14/2008	Heavy Snow		CT			$16k
ncdc.noaa	2/22/2008	Heavy Snow		Tolland County			
ncdc.noaa	12/19/2008	Heavy Snow	Snowfalls of 8 - 11 inches.	CT			
ncdc.noaa	12/31/2008	Heavy Snow	Snowfalls of 4 - 7 inches.	CT			
ncdc.noaa	1/7/2009	Winter Weather	7 to 12 inches of snowfall.	Tolland County			$5k
ncdc.noaa	3/1/2009	Heavy Snow	8 - 12 inches of snowfall.	CT			
ncdc.noaa	12/19/2009	Heavy Snow	Snowfalls between 5 - 20 inches.	CT			
ncdc.noaa	2/16/2010	Heavy Snow	4 - 8 inches of snowfall.	Tolland County			
ncdc.noaa	12/26/2010	Winter Storm	Snowfalls averaging 4" - 10". In addition, strong winds produced near blizzard conditions.	CT			

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ncdc.noaa	1/11/2011	Heavy Snow	13 to 29 inches of snowfall. (Major Disaster Declaration declared 3/3/11. - FEMA)	CT	
ncdc.noaa	1/21/2011	Winter Storm	Between 4 and 6 inches of snowfall.	CT	
ncdc.noaa	1/26/2011	Heavy Snow	13 - 19 inches of snowfall.	CT	
ncdc.noaa	2/1/2011	Winter Storm	6 inches of snow. Damage amounts are from roof collapses. 86.4 inches of snow fell between December 26th and February 2nd.	Tolland County/ Windham County	$1.35 Million
ncdc.noaa	10/29/2011	Heavy Snow	Snowfall between 6 - 10 inches. Heavy, wet snow fell on foliated trees, breaking branches and downing trees and wires, resulting in widespread power outages that lasted up to 10 days. (Major Disaster Declaration declared 11/17/11, Emergency Declaration declared 10/31/11. - FEMA)	Tolland County/ Windham County	$3 Million
ncdc.noaa	1/16/2012	Winter Weather	3 inches of snowfall.	CT	
ncdc.noaa	1/19/2012	Winter Weather	2 - 4 inches of snowfall.	Windham County	
ncdc.noaa	1/21/2012	Winter Weather	2 - 4 inches of snowfall.	CT	
ncdc.noaa	2/24/2012	Winter Weather	2 - 4 inches of snowfall.	Tolland County	
ncdc.noaa	2/29/2012	Winter Weather	Between 3 and 6 inches of snowfall.	CT	
ncdc.noaa, DEP, OEM & WILI	Yearly	Thunderstorm Wind	Thunderstorms hit CT yearly causing flooding damage and fires from lightning.		
ncdc.noaa	9/9/2008	Thunderstorm Wind	Multiple trees and wires were downed by strong winds.	Tolland County	$8k
ncdc.noaa	5/4/2010	Thunderstorm Wind	Trees were downed by 50 kt winds blocking roads.	Tolland County	$15k
ncdc.noaa	6/5/2010	Thunderstorm Wind	Trees and wires were downed by 50 kt winds.	Tolland County	$15k
ncdc.noaa	6/27/2009	Thunderstorm Wind	Trees were downed by 50 kt winds.	Willimantic	$10k
ncdc.noaa	7/7/2009	Thunderstorm Wind	Downed tree due to 50 kt winds	Chaplin	$1k
ncdc.noaa	6/9/2011	Thunderstorm Wind	Trees and wires were downed by 50 kt winds.	Windham County	$5k
ncdc.noaa	7/26/2011	Thunderstorm Wind	Trees and wires were downed by 50 kt winds.	Columbia/ Windham	$108k
ncdc.noaa	12/22/2011	Thunderstorm Wind	Winds of 50 kts were reported.	Mansfield	$10k
ncdc.noaa	1950 to 2011	Tornado	94 Tornados have hit Connecticut causing isolated damage, injuries and deaths.	CT	
ncdc.noaa	1950 to 2011	Tornado	Fairfield County: F0 - 2, F1 - 10, F2 - 2, F3 - 0, F4 - 0, F5 - 0	CT	

Appendix I
Historical Weather Data

ncdc.noaa	1950 to 2011	Tornado	Hartford County: F0 - 3, F1 - 7, F2 - 4, F3 - 1, F4 - 1, F5 - 0	CT
ncdc.noaa	1950 to 2011	Tornado	Litchfield County: F0 - 2, F1 - 16, F2 - 9, F3 - 0, F4 - 0, F5 - 0	CT
ncdc.noaa	1950 to 2011	Tornado	Middlesex County: F0 - 2, F1 - 4, F2 - 1, F3 - 1, F4 - 0, F5 - 0	CT
ncdc.noaa	1950 to 2011	Tornado	New Haven County: F0 - 4, F1 - 4, F2 - 3, F3 - 2, F4 - 1, F5 - 0	CT
ncdc.noaa	1950 to 2011	Tornado	New London County: F0 - 0, F1 - 2, F2 - 0, F3 - 0, F4 - 0, F5 - 0	CT
ncdc.noaa	1950 to 2011	Tornado	Tolland County: F0 - 2, F1 - 4, F2 - 3, F3 - 1, F4 - 0, F5 - 0	CT
ncdc.noaa	1950 to 2011	Tornado	Windham County: F0 - 0, F1 - 3, F2 - 0, F3 - 0, F4 - 0, F5 - 0	CT

Resources:

CRREL	Data from the US Corps of Army Engineers, Cold Region Research and Engineering Lab, Ice Jam Database: http://www.crrel.usace.army.mil/, Follow these links "Site Map", "Ice Jam Database", and "Ice Jam Database". Choose "Connecticut" from the drop-down list.
DEP 322 Plan:	Data from the Department of Environmental Protection. This data is taken from Chapter 2 of the Connecticut Hazard Mitigation Section 322 Plan, *Hazard Identification and Evaluation* .
FEMA:	Data from the Federal Emergency Management Agency website: http://www.fema.gov. Click on Connecticut on the map. Each "Disaster Number" link has more information about the events.
ncdc.noaa:	Data from the National Climatic Data Center website: http://www.ncdc.noaa.gov/oa/ncdc.html, Follow these links "Extremes", "U.S. Local Storm Events Data". Enter Connecticut then press Continue. Windham, Tolland, and New London County were searched separately for data to limit the search results.
OEM:	Data from the Office of Emergency Management. This data was faxed over by request from Roy Piper at OEM. This information was extracted from "Connecticut Disaster Declarations".
WILI:	Data from WILI-AM Radio. This data is taken from the Eastern Connecticut Weather Calendar, January-December 2004 edition, prepared by Wayne Norman. Their data was compiled from several sources including: The National Weather Service in Windsor Locks, CT; Upon Emeritus Geology Professor Randy Steinen, and Hill Bullard of Chaplin

Appendix II: Outside Participation in the Planning Process

Appendix II
The Planning Process

Contact, Affiliation, Title	Date	Correspondence	Comments
Douglas Glowacki, DEP, Environmental Analyst III	12/3/2003	e-mail	Correspondence on CT Section 322 Plan.
Wayne Norman, WILI-radio station	12/3/2003	phone	Correspondence on historical weather events.
Roy Piper, OEM	12/4/2003	phone/fax	Correspondence on CT Disaster Declarations.
Ralph Fletcher, Ashford; Rusty Lanzit, Chaplin; Chick Shifrin, Columbia; John Elsesser, Coventry (alt.); Dan McGuire, Lebanon; Martin Berliner, Mansfield (alt.); Michael Paulhus, Windham; Kristie Beaulieu, Planner; Barbara Buddington, WINCOG Executive Director; Jana Butts, WINCOG Senior Planner; Roger Adams, Windham Region Chamber of Commerce; Virginia Sampietro, Eastern CT Work Force Investment Board; and Adel Urban, First Selectman Columbia (ret.).	12/5/2003	WINCOG Meeting (opened to the public)	Meeting Update: Ms. Buddington introduced new WINCOG employee, Ms. Kristie Beaulieu. Ms. Beaulieu is a recent graduate of ECSU and has interned at DEP. She will be working on the Pre-disaster Natural Hazard Mitigation Plan and will contact COG members in the near future regarding a representative from each town to help work on the plan.
Jean Davies, CRERPA, Planner	12/15/2003	e-mail	Correspondence with general assistance.
Chuck Beck, OEM; Bill Blitz, North Central District Health Dept.; Tommy de Ring, CADH; Ralph Fletcher, Ashford EMD and First Selectman; Bill Gerdsen, Chaplin EMD; Lucinda and Thomas Hogarty, Eastern Highland Health District contractors; Meg Hooper, CT DPH; John Jackman, Mansfield EMD; Rusty Lanzit, Chaplin First Selectman; Bob Marquis, Hampton Fire Marshall; Liz McDonald, American Red Cross; Dan McGuire, Lebanon EMD and First Selectman; Rob Miller, Eastern Highlands Health District; Don Muirhead, Windham EMD; Paul Scarchuk, Windham Hospital; Daniel Syme, Scotland fire chief; Noel Waite, Coventry Fire Marshal; Rita Reiss, NECCOG; Barbara Buddington, WINCOG Executive Director; Kristie Beaulieu, WINCOG Planner; Chief Bill Austin, CREPC.	12/16/2003	EMD Workgroup (opened to the public)	Meeting Update: Pre-disaster Hazard Mitigation Plans (PDHM): Ms. Buddington reminded the group that WINCOG is also beginning work on PDHM plans for member municipalities. She introduced WINCOG planner Kristie Beaulieu, who described her efforts to date in gathering data on natural disaster events in this region. She requested from the workgroup additional information on natural disasters and leads to additional sources of information. It was agreed that dedicating a brief part of this workgroup's agenda to PDHM planning issues will be an efficient way of providing opportunities for municipal input into both processes.
Rita Reiss, NECCOG, Assistant Director	12/18/2003	e-mail	Correspondence with general assistance.
Dan Syme, Scotland, Fire Chief	12/19/2003	fax	Correspondence on historical disasters.
Bruce Bernier, Northeast Utilities	12/22/2003	e-mail	Correspondence on power outages.
Nancy McHone, DEP, Geologist	12/22/2003	phone	Correspondence on landslides, land subsidence, expansive soils, and earthquakes.
Tom Beardsley, Historian	12/30/2003	e-mail	Correspondence on historical disasters.

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Contact, Affiliation, Title	Date	Correspondence	Comments
Chuck Beck, OEM; Pat Beckenhaupt, NDDH; Pete Carbone, Tectonic; Dave Dagon, Mansfield; Tommy de Ring, CADH; Ralph Fletcher, Ashford EMD and First Selectman; Tom Gavaghan, OEM Area 3 Coordinator; Bill Gerdsen, Chaplin EMD; Lucinda and Thomas Hogarty, Eastern Highland Health District contractors; Douglas Hull, EMS Coordinator, WCMH; John Jackman, Mansfield EMD; Jerry James, Columbia EMD; Dan McGuire, Lebanon EMD and First Selectman; Rob Miller, Eastern Highlands Health District; Wendy Mis, Colchester Health Dept.; Don Muirhead, Windham EMD; Anthony Scalora, OEM Area 4 Coordinator; Paul Scarchuk, Windham Hospital; Chick Shiffrin, Columbia First Selectman; Noel Waite, Coventry Fire Marshal; Barbara Buddington, WINCOG Executive Director; Kristie Beaulieu, WINCOG Planner; Paul Benyeda, Town of Manchester Emergency Services and CERT coordinator.	1/20/2004	EMD Workgroup (opened to the public)	Meeting Update: Pre-disaster Hazard Mitigation Plans (PDHM): Kristie Beaulieu reminded the group that she is still waiting for responses to the questionnaire that she distributed last month, and that she will be following up with phone calls within a few days. She also distributed three draft maps that are being prepared for inclusion in the plan. She is still seeking information on previous natural disasters that affected WINCOG towns, including data on occurrences and impacts.
Jim Sangivanni, DEP	2/10/2004	phone/fax	Correspondence on dams in the region.
Wes Marsh, DEP	2/11/2004	phone/fax	Correspondence on dam regulations.
Jerry James, Columbia, EMD	2/11/2004	fax	Correspondence on historical disasters.
Chuck Beck, OEM; Pat Beckenhaupt, NDDH; Pete Carbone, Tectonic; Dave Dagon, Mansfield; Michael Gardner, Ashford EMD; Bill Gerdsen, Chaplin EMD; Jerry James, Columbia EMD; Liz McDonald, Red Cross; Rob Miller, Eastern Highlands Health District; Don Muirhead, Windham EMD; Paul Scarchuk, Windham Hospital; Chief John Walsh, Willimantic Fire Department; Barbara Buddington, WINCOG Executive Director; Officer Tom Vennini, Torrington Police Department, and regional CERT coordinator.	2/17/2004	EMD Workgroup (opened to the public)	Meeting Update: Pre-disaster Hazard Mitigation Plans (PDHM): Ms. Buddington distributed an outline of the items being considered in this plan, and additional maps prepared by staff Kristie Beaulieu. Meetings will be set up with each town to identify areas of particular concern.
Chuck Beck, OEM; Pete Carbone, Tectonic; Dave Dagon, Mansfield ; Michael Gardner, Ashford EMD; Tom Gavaghan, OEM Area III; Doug Hull, WCMS Paramedics; John Jackman, Mansfield EMD; Jerry James, Columbia EMD; Jim Low, Tectonic; Mike McMillen, NCDHD; Rob Miller, Eastern Highlands Health District; Tony Paquette, Colchester Public Health ERC; Tony Scalora, OEM Area IV; Paul Scarchuk, Windham Hospital; Noel Waite, Coventry; Barbara Buddington, WINCOG Executive Director.	3/16/2004	EMD Workgroup (opened to the public)	PDHM Plan written updates and packets were handed out.
Douglas Glowacki, DEP, Environmental Analyst III	3/17/2004	e-mail	Correspondence on tornadoes.
Emily Kasacek, Ashford, Assessor	3/17/2004	fax	Correspondence on Grand List report.
Douglas Glowacki, DEP, Environmental Analyst III	3/18/2004	e-mail	Correspondence on tornadoes.
Debra German, Columbia, Assessor	3/18/2004	mail	Correspondence on Grand List report.
Douglas Glowacki, DEP, Environmental Analyst III	3/19/2004	e-mail	Correspondence on tornadoes.
Douglas Glowacki, DEP, Environmental Analyst III	3/23/2004	e-mail	Correspondence on tornadoes.
Doug Stoltenberg, ConnDOT	3/23/2004	phone/e-mail/fax	Correspondence on Scour Critical Bridges.
Walter E. Topliff, Mansfield, Assessor	3/23/2004	mail	Correspondence on Grand List report.
Douglas Glowacki, DEP, Environmental Analyst III	3/25/2004	e-mail	Correspondence on tornadoes.
Chandler Rose, Chaplin, Assessor	3/25/2004	mail	Correspondence on Grand List report.

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Contact, Affiliation, Title	Date	Correspondence	Comments
Jean Davies, CRERPA, Planner	4/7/2004	e-mail	Correspondence with general assistance.
Pete Carbone, Tectonic; David Dagon, Mansfield Emergency Services Administrator; Michael Gardner, Ashford EMD; Tom Gavaghan, OEM Area III; Lucinda Hogarty, contractor, Eastern Highlands Health District; John Jackman, Mansfield EMD; Rob Miller, Eastern Highlands Health District; Paul Scarchuk, Windham Hospital; Chief John Walsh, Willimantic Fire Department; Barbara Buddington, WINCOG Executive Director.	4/20/2004	EMD Workgroup (opened to the public)	Meeting Update: Pre-Disaster Hazard Mitigation*:* Kristie Beaulieu is continuing to work on the risk assessment and will be setting up appointments to meet with individuals from each town in the near future.
Ralph Fletcher, Ashford, First Selectman & Michael Gardner, Ashford, EMD	5/14/2004	mail	Correspondence on historical disasters.
Ralph Fletcher, Ashford, First Selectman & Michael Gardner, Ashford, EMD	5/18/2004	2 hr interview	Correspondence with critical areas of concern.
Noel Waite, Coventry, EMD and Fire Marshall	5/18/2004	0.5 hr interview	Correspondence with critical areas of concern.
Martin Berliner, Mansfield Town Manager; Pete Carbone, Tectonic; David Dagon, Mansfield Emergency Services Administrator; George Davis, Consultant; John Elsesser, Coventry Town Manager; Ralph Fletcher, Ashford First Selectman; Michael Gardner, Ashford EMD; Tom Gavaghan, OEM Area III; Jerry James, Columbia EMD; Lucinda Hogarty, contractor, Eastern Highlands Health District; John Jackman, Mansfield EMD; Jim Low, Tectonic; Liz McDonald, American Red Cross; Rob Miller, Eastern Highlands Health District; Paul Scarchuk, Windham Hospital; Beau Thurnauer, Coventry Police Department; Michael Varney, CT DOIT; Noel Waite, Coventry Fire Marshal; Sue Zacharie, Natchaug Hospital; Barbara Buddington, WINCOG Executive Director.	5/18/2004	EMD Workgroup (opened to the public)	No official update was provided on the Pre-Disaster Hazard Mitigation Plan, but the workgroup had the opportunity to bring up any issues they may have had based on what was provided to them at the previous meeting.
Dan Syme, Scotland, Fire Chief & Bill Schultz, Scotland, Emergency Planning Coordinator and President of the Fire Department	5/19/2004	0.5 hr interview	Correspondence with critical areas of concern.
John Jackman, Mansfield, EMD	5/19/2004	1.5 hr interview	Correspondence with critical areas of concern.
Don Muirhead, Windham, EMD	5/24/2004	1.5 hr interview	Correspondence with critical areas of concern.
Daniel McGuire, Lebanon, First Selectman	5/25/2004	0.75 hr interview	Correspondence with critical areas of concern.
Rusty Lanzit, Chaplin, First Selectman & Bill Gerdsen, Chaplin, EMD	5/25/2004	1 hr interview	Correspondence with critical areas of concern.
Jerry James, Columbia, EMD	5/26/2004	0.5 hr interview	Correspondence with critical areas of concern.
Margaret Haraghey Hampton, EMD and First Selectman & Robert Marquis, Hampton, Fire Marshall	6/3/2004	0.75 hr interview	Correspondence with critical areas of concern.
Pete Carbone, Tectonic; David Dagon, Mansfield Emergency Services Administrator; Tom Gavaghan, OEM Area III; Keri Gilford, CADH; Jerry James, Columbia EMD; Lucinda Hogarty, contractor, Eastern Highlands Health District; John Jackman, Mansfield EMD; Jim Low, Tectonic; Edward Martella, Tectonic; Liz McDonald, American Red Cross; Rob Miller, Eastern Highlands Health District; Don Muirhead, Windham EMD; Beau Thurnauer, Coventry PD; Noel Waite, Coventry Fire Marshal. Guest: Mike Cluney, Kids Protection Network; Barbara Buddington, WINCOG Executive Director.	6/15/2004	EMD Workgroup (opened to the public)	Meeting Update: Pre Disaster Hazard Mitigation Plan: Ms. Buddington provided a brief update of the pre-disaster hazard mitigation plan development and noted that draft copies of the Risk Vulnerability and Assessment portion would be available at the next meeting.

Appendix II
The Planning Process

Contact, Affiliation, Title	Date	Correspondence	Comments
Chuck Beck, OEM; Meg Hooper, DPH; Jerry James, Columbia EMD; Lucinda Hogarty, contractor, Eastern Highlands Health District; John Jackman, Mansfield EMD; Liz McDonald, American Red Cross; Rob Miller, Eastern Highlands Health District; Tony Paquette, Colchester Health District; Tony Scalora, OEM Region 4; Paul Scarchuk, Windham Hospital; Dan Syme, Scotland; Noel Waite, Coventry Fire Marshal; Barbara Buddington, WINCOG Executive Director.	7/20/2004	EMD Workgroup (opened to the public)	Meeting Update: Pre Disaster Hazard Mitigation Plan: Two packets were prepared for each town, each containing a black and white hard copy and a CD with the document in a pdf file (in color). Ms. Buddington distributed these to town representatives present at the meeting and will be mailed to others. A deadline of September 1 has been set for comments / suggested changes to be submitted to WINCOG so that the document can be finalized.
Christine Abikoff, Ashford, Selectman's Assistant	8/2/2004	mail	Correspondence on plan revisions.
Noel Waite, Coventry, EMD and Fire Marshall	8/5/2004	mail	Correspondence on plan revisions.
Don Muirhead, Windham, EMD	8/30/2004	phone	Correspondence on plan revisions.
John Jackman, Mansfield, EMD	8/31/2004	e-mail	Correspondence on plan revisions.
Rusty Lanzit, Chaplin, First Selectman	9/2/2004	phone	Correspondence on plan revisions.
Robert Skinner, Columbia, Town Administrator	9/2/2004	phone	Correspondence on plan revisions.
Daniel McGuire, Lebanon, First Selectman	9/7/2004	phone	Correspondence on plan revisions.
Margaret Haraghey, Hampton, First Selectman	9/14/2004	phone	Correspondence on plan revisions.
Liz Wilson, Scotland, First Selectman	9/21/2004	in person	Correspondence on plan revisions.
Ralph Fletcher, Ashford; Rusty Lanzit, Chaplin; Robert Skinner, Columbia (alt.); John Elsesser, Coventry (alt.); Margaret Haraghey, Hampton; Dan McGuire, Lebanon; Michael Paulhus, Windham; Matt Hart sat in for Mansfield (alt.) Martin Berliner; Barbara Buddington, WINCOG Executive Direction; Jana Butts, WINCOG Senior Planner; Hedy Ayers, CRCOG; Roberta Dwyer, NE Alliance; Maureen Friedman, DAS; and Donna Simpson, CT East.	10/1/2004	WINCOG Meeting (opened to the public)	Meeting Update: Pre-Disaster Hazard Mitigation Plan: Ms. Buddington distributed copies of the draft Risk and Vulnerability Assessment (Part I of II) of the Pre-Disaster Hazard Mitigation Plan. She reported that the parts of the document are now offered by the state as a model for use by other regions. Completion of the full plan will allow Windham Region municipalities to apply for federal aid in the event of a federally-declared disaster. The COG tabled action on the Risk and Vulnerability Assessment to the next meeting.

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The Planning Process

Contact, Affiliation, Title	Date	Correspondence	Comments
Rusty Lanzit, Chaplin; Chick Shifrin, Columbia; John Elsesser, Coventry (alt.); Margaret Haraghey, Hampton; Dan McGuire, Lebanon; Martin Berliner, Mansfield (alt.); Liz Wilson, Scotland; Michael Paulhus, Windham; Robert Skinner, Columbia (alt.); Barbara Buddington WINCOG Executive Director; Jana Butts, WINCOG Senior Planner; Roger Adams, Windham Area Chamber of Commerce; Charlene Barnett, Andover First Selectman; Roberta Dwyer, NE Alliance; James Lawlor and Dawn Alderucci, CT Probate Assembly; Dennis O'Brien, Windham Judge of Probate; Carl Fontneau, Columbia Planner; Donna Simpson, CT East; Dennis Twiss, CT SBDC; Mike Murphy and Joanne Lincoln, CT Humane Society; and Grayson Wright, ConnDOT.	11/5/2004	WINCOG Meeting (opened to the public)	Meeting Update: Pre-Disaster Hazard Mitigation Plan/ Risk and Vulnerability Assessment: MOVED by Mr. Elsesser, SECONDED by Mr. McGuire, to approve the Pre-Disaster Hazard Mitigation Plan Risk and Vulnerability Assessment as submitted. MOTION CARRIED unanimously.
Ralph Fletcher, Ashford; Rusty Lanzit, Chaplin; Robert Skinner, Columbia (alt); Margaret Haraghey, Hampton; Dan McGuire, Lebanon; Liz Wilson, Scotland; Michael Paulhus, Windham; Barbara Buddington, WINCOG Executive Director; Roger Adams, Windham Area Chamber of Commerce; Roberta Dwyer, NE Alliance; Bethany LoMonaco, Chamber of Commerce intern; Derek Phelps and Christine LePage, CT Siting Council; Ron Clark, Wireless Services, LLC; Joanne Lincoln and Mike Murphy, CT Humane Society; and Christine Abikoff, Town of Ashford.	1/7/2005	WINCOG Meeting (opened to the public)	Meeting Update: Ms. Buddington reported that staff met with FEMA representatives on Wednesday to discuss the Pre-Disaster Hazard Mitigation Plans that are being prepared for member towns. FEMA will be requiring that each town's plan identify at least one concrete mitigation project that is a priority (and that it would implement if funding became available).
Liz Kenton, DEP	1/10/2005	phone/e-mail	Correspondence on dam hazard Class C inundation area.
Margaret Thomas, DEP, Geologist	1/14/2005	phone	Correspondence on avalanches, landslides, and volcanoes.
Liz Kenton, DEP & Douglas Glowacki, DEP, Environmental Analyst III	1/20/2005	phone	Correspondence on dam hazard Class C inundation area.
Rusty Lanzit, Chaplin, First Selectman	3/17/2005	1 hr interview	Correspondence with mitigation projects.
Daniel McGuire, Lebanon, First Selectman & John Lyon, Lebanon, Deputy EMD	3/18/2005	1.5 hr interview	Correspondence with mitigation projects.
John Jackman, Mansfield, EMD	3/28/2005	1.5 hr interview	Correspondence with mitigation projects.
Ralph Fletcher, Ashford, First Selectman	3/29/2005	0.75 hr interview	Correspondence with mitigation projects.
Chick Shifrin, Columbia, First Selectman & Robert Skinner, Columbia, Town Administrator	3/30/2005	0.75 hr interview	Correspondence with mitigation projects.
John Elsesser, Coventry, Town Manager	4/4/2005	1 hr interview	Correspondence with mitigation projects.
Margaret Haraghey, Hampton, First Selectman & Maurice Bission, Hampton, Selectman & Daryl Christadore, Hampton, Road Forman	4/7/2005	1 hr interview	Correspondence with mitigation projects.
Liz Wilson, Scotland, First Selectman & Bill D'Appollonio, Scotland, Highway Forman	4/18/2005	0.75 hr interview	Correspondence with mitigation projects.
Don Muirhead, Windham, EMD	7/20/2005	0.5 hr interview	Correspondence with mitigation projects.
Jean Davies, CRERPA, Planner	12/18/2005	0.5 hr interview	Correspondence with general assistance.
Don Muirhead, Windham, EMD	3/8/2006	0.5 hr interview	Correspondence with mitigation projects.

Appendix II
The Planning Process

Contact, Affiliation, Title	Date	Correspondence	Comments
Fran Raiola, Mansfield Deputy EMD/Fire Marshal	10/15/2012	1 hr interview	Mansfield updates to critical facilities, mitigation pr
Pamela D. Schipani, UConn Director of Housing Services	10/24/2012	email	correspondance re: student housing
Robert Zaffetti, P.E. Manager of Bridge Safety and Evaluation ConnDOT	10/24/2012	email	correspondance re: scour bridges
Tom Conley, Lebanon Public Works Director & Byron Lennox, Lebanon EMD & Philip Chester, Lebanon Town Planner	1/24/2013	2 hour interview	Correspondence with mitigation projects.
Jerry James, Columbia EMD	1/25/2013	2 hour interview	Correspondence with mitigation projects.
Jim Randall, Chplin EMD	7/26/3013	1 hour interview	Correspondence with mitigation projects.
Jim Randall, Chaplin EMD & Steve Guay, Chaplin Public Works Director & Jay Gigliotti, Chaplin Zoning Enforcement Officer	8/27/2013	1.5 hour interview	Correspondence with mitigation projects.
Bill Rose, Chaplin First Selectman & Jim Randall, Chaplin EMD & Steve Guay, Chaplin Public Works Director	9/9/2013	1.75 hour interview	Correspondence with mitigation projects.
Noel Waite, Coventry EMD & David Gofstein, Coventry Public Works Director & Eric Trott, Coventry Town Planner	9/18/2013	1.5 hour interview	Correspondence with mitigation projects.
Dan Syme, Scotland First Selectman/Public Works Director/Planner & Ernie Mellor, Emergency Management Director	9/26/2013	2 hour interview	Correspondence with mitigation projects.
Chaplin Public Info Session/Presentation to Board of Selectmen	10/3/2013	.5 hour session	Public presentation of plan.
Scotland Public Info Session/Presentation to Board of Selectmen	11/13/2013	.25 hour session	Public presentation of plan.
Michael Licata, Windham Emergency Management Director & James Finger, Windham Town Planner & Scott Clairmont, Windham Public Works Director	11/26/2013	1.5 hour interview	Correspondence with mitigation projects.
Michael Licata, Windham Emergency Management Director	12/6/2013	.5 hour session	Correspondence with mitigation projects.
Allan Cahill, Hampton First Selectman and Dan Meade, Emergency Management Director and Toby Vertefeuille, Public Works Director	12/12/2013	1.5 hour interview	Correspondence with mitigation projects.
Coventry Public Info Session	12/12/2013	1.5 hour session	Public presentation of plan.
Michael Licata, Windham Emergency Management Director	12/31/2013	1 hour interview	Correspondence with mitigation projects.
Hampton Public Info Session	2/7/2014	1 hour session	Public presentation of plan.
Windham Public Info Session	2/20/2014	2 hour session	Public presentation of plan.
Joyce Okonuk, Lebanon First Selectman & Phil Chester, Lebanon Town Planner & Brandon Handfield, Town Engineer & Public Works Director	2/27/2014	1.5 hour interview	Correspondence with mitigation projects.
Lebanon Public Info Session	3/4/2014	.75 hour session	Public presentation of plan.

Appendix II (cont.)
The Planning Process

Contact, Affiliation, Title	Date	Correspondence	Comments
Marilyn Hilliard, FEMA	3/11/2008	phone	Discussion regarding required Plan
Michael Eldredge, First Selectman	3/11/2008	phone	Discussion regarding required Plan
Jana Butts, Senior Planner, WINCOG	3/11/2008	phone	Discussion regarding required Plan
Jana Butts, Senior Planner, WINCOG	3/14/2008	e-mail	Transmittal of WINCOG Regional Pre-Disaster Hazard Mitigation Plan
Karl Acimovic, P.E. & L.S.; Jana Butts, Senior Planner, WINCOG; Alex Acimovic	3/28/2008	meeting	Meeting to set up and outline Pre-Disaster Hazard Mitigation (PDHM) Plan for Willington. The requirements of the plan, sources of information and examples from other WINCOG towns were discussed. A schedule was agreed to and tasks were assigned.
Jana Butts, Senior Planner, WINCOG	4/1/2008	e-mail	Transmittal of Risk Assessment Questionnaire
Jana Butts, Senior Planner, WINCOG	4/11/2008	e-mail	Transmittal of draft maps for PDHM Plan
Karl Acimovic, P.E. & L.S.; Jana Butts, Senior Planner, WINCOG	4/23/2008	phone	Discussion regarding PDHM Plan content
Karl Acimovic, P.E. & L.S.	4/30/2008	e-mail	Transmittal of PDHM Plan Questionnaires to: Mike Eldredge, Stuart Cobb, Lynn Nicholls, Susan Yorgensen, Mark Palmer & Dave Charette
Mary Bowen, Town of Willington	5/13/2008	e-mail	Transmittal of completed PDHM Plan Questionnaire
Mary Bowen, Town of Willington	5/16/2008	e-mail	Transmittal of revised PDHM Plan Questionnaire
Mary Bowen, Town of Willington	6/6/2008	phone	Discussion regarding PDHM Plan content
Mary Bowen, Town of Willington	6/6/2008	e-mail	Discussion regarding PDHM Plan content
Jana Butts, Senior Planner, WINCOG	6/6/2008	phone	Discussion regarding PDHM Plan content
Mary Bowen, Town of Willington	6/9/2008	e-mail	Transmittal of PDHM Plan information
Karl Acimovic, P.E. & L.S.; Alex Acimovic	6/9/2008	phone	Discussion regarding PDHM Plan content and formatting; review of draft Plan
Mary Bowen, Town of Willington	6/9/2008	e-mail	Review of draft PDHM Plan
Alex Acimovic	6/9/2008	e-mail	Review of draft PDHM Plan
Mary Bowen, Town of Willington	6/9/2008	e-mail	Review of draft PDHM Plan
Mary Bowen, Town of Willington	6/10/2008	phone	Provided additional PDHM Plan content
Jana Butts, Senior Planner, WINCOG	6/10/2008	phone	Discussion of PDHM Plan draft and submittal
Jana Butts, Senior Planner, WINCOG	6/10/2008	e-mail	Discussion of PDHM Plan draft and submittal

Pre-Disaster Hazard Mitigation Fact Sheet

What is "Hazard Mitigation"?

Hazard mitigation is a project, ordinance, or public education effort whose goal is to permanently alter a structure that fundamentally reduces the risk of loss in the face of natural hazards. It eliminates a hazard more permanently. Mitigation—as defined by FEMA—is different from preparedness, response, and recovery.

What is the "Natural Hazard Mitigation Plan"?

This plan identifies the risk each hazard presents to a community and outlines past, present and future efforts to mitigate against those hazards.

What are the benefits of adopting a "Natural Hazard Mitigation Plan"?

The Natural Hazard Mitigation Plan is a continuously-updated plan that is reviewed in five-year cycles and is integrated with other town plans and priorities. More federal and state agencies are looking at these plans when considering funding distribution, and most FEMA pre- and post-disaster hazard mitigation funds now require that recipient communities have a current plan in place to access funding.

What is the timeline for completion of this plan cycle?

The entire plan must be adopted by the town by August of 2014. We must submit a draft to FEMA for review by December of 2013.

Who is working on this plan?

WINCOG is working closely with DEEP and a workgroup of town staff to identify and prioritize hazard mitigation actions specific to Scotland drawing on feedback from the public, historic data on natural hazard vulnerability, and town initiatives. Scotland Hazard Mitigation Workgroup meetings have included the First Selectman and the Emergency Management Director, and the Zoning Enforcement Officer. Folks are welcome to contact WINCOG Planner Dagmar Noll at 860-456-2221 with further suggestions for consideration or to ask any questions related to the plan.

REGULAR MEETING – MANSFIELD TOWN COUNCIL
November 25, 2013

Mayor Elizabeth Paterson called the regular meeting of the Mansfield Town Council to order at 7:30 p.m. in the Council Chamber of the Audrey P. Beck Building.

I. ROLL CALL
Present: Kegler, Kochenburger by phone, Marcellino, Moran, Paterson, Raymond, Ryan, Shapiro, Wassmundt

II. APPROVAL OF MINUTES
Mr. Shapiro moved and Ms. Moran seconded to approve the minutes of the November 12, 2013 meeting with the correction of a typographical error. Members noted the meeting adjourned at 10:32 p.m. The motion to approve the minutes as corrected passed unanimously.

III. PUBLIC HEARING
1. Draft Windham Region Hazard Mitigation Plan
The Town Clerk read the legal notice and staff outlined the process and goals of the plan being prepared by WINCOG.
Arthur Smith, Mulberry Road, asked how the plan will work with state government entities who are not subject to zoning regulations.
Brandon Coleman, Centre Street, on behalf of Brian Coleman, presented a packet of suggestions. (Statement attached)

IV. OPPORTUNITY FOR PUBLIC TO ADDRESS THE COUNCIL
Ric Hossack, Middle Turnpike, posed questions about the use of the charging station, the funding for the Town Square, the parking garage settlement and whose responsibility would it be to provide water for a major fire in Storrs Center?
Saman Azimi, representing ConnPirg, urged the Council to support their efforts to enact a bigger and better bottle bill.
Winkie Gordon, Charter Oak Square, asked for details on the workings of the proposed Water Advisory Board and asked if a response has been received from UConn regarding the impact study on the Next Gen project.
Arthur Smith, Mulberry Road, reiterated his questions regarding the estimates of "roving" students and accidents caused by deer as a result of deforestation and objected to illegible pages in the packet and proposed changes to the Town Council Rules of Procedures.

V. REPORT OF THE TOWN MANAGER
Town Manager Matt Hart addressed issues in his report and added the following comments:

- A reception for retiring Director of Public Works Lon Hultgren will be held on December 5, 2013
- The charging station does not have a separate meter and is used by one member of the staff, all others use a smart form application to access the station
- In the event of a fire in Storrs Center a combination of Town and mutual aid facilities would be used
- The Town's contribution to the parking garage will be financed by the use of future tax revenues
- Both the Sustainability and the Solid Waste Advisory Committees have reviewed the proposed bottle bill and have expressed support
- The Advisory Board to Connecticut Water Company will be created as part of the agreement and therefore will be organized after the contract is signed

- Information on the requested impact analysis of Next Gen Connecticut will be available at a future meeting
- The estimates of "roving" students were prepared by the State Police and have been discussed with UConn personnel
- The deer population is increasing due to an expansion in forested areas.

By consensus the Council agreed to authorize the Town Manager to send a letter of support to the Town's legislators regarding the expansion of the bottle bill. A copy of the letter will also be sent to ConnPirg.

VI. REPORTS AND COMMENTS OF COUNCIL MEMBERS

Mayor Paterson reported the Human Services Department is working hard to provide holidays to those in Town who do not have the means to do so and urged citizens to do what they can to help.

Mr. Shapiro moved and Ms. Moran seconded to move Items 7, Town Square Project-Funding Agreements; Capital Improvement Program (CIP) Adjustment and Appropriation, and Item 8, Town of Mansfield Assistance Agreements By and Between, the State of Connecticut Acting by the Department of Economic and Community Development for $450,000 under the State's Brownfield Remediation and Revitalization Program; and Pass-Through Agreement by and among the Town of Mansfield, the DECD, and Storrs Center Alliance LLC and Leyland Storrs, LLC, just prior to Old Business.

The motion passed unanimously.

Ms. Wassmundt questioned whether or not all proposed water lines will be forwarded to the Planning and Zoning Commission. Mr. Hart reported all lines will be included.

Ms. Raymond moved and Mr. Shapiro seconded to add Item 5a, Comments on Fire Water Holes, to the agenda.

The motion passed unanimously.

Mr. Kochenburger no longer participated by phone.

VII. OLD BUSINESS

2. Draft Windham Region Hazard Mitigation Plan

This item will be carried as old business and the comments received will be reviewed.

3. Town Council Rules of Procedures

Chair of the Personnel Committee Toni Moran moved, effective November 25, 2013, to adopt the amended Rules of Procedure as presented. Ms. Moran described the proposed changes which include the identification of an edition of Roberts Rules, the elimination of Town Council office hours, and the addition of a section concerning the use of email with regards to the Freedom of Information Act.

Members discussed the proposed change in Rule 3, elimination of "and Comments" from Item 7 of the agenda.

Ms. Wassmundt moved and Ms. Raymond seconded to amend the motion and recommit the Town Council Rules of Procedures to the Personnel Committee.

Members discussed why this change was deemed necessary and the need for a place on the agenda for Councilors to make comments. Ms. Wassmundt withdrew her motion to recommit. Ms. Moran moved to amend the original motion to restore "and Comments" to Rule 3. The motion passed unanimously.

The amended motion passed unanimously.

VIII. NEW BUSINESS

4 Agricultural Leases

Ms. Moran moved and Mr. Ryan seconded, effective November 25, 2013, to refer the proposed leases of the Town's agricultural properties to the Planning and Zoning Commission for review pursuant to Connecticut General Statutes §8-24.

Motion passed unanimously.

5. Department of Homeland Security (DHS), Assistance to Firefighters Grant

Mr. Ryan moved and Ms. Shapiro seconded, effective November 25, 2013, to authorize Town Manager Matthew W. Hart to submit the proposed Fiscal Year 2013 Assistance to Firefighters Grant application, which purpose is to support the provision of fire protection and emergency services within the Town of Mansfield.
Motion passed unanimously.

5a. Comments on Fire Water Holes
Chief Dave Dagon reviewed the Town's efforts to provide water availability within 1.5 miles to almost all sections of Town. Currently 82.01% of the Town is covered.

6. Financial Statements Dated September 30, 2013
Mr. Ryan, Chair of the Finance Committee moved, effective November 25, 2013, to accept the Financial Statements dated September 30, 2013.
Motion passed unanimously.

7. Town Square Project – Funding Agreements; Capital Improvement Program (CIP) Adjustment and Appropriation
Mr. Shapiro moved and Mr. Ryan seconded, effective November 25, 2013, to authorize the Town Manager to execute the Agreement between the University of Connecticut and the Town of Mansfield regarding the town square project.

Mr. Shapiro moved and Mr. Ryan seconded, effective November 25, 2013, to authorize the Town Manager to execute the Agreement between the Town of Mansfield and EDR Storrs LLC, and Leyland Storrs, LLC regarding the town square project.

Mr. Shapiro moved and Mr. Ryan seconded, effective November 25, 2013, to authorize the Town Manager to execute the Agreement between the Town of Mansfield and the Mansfield Downtown Partnership, Inc. regarding the town square project.

Mr. Shapiro moved and Mr. Ryan seconded effective November 25, 2013, to approve the adjustment to the Capital Improvement Program of $850,000 for the design and construction of the town square, and to appropriate said amount.

Mr. Shapiro moved and Mr. Ryan seconded, effective November 25, 2013, to approve the adjustment to the Capital Improvement Program of $500,000 from the state Main Street Investment Fund for the town square project, street lights and street trees on Wilbur Cross Way and signage in the Phase 1A area, and to appropriate said amount.

Executive Director of the Mansfield Downtown Partnership, Inc. Cynthia van Zelm, and Director of Public Works Lon Hultgren reviewed the design and construction plans.
Rosemary Ayers, attorney with Day Pitney LLP, outlined a proposed change to the agreement between the University of Connecticut and the Town of Mansfield. The requested deletion would eliminate the first sentence of paragraph 4. g. The State does not give indemnification and UConn will be required to carry insurance when conducting events.
Mr. Ryan moved and Ms. Moran seconded to amend the agreement by striking the first sentence of paragraph 4.g.
The motion passed with all in favor except Ms. Wassmundt, who abstained.
Members discussed the possible kiosks, the event planning process and the funding sources for the contributions to the Town Square Project.
The motions, as amended, passed with all in favor except Mr. Kegler, Ms. Wassmundt and Ms. Raymond who abstained.

8. Town of Mansfield Assistance Agreement By and Between the State of Connecticut Acting by the Department of Economic and Community Development (DECD) for

$450,000 under the State's Brownfield Remediation and Revitalization Program; and Pass-Through Agreement by and among the Town of Mansfield, the DECD, and the Storrs Center Alliance, LLC and Leyland Storrs, LLC

Ms. Moran moved and Mr. Shapiro seconded the following resolution:
WHEREAS, pursuant to PA 13-308 Brownfield Remediation Law, the Connecticut Department of Economic and Community Development is authorized to extend financial assistance for economic development projects; and

WHEREAS, it is desirable and in the public interest that the Town of Mansfield make an application to the State for $450,000 in order to undertake the Municipal Brownfield Grant and to execute an Assistance Agreement.

NOW, THEREFORE, BE IT RESOLVED BY THE TOWN OF MANSFIELD:

1.That it is cognizant of the conditions and prerequisites for state assistance imposed by PA 13-308 Brownfield Remediation Law.

2.That the filing of an application for State financial assistance by the Town of Mansfield in an amount not to exceed $450,000 is hereby approved and that the Town Manager is directed to execute and file such application with the Connecticut Department of Economic and Community Development, to provide such additional information, to execute such other documents as may be required, to execute an Assistance Agreement with the State of Connecticut for State financial assistance if such an agreement is offered, to execute any amendments, decisions, and revisions thereto, and to act as the authorized representative of the Town of Mansfield.

3.That said Matthew W. Hart, as Town Manager, is further directed to execute a Certificate of Applicant, Environmental Certificate and Indemnity Agreement and Negative Pledge and Agreement for the benefit of the Connecticut Department of Economic and Community Development and to execute a Pass-Through Agreement by and among the Town of Mansfield, the Connecticut Department of Economic and Community Development and the Sub-Recipient identified therein, and to execute any amendments, decisions and revisions thereto, and to act as the authorized representative of the Town of Mansfield.

4.That any and all documents heretofore executed and delivered and all acts heretofore done in connection with or to effectuate the purposes of the foregoing resolutions are hereby ratified and confirmed.
The motion passed unanimously.

9. Appointment of Town Attorney
Ms. Shapiro moved and Ms. Moran seconded to approve the following resolution:
RESOLVED: Pursuant to Section C305 of the Mansfield Charter, to appoint Attorneys O'Brien and Johnson as Town Attorney, for a term commencing on December 5, 2013 and ending on June 6, 2014 and to authorize the Town Manager to execute the proposed Retainer Agreement between the Town of Mansfield and Attorneys O'Brien and Johnson.
The motion passed unanimously.
Mr. Shapiro moved and Ms. Moran seconded that the Council direct the Personnel Committee, with appropriate staff participation, to issue an RFQ for the purpose of identifying one or more candidates for appointment as Town Attorney. The Personnel Committee is further directed to bring a candidate or candidates to the full Council for its consideration.
The motion passed unanimously.

10. Appointment of Council Representatives to Advisory Committees

Mayor Paterson appointed Alex Marcellino to the Committee on Committees in place of Toni Moran.

Mayor Paterson offered the following recommendations:
Campus Community Partnership – Elizabeth Paterson
Eastern Highlands Health District – Elizabeth Paterson
Transportation Committee – Alex Marcellino and Bill Ryan
Emergency Management – Peter Kochenburger
Sustainability Committee – Paul Shapiro
Discovery Depot – Betty Wassmundt
Four Corners Sewer and Water Advisory Committee – Bill Ryan and Virginia Raymond
Downtown Partnership – Toni Moran (6/30/2015), Elizabeth Paterson
University Town Relations – Steve Kegler and Elizabeth Paterson
Windham Regional Council of Governments – Elizabeth Paterson
The motion to approve the recommendations passed unanimously.

IX. QUARTERLY REPORTS

No comments offered.

X. DEPARTMENTAL AND COMMITTEE REPORTS

By consensus the Council agreed that in the future all Departmental and Committee Reports will be distributed electronically.

XI. REPORTS OF COUNCIL COMMITTEES

Chairman of the Finance Committee Bill Ryan reported on recently enacted legislation which requires the school budget to be reviewed within 10 days of publication by the Finance Committee to offer suggestions on non-educational items.

Ms. Moran reported the Ad hoc Committee on Responsible Contractors heard from local contractors.

XII. PETITIONS, REQUESTS AND COMMUNICATONS

11. A. Smith (10-28-13)
12. Community Center Vehicle Charging Station Cost to Date
13. CT Water Company re: Questions from 11/12/13 Public Comment
14. State of Connecticut Department of Transportation re: 2014 Construction Season
15. State of Connecticut Siting Council re: Interstate Reliability Project
16. Managing Urban Deer in Connecticut – A Guide for Residents

XIII. FUTURE AGENDA

Ms. Moran moved and Mr. Shapiro seconded to add the cancelation of the second meeting in December to the agenda. Motion passed unanimously.

Mr. Shapiro moved and Mr. Kegler seconded to cancel the second Council meeting in December. Motion passed unanimously.

XIV. ADJOURNMENT

Ms. Moran moved and Mr. Shapiro seconded to adjourn the meeting at 10:40 p.m.

Elizabeth Paterson, Mayor Mary Stanton, Town Clerk

Suggestions:

Objective: Minimize impact of heavy snow in major winter storms.

Task: Minimize road obstructions by providing ample room to push and move snow.

Task: Minimize street parking, especially on state highways. Snow removal will take longer in these areas. Islands and landscaping can become obstructions as well (Storrs Center).

Task: Design parking lots to provide enough room for snow removal and piling.

Task: Be sure current building codes are sufficient for heavy snow loads on town buildings. Have a snow removal plan for flat roofs and insufficient structures that the town own.

Task: Parking Ban plan and enforcement.

Task: Look into the use of snow fence in large open areas to reduce drifting in roadways.

Objective: Minimize impact of heavy winds in all storms.

Task: Study the effects of tall buildings and wind on pedestrians (lower wind speeds on tall buildings can create hazards long before wind speeds become problematic on single and double storied buildings) (Storrs Center and UConn)

Task: Educate the public on wind resistant construction materials and techniques.

Submitted By: Brian Coleman Centre St. Mansfield Center. November 25, 2013

Objective 3: Reduce the likelihood of flooding and evaluate property prone to flooding.

Task 2: (page15 of Nov 25th packet) Monitor Thornbush properties, the addition of more than 2 million gallons of water a day created by the inter-basin transfer proposed by the Connecticut Water Company. Will that have an impact on the Thornbush properties?

Objective 4: Reduce the amount of debris from severe storms.

Task 2 & 3 (page16 of Nov 25th packet) Educate the public on tree planting and maintenance, Encourage use of native species, which the town has already failed at. The planting of less than desirable species at Storrs Center has already occurred. The Bradford Pear is a non-native species with invasive characteristics and are very weak limbed and break easily in the wind and under the weight of snow. The Pin Oaks planted under the power lines across from 7-11 have a maturity height and spread of 80 and 40 feet respectively. I don't think you could find a worse tree to plant under power lines. This is now the butt of jokes in UConn Dendrology and Landscaping courses. I guess the education starts right here in town with our town leaders and developers.

Objective: 7 To reduce the likelihood of fire hazards

Task 3 (page 18 of Nov 25th packet) Educate property owners of clearing of vegetation.

What kind of vegetation? Are we referring to dead and drying vegetation that is fuel for wild fires?

Should we say? : keep property clear of flammable debris such as dead vegetation scrap lumber etc.

Or are we referring to the removal of vegetation that leads to quicker water runoff and less water retention. If so, use both.

REGULAR MEETING MINUTES
COLUMBIA BOARD OF SELECTMEN
Tuesday, December 17, 2013
Adella G. Urban Administrative Offices Conference Room
323 Route 87, Columbia, CT

Members Present: First Selectman Carmen Vance, Selectman William O'Brien, Selectman Robert Hellstrom, Selectman Robert Bogue, and Selectman Steven Everett.

Also Present: Town Administrator Jonathan Luiz and others.

CALL TO ORDER: C. Vance called the meeting to order at 7:00 p.m.

1. PLEDGE OF ALLEGIANCE: The Pledge of Allegiance was recited.

2. Minutes: 12/3/13 Regular Meeting: W O'Brien MOVED to approve the regular meeting minutes of 12/3/13 as presented. MOTION CARRIED 4:0:1 with R. Bogue abstaining.

3. AUDIENCE OF CITIZENS: None.

C. Vance MOVED to address item 7.3 at this time. MOTION CARRIED UNANIMOUSLY.

7. APPOINTMENTS/RESIGNATIONS

7.3 Appointment of Todd Shepard (R) to Financial Planning and Allocation Commission: C. Vance MOVED to appoint Todd Shepard (R) to the Financial Planning and Allocation Commission. MOTION CARRIED UNANIMOUSLY.

C. Vance MOVED to address item 5.3 at this time. MOTION CARRIED UNANIMOUSLY.

5. NEW BUSINESS

5.3 Outdoor wood-burning furnaces: C. Vance inquired as to whether or not members of the Board of Selectmen (BOS) wanted to explore the need to regulate outdoor wood burning furnaces. R. Bogue questioned the need for the town to adopt regulations since the state already regulates outdoor wood-burning furnaces. J. Luiz said that he has received several complaints the past few years from residents complaining about the amount of smoke generated from the furnaces at issue. W. O'Brien said that he thinks the BOS should research the matter further since some residents have complained about pollution caused by these furnaces. C. Vance said that in the event the town decided to regulate these furnaces that she hopes that people that have already had them approved would be "grandfathered in." S. Everett MOVED that the town enforce only existing state regulations pertaining to outdoor wood burning furnaces. W. O'Brien asked S. Everett to consider withdrawing the motion since the BOS has had very little opportunity to explore the question of whether or not there is a need in Columbia for the town to regulate wood burning furnaces beyond the regulations established by the state. C. Vance and R. Hellstrom agreed with W. O'Brien. S. Everett withdrew his motion. C. Vance said that the BOS will gather more information on this issue.

4. OLD BUSINESS

4.1 Resolution of endorsement for Regional Performance Incentive Grant: C. Vance MOVED to adopt the resolution as presented. MOTION CARRIED UNANIMOUSLY.

4.2 Columbia Youth Services: C. Vance expressed her desire to appoint an ad-hoc Committee to take an objective look at whether or not Columbia should become a full-member of AHM Youth Services. W. O'Brien objected and questioned whether or not C. Vance had discussed her proposal with Richard Szegda. C. Vance explained that she met with R. Szegda in her office and that the two discussed Youth Services. W. O'Brien expressed his strong objection to C. Vance wanting to replace existing members of the Youth Services Committee with new people. C. Vance said that since R. Szegda has been a strong proponent of Columbia joining AHM as a full member then he is not the right person to do an objective analysis of whether Columbia should join AHM. Discussion ensued about the Youth Services Committee. S. Everett questioned whether or not the BOS has seen a recommendation from the Youth Services Committee. R. Bogue said he had not. R. Hellstrom and W. O'Brien said that they were aware of such a recommendation. W. O'Brien MOVED to appoint the following people to the Youth Services Committee: Richard Szegda, William O'Brien, Brian Keldsen, Denise Morell, Laurie Rogers, Melissa Petrone, Rebecca Stearns, Katelin Rogers. The MOTION FAILED 2-2-1, with W. O'Brien and R. Hellstrom voting in favor, C. Vance and R. Bogue voting opposed, and S. Everett abstaining. Discussion ensued about the charge of the Youth Services Committee. A consensus was reached among members of the BOS that a Youth Services Committee would be charged with providing the following information to the BOS no later than March 4, 2013: (1) Listing of current youth services provided in Columbia, including costs; (2) Statistics on the number of Columbia youths that have participated each year in the separate youth service offerings; (3) Priority ranking of each of the current youth services offerings; (4) Listing of proposed youth services to be added in Columbia; (5) Reasons why each service is needed (specific benefits to the town); (6) Priority ranking of each of the proposed youth services offerings; (7) Priority ranking of existing and proposed youth service offerings; (8) Pro's and Con's of Columbia performing the services listed in #7. Each service should be addressed. (9) Costs that Andover, Hebron and Marlborough have each paid to AHM for Fiscal Years '09-'10, '10-'11, '11-'12, '12-'13, '13-'14. (10) Listing of the youth services programs that Andover, Hebron and Marlborough receive in consideration of being permanent full-time members of AHM. BOS members should review the list of items that the Youth Service Committee will be charged and provide J. Luiz with proposed changes. R. Bogue MOVED to appoint the following people to the Youth Services Committee: Richard Szegda, William O'Brien, Brian Keldsen, Denise Morell, Laurie Rogers, Melissa Petrone, Rebecca Stearns, Katelin Rogers. MOTION CARRIED UNANIMOUSLY.

5. NEW BUSINESS

5.1 Budget Discussion with Recreation Commission: A. Dunnack expressed the Rec Commission's desire for a full-time Recreation Director. Discussion ensued. J. Luiz will work with A. Dunnack to further detail the costs and benefits of a full-time Rec Director.

5.2 Regional hazard Mitigation Plan: members of the BOS reviewed the Plan.

5.3 Outdoor wood-burning furnaces: addressed earlier on in the meeting.

5.4 Agreement between the Columbia BOE and the Columbia Teaches Association: C. Vance encouraged members of the BOS to read the agreement if they had not done so already.

5.5 Draft Personal Protective Policy: S. Everett MOVED to adopt the Policy. MOTION CARRIED UNANIMOUSLY.

5.6 Draft Hearing Conservation Policy: S. Everett MOVED to adopt the Policy. MOTION CARRIED UNANIMOUSLY.

5.7 Draft DPW Bloodborne Pathogens Exposure Control Plan: S. Everett MOVED to adopt the Plan. MOTION CARRIED UNANIMOUSLY.

5.8 Draft Inorganic Lead operations Safety Procedures: S. Everett MOVED to adopt the Procedures. MOTION CARRIED UNANIMOUSLY.

5.9 Draft Lockout/Tagout Program and Procedures: S. Everett MOVED to adopt the Program and Procedures. MOTION CARRIED UNANIMOUSLY.

6. COLUMBIA LAKE/DAM/BEACH

6.1 Application for Constructing Structures on or over the Lake by B. & C. Herpst: C. Vance MOVED to reject the Herpst application in consideration of Lake Management's recommendation. MOTION CARRIED UNANIMOUSLY.

6.2 Application for Constructing Structures on or over the Lake by A. Sposito: TABLED.

6.3 Memo from LMAC Chair dated 12/5/13: J. Luiz stated that funds budgeted for the gate would remain in the Capital Budget and be used to address certain capital issues at the Beach.

7. APPOINTMENTS/RESIGNATIONS

7.1 Appointment of Deputy Selectman: C. Vance MOVED to appoint S. Everett as Deputy Selectman. MOTION CARRIED UNANIMOUSLY.

7.2 Appointment of Walter Tabor (D) as alternate to Planning and Zoning Commission: W. O'Brien MOVED to appoint Walter Tabor (D) as alternate to Planning and Zoning Commission. MOTION CARRIED UNANIMOUSLY.

7.3 Appointment of Todd Shepard (R) to Financial Planning and Allocation Commission: addressed earlier on in the meeting.

8. TOWN ADMINISTRATOR REPORT: J. Luiz provided updates on the Baker Hill Road Bridge plans, Solarize Columbia-Lebanon, floater recruiting, Community Development Block Grant opportunities, Annual Report compilation, the Fiscal Year '12-'13 Audit, Winter Wonder Run and a $500 donation from St. Columbia to benefit the Town fuel fund.

9. CORRESPONDENCE

9.1 Thank you note from Commissioner Prague

9.2 Letter from Camp Care regarding 2013 and 2014

9.3 Article and explanatory materials relating to the School Performance Index

9.4 Letter from Troop K regarding monthly police services

9.5 FY '14-'15 Budget Instructions

10. BUDGET

10.1 Transfers: R. Bogue MOVED to approve the following FY '13-'14 transfers:

AMOUNT	FROM	TO
$150	10-4117-600, Meeting Place, Maint/Repairs	10-4117-120, Meeting Place, Telephone
$1,140	Contingency, 10-4800-900	10-4135-500, Financial Planning, Prof/Tech

MOTION CARRIED UNANIMOUSLY.

10.2 Refunds: R. Bogue MOVED to approve the following refunds:

AMOUNT	FROM	TO
$23.25	Town of Columbia	Bozena Waters
$47.35	Town of Columbia	Kevin M. Leist

MOTION CARRIED UNANIMOUSLY.

11. APPROVE PAYMENT OF BILLS: C. Vance MOVED to approve the regular payment of bills in the amount of $54,704.59. MOTION CARRIED UNANIMOUSLY.

12. BOARD MEMBER COMMENTS: None.

13. EXECUTIVE SESSION

13.1 Real Estate State Statutes Section 1-200(6)(D); Pending Litigation per State Statutes Section 1-200(6)(B); Personnel per State Statutes Section 1-200(6)(A). C. Vance MOVED to enter Executive Session at 9:35 pm with J. Luiz and Ann Dunnack present. MOTION CARRIED UNANIMOUSLY. A. Dunnack exited Executive Session at 9:50 pm. Executive Session ended at 10:05 pm.

14. ADJOURNMENT: C. Vance MOVED to adjourn at 10:06 pm. MOTION CARRIED UNANIMOUSLY. The next meeting of the BOS is scheduled for Tuesday, January 7, 2014 at 7:00 p.m.

Respectfully submitted by Jonathan Luiz.

Board of Selectmen Minutes 12/16/2013

BOARD OF SELECTMEN
Meeting Minutes

Regular Meeting **December 16, 2013**
Lower Level Conference Room **6:30 P.M.**

**Minutes are not official until approved at the next regular meeting*

First Selectman Mailhos called the meeting to order at 6:30 P.M. with the following in attendance: Selectmen Kowalyshyn & Blessington, Lynn Nicholls and residents. First Selectman Mailhos led the Pledge of Allegiance.

Approval of Minutes:

Selectman Blessington moved to approve the minutes of December 2, 2013 with the following amendment: under New Business/Appointments, first sentence should read, "First Selectman Mailhos gave a recap of the seats on the CIP Committee"
Selectman Kowalyshyn seconded the motion.
Vote 3 Yes (Mailhos Kowalyshyn & Blessington) 0 No.

Present to Speak:

No one.

Correspondence:

A list of correspondence was available at the meeting and in the Selectman's office.

First Selectman Status Report

First Selectman Mailhos did not have a chance to update the report, however she reported that the new trailer has been delivered and installed at the bus lot on Route 320. The Old Town Hall bids were expected to go out today, but we have not heard from the architect. Turnpike Road is expected to begin when the winter weather breaks and the submittals have been reviewed by the Town Engineer.

Public Works:

Lynn stated that the crews have been working to keep up with the weather.

A. Polster Road Bridge

Town Engineer Karl Acimovic was present to discuss the bridge. He noted that the State DOT has been looking at the Polster Road Bridge for a few months and it was found to be in a deteriorating state with the northern beam being most deteriorated. At that time, the state had recommended closing one lane of the bridge. Barricades were then put up, but were vandalized (thrown off the bridge and into the brook underneath). A few weeks ago, the State returned and performed another inspection and found the center beam to be deteriorated as well. Mr. Acimovic added that the corners of the bridge are in the worst shape and recommends shutting the bridge down entirely, however the State has recommended that the weight limit be reduced to 10 tons. With the reduction in weight, this means that tractor trailer trucks, busses, emergency apparatus and plow trucks are no longer able to travel over the bridge. Lynn expressed concern that tractor trailer trucks will not pay attention to the signs and would rather just shut the bridge down to avoid further damage to the bridge. She added that she, Karl and the Stafford Public Works Director had met to discuss the situation and Stafford Director of Public Works, Mr. Zulick was in agreement that the best thing to do is to close it down completely. She added that there are alternate routes residents can take.

First Selectman Mailhos asked what will happen if a tractor trailer does not see the sign? Selectman Kowaylshyn asked where the sign would be placed to let people know that the bridge is now closed. First Selectman Mailhos cautioned that we should inform the public and give residents ample time to prepare. She then asked how fast we can fix it and how much will it cost? Mr. Acimovic said he prepared pricing back in October based on a new "super structure", but noted that we also have scour issues at the footings of

the bridge and the beams will need to be replaced. The abutment concrete walls are in good shape. The super structure includes new beams and decking at a cost of $56,000 (which includes delivery), however, the labor could bring the total between $250,000 and $350,000. The higher amount reflects an alteration (widening) the swing at the end of the bridge, which will alleviate tractor trailer trucks taking out the guard rail at the end of it. Right now there is a sharp curve at the end of the bridge and the rail has been taken out several times by the larger trucks. Mr. Acimovic then added that the work most likely will not be able to get done until spring.

First Selectman Mailhos noted that she has also requested for BOF to put this on their agenda for their meeting on Thursday.

Selectman Blessington asked who will be affected if the bridge is closed and how will they be affected. Lynn clarified that there are only three houses in Willington (and two in Stafford) on the other side of the bridge that will be affected. Lynn added that emergency vehicles have been notified and TN has set up mutual aid arrangements as well as plowing arrangements with the town of Stafford.

First Selectman Mailhos stated that we should also contact the companies who use the bridge by sending them a letter to inform them and make them aware. Lynn cautioned that the problem is not with the local drivers, (referencing Fed Ex) it is the ones from out of town. Christine Psathas asked why allow commercial vehicles on that road anyways? Lynn clarified that we cannot close roads down to any vehicle, (when in good condition) but can suggest that they are not allowed to use the road. She then clarified that the signs that are placed on the road (that note the weight limit of the bridge) have been approved by the State because of the condition of the bridge only. First Selectman Mailhos clarified that the signs have not been up that long and if they choose to ignore it, they do so at their own peril.

Mr. Acimovic added that he has no confidence in the bridge, and feels it is no longer a safe structure. He added that it might be ok today, tomorrow or even weeks from now, but we cannot predict the breaking point. First Selectman Mailhos warned that this might take longer than expected, as we have not budgeted for this. The idea of funding it this fiscal year needs to be sold to the BOF, and then we will need zoning permits and possibly an 8-24 review. Discussion was held on the process of closing the bridge. A date should be chosen and the residents must be notified and a public notice should be sent out, as well as a public notice in Stafford.

First Selectman Mailhos moved to close Polster Road Bridge as of December 30, 2013 to all traffic and notify the public until further notice.
Selectman Blessington seconded the motion.
Vote 3 Yes (Mailhos Kowalyshyn & Blessington) 0 No.

New Business

A. Appointments

First Selectman Mailhos moved to appoint Heather Dionne as a regular member of the Inland Wetlands & Watercourse Commission, effective December 16, 2013, expiring May 15, 2016
Selectman Blessington seconded the motion
Vote: 3 Yes (Mailhos, Kowalyshyn & Blessington) 0 No.

First Selectman Mailhos moved to re-Appoint Greg Blessing as an alternate member of the Inland Wetlands & Watercourse Commission, effective December 16, 2013, expiring May 15, 2016.
Selectman Kowalyshyn seconded the motion
Vote: 3 Yes (Mailhos, Kowalyshyn & Blessington) 0 No

First Selectman Mailhos moved to re-appoint Robert Shabot as a regular member of the Willington Historical District, retro-active January 1, 2013; expiring January 1, 2018
Selectman Blessington seconded the motion
Vote: 3 Yes (Mailhos, Kowalyshyn & Blessington) 0 No

First Selectman Mailhos moved to appoint Tara Bergeron as the Town of Willington Agent for the Elderly – effective December 16, 2013 expiring December 7, 2015.
Selectman Kowalyshyn seconded the motion
Vote: 3 Yes (Mailhos, Kowalyshyn & Blessington) 0 No

First Selectman Mailhos moved to re-appoint Mike Pinatti as a regular member of the Willington Parks & Recreation Commission, effective December 16, 2013, expiring December 15, 2016
Selectman Blessington seconded the motion
Vote: 3 Yes (Mailhos, Kowalyshyn & Blessington) 0 No

First Selectman Mailhos moved to re-appoint Joe Colangelo as a regular member of the Willington Parks & Recreation Commission, effective December 15, 2013, expiring December 15, 2016

Selectman Kowalyshyn seconded the motion
Vote: 3 Yes (Mailhos, Kowalyshyn & Blessington) 0 No

First Selectman Mailhos noted that the Park & Recreation Commission still has a vacancy. The Commission has received letters of interest, but the Board of Selectmen has not received a letter of recommendation yet. She thinks it is because they have not met in a while.

B. Public Comment – Hazard Mitigation Plan

Dagmar Noll of the Windham Region Council of Governments presented the draft of the Hazard Mitigation Plan. Ms. Noll has been working on the plan, which our individual plan is part of a regional plan. Ms. Noll is hopeful to have the draft finalized by the end of January, with public comments sent to her by the end of this month. Once the draft is finalized, she will send it to the State, and it should then be adopted next summer. Once the plan is integrated, it will allow us to continue to apply for FEMA reimbursement in the event of an emergency. If we do not have a plan in place, we will not be eligible for reimbursement.

Ms. Noll stated that she has been working on this plan with DEEP, our Town Engineer, Lynn and Stuart Cobb for several months. The plan was last done in 2007. The plan, which was handed out to residents was then discussed. Ms. Noll encouraged everyone to review the plan and submit any changes they would like to see in the document by December 31st. Public Comments should be addressed to Robin Campbell, who will then forward to our Emergency Management Director, Stuart Cobb. The Board of Selectmen will then either approve the draft at the January 6th meeting. Ms. Noll noted that the plan should not have anything deleted from it, but rather annotated with changes, so the history will remain in the document.

First Selectman Mailhos asked if this plan will move with us when we move to CRCOG? Ms. Noll stated that she is not sure yet, as the plan is not expected to be finalized until August of 2014 and at that time, it is most likely WINCOG will be dissolved.

A copy of the plan (and a link to the WINCOG website to view the entire regional plan) is listed on the Town of Willington website: www.willingtonct.org

Comments/ change requests should be directed to Robin Campbell: RCampbell@willingtonct.org

C. Tax Refund

First Selectman Mailhos moved to refund $205.36 to Ally Financial, Louisville, KY for a credit of a sold vehicle.
Selectman Kowalyshyn seconded the motion.
Vote: 3 Yes (Mailhos, Kowalyshyn & Blessington) 0 No

D. Call Town Meeting – January 14, 2014

First Selectman Mailhos moved and read the call of the meeting:

TOWN OF WILLINGTON
NOTICE AND WARNING
SPECIAL TOWN MEETING

The electors of the Town of Willington and all persons who are entitled to vote in Town Meeting on the matters mentioned in the following warning are hereby warned and notified to meet in Town Meeting at the Willington Town Office Building; 40 Old Farms Road, Willington, at 7:00 P.M. on Tuesday, January 14, 2014 for the following purpose:

ITEM I

To see if the townspeople, on the recommendation of the Board of Selectmen will adopt a resolution to authorize the Willington Board of Education to apply to the Commissioner of Education and to accept or reject a grant for roof replacement on a portion of Center Elementary School.

ITEM II

To see if the townspeople will adopt a resolution that authorizes the Board of Education to form a Committee and will hereby be established as the Building Committee with regard to the roof replacement on a portion of Center Elementary School.

ITEM III

To see if the townspeople will adopt a resolution to at least prepare schematic drawings and outlines specifications for the roof replacement on a portion of Center Elementary School.

ITEM IV

A presentation and discussion of a 7 year Lease/Purchase Agreement for new pick up truck and new ambulance for Willington Fire Department #1. **(No vote on this item)**

ITEM V

A presentation and discussion of a 3 year Lease/Purchase Agreement for a used 1995 Elgin sweeper for Public Works. **(No vote on this item)**

ITEM VI

A presentation and discussion of a 5 year Lease/Purchase Agreement for a used backhoe for Public Works. **(No vote on this item)**

Dated at Willington,
This 16th day of December, 2013 - Willington Board of Selectmen
Selectman Kowalyshyn seconded the motion.

First Selectman Mailhos noted that the last three items on the agenda were originally warned at the last BOS meeting to be held during a public hearing; however the BOE needs to have the first three items go to Town Meeting ASAP, because there is a leak at Center School. In order to apply for a grant to cover the costs, they need to go to Town Meeting to get approval and it is easier to hold one meeting for everything.
Vote: 3 Yes (Mailhos, Kowalyshyn & Blessington) 0 No.

E. CIP Requests

First Selectman Mailhos stated that the CIP Committee held their first meeting last week. CIP requests are due to the CIP Committee by December 31st. The following requests will be submitted, and First Selectman Mailhos wanted to run it by the Board.

TOB roof & gutters: estimated at $80,000. First Selectman Mailhos clarified that the roof was done this past year over the oldest part of the building, and this request is for over the Common Room area. The roof has some areas with leakage but does not affect any of the work areas. The $80,000 request will cover planning and construction.

Old Town Hall Renovations: estimated at $125,000 for FY 16-17. This estimate is based on the structural assessment that was done by the Architect this past year. While we have STEAP funding to cover the list of urgent items and those are happening this year. First Selectman Mailhos would like to finish the other needed items on the list.

TOB renovations assessment: Estimated at $70,000; First Selectman Mailhos stated that she asked for this last year, but was not successful. She feels the assessment is important because we need to determine what repairs are needed on this building (structural/electrical/ plumbing, etc) and make it user friendly for the employees. It is estimated to cost $20,000 and would be for FY 14-15. The second phase would be the construction to be done FY 2015-2016, cost $50,000.

Masonry/door replacement at the TOB: Estimated at $45,000; FY 14-15. Several sections of the foundation are cracked and are losing stone due to age. The back door is rusting and leaking also due to age.

Land Use Software: Estimated cost: TBD. First Selectman Mailhos stated that she is still waiting for an estimated cost by our Land Use Department. The software would be utilized by the land use office to streamline applications. The Building Inspector would also be able to use the software on different job sites. Selectman Blessington asked why this is on the CIP, rather than a budgeted item. First Selectman Mailhos clarified that she is not sure where to put this request until she gets the real estimate. She added that this software is also what is used with CRCOG and can also be used in the Assessor's office.

Nutmeg Network: Estimated cost: $70,000 ($20,000 – consulting & $50,000 construction costs); First Selectman Mailhos stated that she is not sure if she is going to add this to the CIP, as it is going to end up costing us more than what we are paying now.

Selectman Blessington suggested that the Daleville School Road Bridge should be added to the list, as it is in poor condition. Lynn stated it is on the Public Works CIP list, but for an "out year" and it might end up as a bonded item with other projects. First

Selectman Mailhos warned that sometimes it is not realistic to load up the work in one year, because we are limited with manpower. We need to pace the work.

F. Set Budget Workshop Calendar

First Selectman Mailhos referenced an email that was sent by the Business Manager with the budget schedule. The department budgets will be due by December 30th and the BOS budget will be presented to the Board of Finance on February 20th, leaving the final budget to be submitted to BOF by February 13th. With that date in mind, First Selectman Mailhos clarified that the final budget must be approved by the BOS at the February 3, 2013 regular meeting or at a special meeting to be scheduled.

Budget workshops will be held on the following dates: Monday, January 6 (before the regular meeting); Monday, January 13th and Tuesday, January 21st (before the regular BOS meeting). All meetings will be held at 5:15 PM.

First Selectman Mailhos noted that she feels this year will not be a particularly onerous budget season; the union increases are at 2.25% and will not have a big impact on the bottom line. Electricity and fuel are also locked in at lower rates. Workman's comp will not exceed 3% and insurance is maxed at 9%, which is lower than anticipated. Also, Region 19 and our BOE budgets are shaping up to be favorable. The Board of Finance will let us know what to expect at their upcoming meeting this Thursday, December 19th.

Good & Welfare

Lynn Nicholls mentioned that someone called her to tell her Willington was on the Channel 7 news on Sunday, which stated that Willington had the best roads in the state; post snowstorm. (They were broadcasting from the Sunoco station on Route 32). Lynn commended her crews for their hard work and was proud to hear that.

First Selectman Mailhos extended condolences to the Parizek family, for the recent loss of Mr. Ralph Parizek.

First Selectman Mailhos mentioned a citizen request she received, which requested having the library put up photos of the former head librarians and/or former directors up somewhere in the library, which would be nice to have at the library. She will follow up on that and send a letter to the Library Board.

First Selectman Mailhos thanked the PW crews for keeping our roads clear during the recent storms.

Selectman Kowalyshyn moved to adjourn the meeting at 8:28 P.M.
First Selectman Mailhos seconded the motion
Vote: 3 Yes (Mailhos, Kowalyshyn & Blessington) 0 No

Respectfully submitted,
Robin Campbell
Administrative Assistant

12/12 Thurs

Coventry Public Info Session

6 PM – 7:30 PM

Name	Association
ERIC TROTT	TOWN OF COVENTRY
NOEL WAITE	Town of Coventry EMD
David R. Gotsch	TOC - PWD

3/4

Lebanon Public Info Session Natural Hazard Mitigation

Name	Town / Affiliation
Michelle Firestone	The Chronicle newspaper
Ryan Blessing	Norwich Bulletin
Mark DeCagni	Lebanon EMD
Philip Chester	Town Planner
Jayce Okonuk	FIRST SELECTMAN
Brandon Handfield	Director Public Works

TOWN OF LEBANON CONNECTICUT

Town Hall
579 Exeter Road
Lebanon, CT 06249
860.642.2011
Fax: 860.642.7716

Hours
Monday, Thursday & Friday - 8:00am-4:00pm
Tuesday: 8:00am-6:00pm
Closed Wednesday
Individual Department Hours May Vary



HOME
TOWN DEPARTMENTS
BOARDS
COMMITTEES
COMMISSIONS
COMMUNITY
FARMERS' MARKET
CALENDAR
DOCUMENTS AND RESOURCES
KEY LINKS
CONTACT
VISITOR INFO
YOUR STATE & FEDERAL REPRESENTATIVES

Natural Hazards Mitigation Plan Public Information Session

This event is scheduled for

TUE, MAR 04, 2014 STARTING AT 3:00 PM

at Lebanon Town Hall - Upper Level Conference Room

There will be a Natural Hazards Mitigation Plan Public Information Session on Tuesday, March 4, 3:00 - 4:00 p.m. in Lebanon Town Hall Upstairs Conference Room Town officials will be present and available to answer questions about the Lebanon Natural Hazards Mitigation Plan and welcome input from the public.

[Return to Calendar]

Downloads:

- Other Information

Resources:

-- No resources available --

EMERGENCY MANAGEMENT
Upload Minutes/Agendas

Boards and Commissions:

Boards

- Board of Assessment Appeals
- Board of Education
- Board of Finance
- Board of Selectmen
- Flood & Erosion Control Board
- Jonathan Trumbull Jr. House Board of Historical Preservation
- Library Board of Trustees
- Regional Animal Control District Board of Directors
- Village Business District Design Review
- Village Green District Design Review
- Water Pollution Control Authority
- Zoning Board of Appeals

Commissions

- Cemetery Commission
- Charter Commission

Appendix III: DEEP's List of Potential Natural Hazard Mitigation Measures

Appendix III
CT DEP's List of Potential Natural Disaster Mitigation Measures

Avalanche
Coastal Erosion
Coastal Storm
Dam Failure
Drought
Create cooperative Federal/non-Federal drought contingency plans for rapid implementation during water shortages
Develop an early warning system
Evaluate the current use of ground water
Establish new data collection networks
Study public willingness to pay more for more reliable water supplies
Study effectiveness of conservation measures
Monitor vulnerable public water supplies
Pass legislation to protect and manage ground water
Provide funds for water recycling projects
Organize drought information meetings for the public and media
Implement water conservation awareness programs
Assist water agencies in developing contingency plans
Establish stronger economic incentives for private investment of water conservation
Implement water metering and leak detection programs
Adopt an emergency water allocation strategy to be implemented during severe drought
Evaluate worst-case drought scenarios for possible further actions
Earthquake
Expansive Soil
Extreme Heat (heat wave)
Flood
Encourage neighborhood preservation/revitalization for floodproofing techniques
Elevate structures above the 100-year flood level
Maintenance program to clear debris from stormwater drainage areas
Provide information to contractors and homeowners on the risks of building in hazard-prone areas and mitigation
Provide the public with Federal Emergency Management Agency (FEMA) floodplain maps
Develop a list of techniques for homeowner self-inspection an implementation of mitigation activities
Install backflow valves in sewer systems

Appendix III
CT DEP's List of Potential Natural Disaster Mitigation Measures

Incorporate a "hazard disclosure" requirement for deed transfers, leases, or other contracts for sale or exchange of property in flood hazard areas
Develop sediment control to prevent clogged drainage systems such as street sweeping, curb and gutter cleaning, paving dirt roads, and planting vegetation on bare ground
Investigate the use of flood prone areas as open space
Retrofit critical facilities
Purchase flood insurance
Know evacuation routes
After a flood, inspect foundations of buildings for cracks and other damage
Make sure buildings are not in danger of collapsing
Encourage building inspection by a hazard mitigation professional
Retrofit:
Elevate the lowest floor above the 100-year flood level
Wet floodproofing (allowing water to enter uninhabited areas of the structure)
Dry floodproofing (sealing the structure to prevent flood waters from entering)
Levees and floodwalls (constructing a barrier around the structure to keep out flood waters)
Demolition (tearing down the structure and rebuilding with appropriate floodproof techniques or relocating the structure)
Elevate the main breaker or fuse box
Hurricane
Encourage neighborhood preservation/revitalization for wind damage retrofitting
Provide information to contractors and homeowners on the risks of building in hazard-prone areas
Develop a list of techniques for homeowner self-inspection and implementation of mitigation activities
Implement dune restoration programs
Acquire shorefront land for open space
Develop a comprehensive sheltering system with funding provided for the acquisition and construction of shelters
Identify refuges of last resort for those unable to reach shelters
Implement a Tree Hazard Management Program to encourage responsible planting practices and minimize future storm damage to buildings, utilities, and streets
Encourage building inspection by a hazard mitigation professional
Practice a Tree trimming maintenance program
Relandscape with native species
Distribute hurricane preparedness information including pet sheltering plans
Encourage the purchase of flood insurance
Retrofit:
Wet floodproofing (allowing water to enter uninhabited areas of the houses)
Dry floodproofing (sealing the structure to prevent floodwaters from entering)
Install backflow valves on sewer systems
Venting on roofs
Garage doors with stiffer horizontal members
Glider tracks and track supports should be strengthened
In-place shutters
Hurricane straps and hurricane clips

Appendix III
CT DEP's List of Potential Natural Disaster Mitigation Measures

Reinforcement of concrete block wall; concrete tie-columns at all corners
Bracing with struts or pilaster columns in walls perpendicular to freestanding walls
Elevation of structures by piers, posts and columns and pilings
Adequate connection or anchoring of each element to the adjacent element
Add shutters for glazed openings
Renail sheathing
Create a secondary water barrier
Provide support for sliding glass doors and double doors opening to the outside
Improve anchorage of windows to openings
Add ridge ventilators to reduce uplift of wood sheathing
Strengthen garage doors and particularly double-wide garage doors
Anchor adjacent structures, including privacy fences, pool enclosures, and patio roofs
Improve connections of porch roofs and overhangs
Reinforce entry doors
Modify building codes:
Hip roofs instead of gable
Metal panels that simulate tile instead of tile roofs
Consistent mortar pad placement
Full 10-inch mason's trowel of mortar on tile roofs
4 to 6 inch nail spacing on sheathing panel
Venting on roofs
Garage doors with stiffer horizontal members
Multiple-panel sliding glass doors and windows should be avoided
Individual panel width should be no more than 3 feet
Total window and door openings should be no more than 30% of the wall's total area
Shatter-resistant transparent material
Improved adherence to adequate attachment procedures
Hurricane straps and hurricane clips
Reinforcement of concrete block walls; concrete tie-columns at all corners
Bracing with struts or pilaster columns in walls perpendicular to freestanding walls
Walls sufficiently anchored in the foundation or story below
Adequate connection or anchoring of each element to the adjacent element
Require hurricane shelters on multi-unit housing
Construction products examined by independent laboratories under the guidance of the county compliance office
Contractors must install high-quality shutters or strong "impact" glass, like that found in car windshields in each new single family home
Ice Jam
Land Subsidence

Appendix III
CT DEP's List of Potential Natural Disaster Mitigation Measures

Landslide
Severe Winter Storm
Thunderstorm
Clear dead or rotting trees and branches
Public information on when to turn off gas, electricity, and water; how to develop an emergency communication plan; and actions to take during a severe thunderstorm such as avoiding bathtubs, water faucets, and sinks
Secure outdoor objects that could become projectiles
Install lightning rods
Encourage purchase of flood insurance
Tornado/Wind Damage
Telephone warning system
Community warning sirens
NOAA weather radio tone alerts
Underground shelter actions to be taken during hurricanes and tornadoes need better distinction
Modify building codes to include an interior reinforced "safe room"
Retrofit structures to include reinforced "safe room"
Tsunami
Volcano
Wildfire Hazard
Acquire land susceptible to fire for conversion to open space
BEHAVE (Fire Behavior Prediction and Fuel Modeling System)
METAFIRE (National information system that transmits daily severity index values for every climate division in the county)
Move shrubs and other landscaping away from the sides of the structure
Clean brush and dead grass from the property
Public information on safe fire practices (build away from nearby trees or bushes, fire extinguisher availability)
Building code modification:
Fire-resistant materials when renovating, building, and retrofitting
Create a safety zone between the structure and combustible plants and vegetation (stone walls, swimming pools)
Install power lines underground
Install tile, fire-retardant shingles, asphalt, fiberglass, concrete tile, or metal on the roof
Plant trees in clusters so that there are gaps in the tree branch canopies overhead
Use alternatives to wood and other combustible materials such as brick, stone, or metal when building walls
Prescribed burns
Keep trees trimmed so there is no contact with power lines or other wires

Appendix III
CT DEP's List of Potential Natural Disaster Mitigation Measures

Cut back tree limbs that overhang the structure
Remove combustible debris from around the structure
All Hazards
Map vulnerable areas and distribute information about the hazard mitigation strategy and projects
Provide information to contractors and homeowners on the risks of building in hazard-prone areas
Develop a list of techniques for homeowner self-inspection an implementation of mitigation activities
Organize and conduct professional training opportunities regarding natural hazards and hazard mitigation
Distribute NOAA weather radios (school superintendents, etc.)
Sound land use planning based on known hazards
Enforcing effective building codes and local ordinances
Increasing public awareness of community hazards
Provide sites that are as free as possible from risk to natural hazards for commercial and industrial activities
Consider conservation of open space by acquisition of repetitive loss structures
Ensure a balance among residential growth, conservation of environmental resources through a detailed analysis of the risks and vulnerability to natural hazards
Joint planning and sharing of resources across regions, communities, and states
Establish a hazard mitigation council
For future proposed development design guidelines, incorporate hazard mitigation provisions, including improved maps
Add a "safe room" requirement for all new buildings

Resources:

This data was provided by the State NFIP Coordinator in the Flood Management Section of the Department of Environmental Protection, 2004 .

Appendix IV: Mitigation Task Rating Sheet

Mitigation Strategies and Actions for the former WINCOG Communities of Columbia, Coventry, Lebanon, Mansfield, Willington, and Windham	Hazard Mitigated									Responsible Department[1]	Timeframe	Cost[2]	Potential Funding Sources[3]	Weighted STAPLEE Criteria[4]														Total STAPLEE Score
														Benefits								*Costs*							
	Dam Failure	Drought	Earthquakes	Flooding (including Ice Jams)	Hurricanes	Severe Winter Storms	Thunderstorms	Tornado/Wind Damage	Wildfires					Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	**STAPLEE Subtotal**	Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	**STAPLEE Subtotal**	
COLUMBIA STRATEGIES AND ACTIONS																													
Upgrade drainage on Hennequin Road, upgrading/retrofitting all culverts on the west side of Hennequin Road, from Recreation Park to Lake Road				X	X	X	X			PW	7/2015-6/2016	High	STEAP, Municipal/CI, HMA	1	1	1	1	1	0.5	0.5	**7.5**	-0.5	0	0	0	0	-1	0	**-2.5**	**5.0**
Encourage CT DOT to upgrade drainage system on Route 87 west of Lake Road to Curland and Vanderbilt to mitigate against icing				X	X	X	X			FS, TA	7/2015-6/2020	Minimal	Municipal/OB	1	0.5	1	1	1	0.5	0.5	**6.5**	0	0	0	0	0	0	0	**0.0**	**6.5**
Upgrade drainage system at Parker Bridge Road. Elevate road with cross culverts to mitigate against flooding				X	X	X	X			PW	7/2019-6/2020	High	STEAP, Municipal/CI, HMA	1	1	1	1	1	0.5	0.5	**7.5**	-0.5	0	0	0	0	-1	0	**-2.5**	**5.0**
Replace culvert pipe and possible basin retrofit at Macht Road				X	X	X	X			PW	7/2015-6/2016	Moderate	STEAP, Municipal/CI, HMA	1	1	1	1	1	0.5	0.5	**7.5**	-0.5	0	0	0	0	-0.5	0	**-1.5**	**6.0**
Identify location for secondary access to Island Woods subdivision and prepare and file map of proposed street in the office of the Town Clerk in accordance with CT General Statute Section 8-29			X	X	X	X	X	X	X	EM, PW, TP	7/2015-6/2018	Low	Municipal/OB	1	1	1	1	1	0	0.5	**6.5**	-0.5	0	0	0	-0.5	0	0	**-1.0**	**5.5**
Increase the amount of preventative tree maintenance					X	X	X	X	X	PW (TW)	7/2015-6/2020	Moderate	Municipal/OB	1	1	1	1	1	1	0	**8.0**	0	0	-0.5	0	0	-0.5	0	**-1.5**	**6.5**
Encourage tree management along private roads through public education on street plantings using Eversource Energy brochures					X	X	X	X	X	PW (TW); EV	7/2015-6/2020	Low	Municipal/OB, Eversource	1	0.5	1	1	1	0.5	0	**6.0**	0	0	0	0	0	0	0	**0.0**	**6.0**
Install fire protection water cistern at Island Woods subdivision							X		X	TA, EM, PW	7/2015-6/2017	Moderate	STEAP, Municipal/CI, HMA	1	1	1	1	1	1	0.5	**8.5**	-0.5	0	0	0	-0.5	-0.5	0	**-2.0**	**6.5**
Create maps illustrating the inundation zone of all high hazard dams and distribute information to property owners within inundation area and info on emergency notification system	X									TA, EM, TP	7/2017-6/2018	Low	Municipal/OB	1	1	1	1	1	0.5	0	**7.0**	0	0	0	0	0	0	0	**0.0**	**7.0**
Create Emergency Operations Plan for Columbia Lake Dam (in progress)	X									TA, EM	7/2015-6/2016	Moderate	Municipal/OB	1	1	1	1	1	0.5	0	**7.0**	0	0	-0.5	0	0	-0.5	0	**-1.5**	**5.5**
Update single-lane Roses Bridge Road/Pucker Street bridge to a double-lane bridge				X	X	X	X	X		PW	7/2015-6/2017	High	STEAP, Municipal/CI, HMA	0.5	1	1	1	1	0.5	0	**6.5**	-0.5	-0.5	0	0	-0.5	-0.5	0	**-3.0**	**3.5**
Distribute informational materials regarding emergency preparedness. Make 1,000 copies available at the senior center, events, and town hall. Use Columbia Crossroads newsletter to notify residents of other resources.	X	X	X	X	X	X	X	X	X	TA, EM	7/2015-6/2020	Low	Municipal/OB	1	1	1	1	1	0.5	0	**7.0**	0	0	0	0	0	0	0	**0.0**	**7.0**
COVENTRY STRATEGIES AND ACTIONS																													
Update single-lane Pucker Street bridge to a double-lane bridge with increased water capacity				X	X	X	X	X		TE	7/2015-6/2017	High	STEAP, Municipal/CI, HMA	0.5	1	1	1	1	0.5	0	**6.5**	-0.5	-0.5	0	0	-0.5	-0.5	0	**-3.0**	**3.5**
Seek grant for large 2,000 gallon tanker fire apparatus							X		X	EM	7/2015-6/2020	Low	Municipal/OB	1	1	1	1	1	1	0.5	**8.5**	0	0	0	0	0	0	0	**0.0**	**8.5**
Improve the intersection of South Street, Swamp Road, and Swamp Road Extension where there are drainage problems				X	X	X	X			TE	7/2018-6/2019	High	STEAP, Municipal/CI, HMA	1	1	1	1	1	0.5	0	**7.0**	-0.5	0	0	0	0	-1	0	**-2.5**	**4.5**
Improve roads around the lake area where there are flash flooding issues				X	X	X	X			TE, PW	7/2015-6/2020	High	STEAP, Municipal/CI, HMA	1	1	1	1	1	1	0.5	**8.5**	-0.5	-0.5	0	0	0	-1	0	**-3.5**	**5.0**
Substantially change the collection of stormwater and improve redistribution through silted-in ponds along Mill Stream in the village from Coventry Lake to the Willimantic River				X	X	X	X			TE, CT DOT	7/2015-6/2016	High	STEAP, Municipal/CI, HMA	1	0.5	0.5	0.5	1	0.5	0.5	**5.5**	0	0	-1	0	-1	-1	0	**-4.0**	**1.5**
Upgrade all town plows to salt/slurry mixture spreaders						X				PW	7/2015-6/2020	High	Municipal/OB	1	1	1	1	1	0.5	0	**7.0**	0	0	0	0	0	-0.5	-1	-0.5	**-3.0**	**4.0**
Based on the results of the hazardous tree survey, remove dead, dying, dangerous, or diseased trees. Focus on the Ash tree which is suffering a massive regional die-off due to insect infestation					X	X	X	X		PW (TW)	7/2015-6/2020	Moderate	Municipal/OB	1	1	1	1	1	0.5	0.5	**7.5**	0	0	0	0	0	-0.5	0	**-1.0**	**6.5**
Upgrade town-wide communication system	X	X	X	X	X	X	X	X	X	EM	7/2015-6/2020	Moderate	Municipal/CI, EOC	1	1	1	1	1	1	0.5	**8.5**	0	0	0	0	0	-0.5	0	**-1.0**	**7.5**
Educate the public on tree planting around power lines			X		X	X	X	X		TW	7/2015-6/2020	Low	Municipal/OB	1	0.5	0.5	1	1	0.5	0.5	**6.0**	0	0	0	0	0	0	0	**0.0**	**6.0**
Visit schools and educate children about the risks of floods and other natural hazards and how to prepare for them	X		X	X	X	X	X	X	X	PD, FM	7/2015-6/2020	Low	Municipal/OB	1	0.5	0.5	1	1	0.5	0	**5.5**	0	0	0	0	0	0	0	**0.0**	**5.5**
Make available literature on natural disasters and preparedness at Coventry Town Hall and at the Booth & Dimock Memorial Library	X	X	X	X	X	X	X	X	X	PD, FM	7/2016-6/2018	Low	Municipal/OB	1	1	1	1	1	0.5	0	**7.0**	0	0	0	0	0	0	0	**0.0**	**7.0**
Make available information on natural disasters and preparedness on Coventry's website with links to state and federal resources	X	X	X	X	X	X	X	X	X	PD, FM	7/2016-6/2018	Low	Municipal/OB	1	1	1	1	1	0.5	0	**7.0**	0	0	0	0	0	0	0	**0.0**	**7.0**
Conduct a study and acquire property in the floodplain through grants and donations	X			X	X	X	X			TP, CC	7/2015-6/2020	High	STEAP, HMA, Municipal/OB	0.5	1	1	1	1	1	0.5	**8.0**	-0.5	-0.5	-0.5	0	-0.5	-1	0	**-4.5**	**3.5**
Design and improve Coventry Lake Gate, as it is currently compromised	X			X	X	X	X			TP, TE, TM, PW	7/2016-6/2018	High	STEAP, Municipal/CI	1	1	1	1	1	1	0.5	**8.5**	0	0	-0.5	0	0	-1	0	**-2.5**	**6.0**
Urge FEMA to conduct an engineered study of the town to develop more accurate FIRMs and floodway maps (ex. Cove Village area				X	X	X	X			TP	7/2015-6/2020	Minimal	Municipal/OB	1	0	1	1	1	0.5	0	**5.0**	0	0	0	0	0	0	0	**0.0**	**5.0**
LEBANON STRATEGIES AND ACTIONS																													
Rent or contract for giant vac-all or similar equiment to assist Public Works in keeping up to date with the removal of silt and leaves from the town's waterways along all town roads				X	X	X	X			PW	7/2015-6/2020	Moderate	Municipal/OB	1	0.5	1	1	1	0.5	0.5	**6.5**	0	-0.5	0	0	0	-0.5	0	**-2.0**	**4.5**
Contract for vehicle-mounted catch basin cleaning equipment to assist Public Works in keeping up-to-date with the removal of silt and leaves from catch basins				X	X	X	X			PW	7/2015-6/2020	Moderate	Municipal/OB	1	0.5	1	1	1	0.5	1	**7.0**	0	-0.5	0	0	0	-0.5	0	**-2.0**	**5.0**
Inventory all culverts and catch basins for upgrading and prioritze, schedule, and provide funding for their upgrade				X	X	X	X			PW	7/2016-6/2018	Moderate	STEAP, Municipal/CI, HMA	1	1	1	1	1	1	0	**8.0**	0	0	-0.5	0	0	-0.5	0	**-1.5**	**6.5**
Remove McGrath Lane #2 bridge crossing the Yantic River				X	X	X	X			PW	7/2018-6/2020	High	Municipal/CI	1	1	1	1	1	0.5	0.5	**7.5**	-0.5	0	0	0	0	-1	0	**-2.5**	**5.0**
Upgrade Chappell Road bridge crossing Susquetonscut Brook				X	X	X	X			PW	7/2017-6/2019	High	STEAP, Municipal/CI, HMA	1	1	1	1	1	0.5	0	**7.0**	-0.5	0	0	0	0	-1	0	**-2.5**	**4.5**
Upgrade bridge stability; eliminate or replace wooden deck on Randall Road bridge			X	X	X	X	X			PW	7/2016-6/2018	High	STEAP, Municipal/CI, HMA	1	0.5	1	1	1	0	0	**5.0**	-0.5	0	0	0	0	-1	0	**-2.5**	**2.5**
Encourage ConnDOT to improve Route 87 from Waterman Road to the Franklin town line where drainage problems form puddles of water and ice resulting in many serious motor vehicle accidents				X	X	X	X			FS	7/2015-6/2020	Minimal	Municipal/OB	1	0.5	1	1	1	1	0	**7.0**	0	0	0	0	0	0	0	**0.0**	**7.0**
Encourage ConnDOT to replace culvert on Route 207 between North Street and Mack Road				X	X	X	X			FS	7/2015-6/2020	Minimal	Municipal/OB	1	0.5	1	1	1	0.5	0	**6.0**	0	0	0	0	0	0	0	**0.0**	**6.0**
Install generator at Senior Center to provide secondary or small capacity shelter and at all critical facilities	X		X	X	X	X	X	X	X	EM, BoS	7/2015-6/2020	High	Municipal/CI, HMA	1	1	1	1	1	0.5	0	**7.0**	0	0	0	0	0	-1	0	**-2.0**	**5.0**
Ensure that emergency shelters have adequate supplies to respond to natural disasters	X		X	X	X	X	X	X	X	EM, BoS	7/2015-6/2020	Moderate	Municipal/OB	1	1	1	1	1	0	0	**6.0**	0	0	0	0	0	-0.5	0	**-1.0**	**5.0**
Identify location for secondary access to Lake Shore Drive and prepare and file map of proposed street in the office of the Town Clerk in accordance with CT General Statute Section 8-29			X	X	X	X	X	X	X	TP	7/2015-6/2017	Low	Municipal/OB	0.5	1	1	1	1	0	0.5	**6.0**	-0.5	0	0	0	-0.5	0	0	**-1.0**	**5.0**
Identify projects that may be eligible for FEMA natural hazard mitigation grants				X	X	X				FS	7/2015-6/2020	Minimal	Municipal/OB	1	0.5	1	1	1	0	0	**5.0**	0	0	0	0	0	0	0	**0.0**	**5.0**
Make available literature on natural disasters and preparedness at Lebanon Town Hall, Public Library, Senior Center, and website	X	X	X	X	X	X	X	X	X	EM, BoS	7/2015-6/2020	Low	Municipal/OB	1	1	1	1	1	0.5	0	**7.0**	0	0	0	0	0	0	0	**0.0**	**7.0**
Mail emergency preparedness informational materials to every residence	X	X	X	X	X	X	X	X	X	EM, BoS	7/2017-6/2018	Low	Municipal/OB	1	1	1	1	1	0.5	0	**7.0**	0	0	0	0	0	0	0	**0.0**	**7.0**
Develop a long-term plan to bury power lines in existing development			X	X	X	X	X	X	X	TP	7/2016-6/2018	Low	STEAP, Municipal/OB	1	0.5	1	0.5	1	0	0	**4.5**	0	0	0	0	0	0	0	**0.0**	**4.5**

Mitigation Strategies and Actions for the former WINCOG Communities of Columbia, Coventry, Lebanon, Mansfield, Willington, and Windham	Hazard Mitigated									Responsible Department[1]	Timeframe	Cost[2]	Potential Funding Sources[3]	Weighted STAPLEE Criteria[4]														Total STAPLEE Score
														Benefits								*Costs*								
	Dam Failure	Drought	Earthquakes	Flooding (including Ice Jams)	Hurricanes	Severe Winter Storms	Thunderstorms	Tornado/Wind Damage	Wildfires					Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	**STAPLEE Subtotal**	Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	**STAPLEE Subtotal**	
MANSFIELD STRATEGIES AND ACTIONS																													
Develop a list of quick-filling catch basins with low silt capacity for placement on a priority list for monitoring and more frequent cleaning				X	X	X	X			PW	7/2015-6/2017	Moderate	Municipal/OB	1	1	1	1	1	0.5	1	**8.0**	0	0	-0.5	0	0	-0.5	0	**-1.5**	**6.5**
Purchase or rehabilitate Vac-all equipment for silt removal				X	X	X	X			PW	7/2017-6/2018	High	Municipal/CI	1	1	1	1	1	0.5	1	**8.0**	0	-0.5	0	0	0	-1	0	**-3.0**	**5.0**
Adopt new regulations requiring greater use of Green Infrastructure and Low Impact Development (LID) stormwater management practices				X	X	X	X			TP, PW	7/2015-6/2016	Low	Municipal/OB	1	1	1	1	1	1	1	**9.0**	0	0	0	0	0	0	0	**0.0**	**9.0**
Incorporate LID stormwater management practices into town projects as funding allows				X	X	X	X			PW	7/2015-6/2020	High	Municipal/CI, STEAP	1	0.5	0.5	1	1	0.5	1	**6.5**	0	0	0	0	0	-1	0	**-2.0**	**4.5**
Improve north side of Bassetts Bridge Road west of the bridge crossing the Naubesatuck Lake; this section of road is frequently washed out in high water events				X	X	X	X			PW	7/2017-6/2018	High	Municipal/CI, STEAP	1	1	1	1	1	1	0.5	**8.5**	0	0	0	0	0	-1	0	**-2.0**	**6.5**
Prepare Emergency Operations Plans (EOPs) for Town-owned and maintained dams	X									PW, EM	7/2015-6/2016	Moderate	Municipal/OB	1	1	1	1	1	0.5	0	**7.0**	0	0	-0.5	0	0	-0.5	0	**-1.5**	**5.5**
Implement recommendations resulting from inspections of Town-owned dams	X									PW	7/2015-6/2020	High	Municipal/CI	1	0.5	1	1	1	1	0.5	**7.5**	0	0	0	0	0	-1	0	**-2.0**	**5.5**
Encourage owners of private dams to develop EOPs and share with Town	X									EM	7/2015-6/2020	Minimal	Municipal/OB	1	0.5	1	1	1	0.5	0	**6.0**	0	0	0	0	0	0	0	**0.0**	**6.0**
Encourage owners of private dams to implement recommendations resulting from dam inspections	X									EM	7/2015-6/2020	Minimal	Municipal/OB	1	0.5	0.5	1	1	0.5	0.5	**6.0**	0	0	0	0	0	0	0	**0.0**	**6.0**
Advocate for federal and state agencies to allow dam repair as eligible grant activity for properties acquired by the Town for open space purposes	X									TP, EM	7/2015-6/2020	Minimal	Municipal/OB	1	0	1	1	1	0.5	0	**5.0**	0	0	0	0	0	0	0	**0.0**	**5.0**
Consider acquiring property on Laurel Lane that is isolated during flooding events.				X	X	X	X			EM, TP, OS	7/2015-6/2020	High	Municipal/CI, HMA	0.5	1	1	0.5	1	0	1	**6.0**	-0.5	0	0	0	0	-1	0	**-2.5**	**3.5**
Continue to monitor and work with property owners of five homes on Thornbush Road for possibilities to eliminate risk, including potential use of FEMA grants (these homes are in the flood zone and at times become inundated during high water events)	X			X	X	X	X			EM	7/2015-6/2020	High	Municipal/CI. HMA*	1	0.5	0.5	1	1	1	1	**7.5**	-0.5	0	-0.5	0	0	-1	0	**-3.0**	**4.5**
Monitor and evaluate areas on Higgins Highway (Route 31) that have flooded during large events for possible mitigation actions				X	X	X	X			EM, PW	7/2015-6/2020	Low	Municipal/OB	1	0.5	0.5	1	1	0.5	0	**5.5**	0	0	0	0	0	0	0	**0.0**	**5.5**
Continue to update zoning regulations for flood hazard areas to reflect best practices				X	X	X	X			TP, PZ	7/2015-6/2020	Low	Municipal/OB	1	1	1	1	1	0.5	0.5	**7.5**	0	0	0	0	0	0	0	**0.0**	**7.5**
Develop public education programming with regard to tree planting and maintenance on private property					X	X	X	X	X	EM, TP, OS	7/2016-6/2018	Low	Municipal/OB	1	0.5	0.5	1	1	0.5	0.5	**6.0**	0	0	0	0	0	0	0	**0.0**	**6.0**
Update regulations to encourage use of native species and reflect best practices in hazard mitigation					X	X	X	X	X	TP, PZ	7/2015-6/2016	Minimal	Municipal/OB	1	0.5	1	1	1	0.5	0.5	**6.5**	0	0	0	0	0	0	0	**0.0**	**6.5**
Continue to require underground installation of new utility lines in new subdivisions and encourage property owners to work with utility companies to explore possibilities for undergrounding existing lines			X	X	X	X	X	X	X	TP, PZ	7/2015-6/2020	Minimal	Municipal/OB	1	1	1	1	1	0.5	0	**7.0**	0	0	0	0	0	0	0	**0.0**	**7.0**
Continue to work with state and local partners for regional shelter planning and emergency response	X	X	X	X	X	X	X	X	X	EM, HS	7/2015-6/2020	Low	Municipal/OB	1	1	1	1	1	0	0	**6.0**	0	0	0	0	0	0	0	**0.0**	**6.0**
Acquire and install generators at critical local facilities	X	X	X	X	X	X	X	X	X	EM	7/2016-6/2019	High	Municipal/CI, HMA	1	1	1	1	1	0	0	**6.0**	0	0	0	0	0	-1	0	**-2.0**	**4.0**
Improve and expand the Town's GIS system to assist town personnel in the event of an emergency or natural disaster	X		X	X	X	X	X	X	X	PW, EM, TP	7/2016-6/2018	Moderate	Municipal/OB	0.5	0.5	1	1	1	0.5	0	**5.5**	0	0	0	0	0	-0.5	0	**-1.0**	**4.5**
Continue to improve communication technologies and efficiencies between the Emergency Operations Center (EOC) and other services including the University of Connecticut	X		X	X	X	X	X	X	X	EM	7/2015-6/2020	Moderate	Municipal/OB, EOC	1	0.5	1	1	1	0	0	**5.0**	0	0	0	0	0	-0.5	0	**-1.0**	**4.0**
Use various communication technologies including social media, town website, government access channel and standard media to educate and inform the public on how to prepare and respond to hazards and emergencies and to encourage them to be prepared to help others in need	X	X	X	X	X	X	X	X	X	EM, EHHD	7/2015-6/2020	Low	Municipal/OB	1	1	0.5	1	1	0.5	0	**6.5**	0	0	0	0	0	0	0	**0.0**	**6.5**
Maintain working relationships with utility companies to coordinate planning, response and recovery efforts	X		X	X	X	X	X	X	X	EM	7/2015-6/2020	Low	Municipal/OB	1	0.5	1	1	1	1	0	**7.0**	0	0	0	0	0	0	0	**0.0**	**7.0**
Make available literature on natural disasters and preparedness at Town Hall and the Library	X	X	X	X	X	X	X	X	X	EM	7/2016-6/2018	Low	Municipal/OB	1	0.5	0.5	1	1	0	0	**4.5**	0	0	0	0	0	0	0	**0.0**	**4.5**
Make available information on natural disasters and preparedness on the Town's website with links to state and federal resources	X	X	X	X	X	X	X	X	X	EM	7/2016-6/2018	Low	Municipal/OB	1	1	1	1	1	0.5	0	**7.0**	0	0	0	0	0	0	0	**0.0**	**7.0**
Consider creation of microgrids that can be disconnected from the main power grid that utilize renewable energy sources such as for the Town Hall, Community Center, and E.O. Smith High School which are important for storm recovery and shelter operations			X		X	X	X	X		EM, SC	7/2015-6/2020	High	Municipal/CI, PURA, STEAP	1	1	1	1	1	0.5	0.5	**7.5**	0	0	-0.5	0	0	-1	0	**-2.5**	**5.0**
Monitor best practices with regard to sustainable and resilient design and incorporate into town projects when feasible			X	X	X	X	X	X	X	TP, PW	7/2015-6/2020	Moderate	Municipal/OB and CI	1	0.5	0.5	1	1	0.5	0.5	**6.0**	0	0	0	0	0	-0.5	0	**-1.0**	**5.0**
Identify places in need, throughout town, and add alternative water sources.									X	EM, TP	7/2015-6/2017	Moderate	Municipal/CI	1	1	1	1	1	0.5	0	**7.0**	0	0	0	0	0	-0.5	-0.5	**-1.5**	**5.5**
Encourage developers to install water sources for fire protection and explore potential for a water source ordinance									X	EM, TP	7/2015-6/2020	Low	Municipal/OB	1	0.5	1	1	1	0.5	0	**6.0**	0	0	0	0	0	0	0	**0.0**	**6.0**
Educate property owners on vegetation clearing techniques that will reduce water runoff and reduce the amount of combustible fuel				X	X	X	X		X	EM	7/2015-6/2020	Low	Municipal/OB	1	0.5	0.5	1	1	0.5	0.5	**6.0**	0	0	0	0	0	0	0	**0.0**	**6.0**
Develop a public education program encouraging water conservation		X								SC, W/WWC	7/2015-6/2017	Low	Municipal/OB	1	0.5	0.5	1	1	0	0.5	**5.0**	0	0	0	0	0	0	0	**0.0**	**5.0**
Adopt water use restrictions during drought periods for public water supply customers based on stream flow conditions		X								TP, TC	7/2015-6/2016	Low	Municipal/OB	1	0.5	0.5	0.5	1	0	1	**5.0**	0	0	0	0	0	0	0	**0.0**	**5.0**
Develop communication strategy to better inform public of parking restrictions during snow events						X				PW	7/2015-6/2016	Low	Municipal/OB	1	0.5	1	1	1	0	0	**5.0**	0	0	0	0	0	0	0	**0.0**	**5.0**
Establish protocols for evaluation of snow loads on Town buildings						X				EM, BD	7/2015-6/2016	Low	Municipal/OB	1	1	1	1	1	0.5	0	**7.0**	0	0	0	0	0	0	0	**0.0**	**7.0**
Consider snow storage needs when updating street design specifications						X				PW, TP	7/2015-6/2020	Minimal	Municipal/OB	1	0.5	1	1	1	0.5	0	**6.0**	0	0	0	0	0	0	0	**0.0**	**6.0**

Mitigation Strategies and Actions for the former WINCOG Communities of Columbia, Coventry, Lebanon, Mansfield, Willington, and Windham	Hazard Mitigated									Responsible Department[1]	Timeframe	Cost[2]	Potential Funding Sources[3]	Weighted STAPLEE Criteria[4]														Total STAPLEE Score
														Benefits							*Costs*								
	Dam Failure	Drought	Earthquakes	Flooding (including Ice Jams)	Hurricanes	Severe Winter Storms	Thunderstorms	Tornado/Wind Damage	Wildfires					Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	**STAPLEE Subtotal**	Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	**STAPLEE Subtotal**	
WILLINGTON STRATEGIES AND ACTIONS																													
Encourage ConnDOT to improve drainage culverts and road grading on Route 320 to prevent periodic flooding and icing at the intersection of Hancock Road, at the culvert crossing of Ruby Pond discharge south of the Truck Stop facility just off I-84, at the culvert just south of the Town bus parking area, at the wetland beaver areas north of Cisar Road and north of Eldredge and Pinney Hill Roads, and at the culvert crossing at the north side of the Cosgrove Road intersection				X	X	X	X			FS	7/2015-6/2020	Minimal	Municipal/OB	1	0.5	1	1	1	0.5	0	**6.0**	0	0	0	0	0	0	-0.5	**-0.5**	**5.5**
Improvement of drainage culverts and installation of drainage facilities along Turnpike and Village Hill Roads to reduce flooding and icing problems				X	X	X	X			PW	7/2015-6/2017	High	Municipal/CI, STEAP	1	1	1	1	1	1	0.5	**8.5**	-0.5	0	0	0	0	-1	0	**-2.5**	**6.0**
Install new catch basins and drainage system along Village Hill Road				X	X	X	X			PW	7/2015-6/2017	High	Municipal/CI, STEAP	1	1	1	1	1	0.5	0.5	**7.5**	-0.5	0	0	0	0	-1	0	**-2.5**	**5.0**
Add dry hydrants or underground cisterns near wildfire susceptible areas of State forest and municipal woodlands within the central portion of the Town									X	PW, FD	7/2016-6/2018	Moderate	Municipal/CI	1	1	1	1	1	0.5	0.5	**7.5**	0	0	0	0	0	-0.5	-0.5	**-1.5**	**6.0**
Add dry hydrants in close proximity to new developments									X	PW, FD	7/2015-6/2020	Moderate	Municipal/CI	1	1	1	1	1	1	0	**8.0**	0	0	0	0	0	-0.5	-0.5	**-1.5**	**6.5**
Encourage ConnDOT to replace and upgrade the capacity of the Route 74 bridge over the Willimantic River, to reduce flood impact during severe storm events to the road and to adjacent dwellings	X			X	X	X	X			FS	7/2015-6/2020	Minimal	Municipal/OB	1	0.5	1	1	1	1	0	**7.0**	0	0	0	0	0	0	0	**0.0**	**7.0**
Replace the Kechkes Road Bridge over the Fenton River on Kechkes Road				X	X	X	X			PW	7/2015-6/2018	High	ConnDOT, Municipal/CI, STEAP	1	1	1	1	1	0.5	0	**7.0**	-0.5	0	0	0	0	-1	0	**-2.5**	**4.5**
Examine properties at the intersection of the Willimantic River and Route 74, where flooding occurs severe storm situations	X			X	X	X	X			LU	7/2015-6/2020	Low	Municipal/OB	1	0.5	0.5	0.5	1	0.5	0	**5.0**	-0.5	-0.5	-0.5	0	-0.5	0	0	**-2.5**	**2.5**
Ensure that the emergency shelters have adequate capability to respond to natural emergencies	X	X	X	X	X	X	X	X	X	BoS, FD	7/2015-6/2020	Low	Municipal/OB	1	1	1	1	1	0	0	**6.0**	0	0	0	0	0	0	0	**0.0**	**6.0**
Develop a GIS application to assist town personnel in the event of an emergency or natural disaster, including mitigation plan maps as layers	X	X	X	X	X	X	X	X	X	LU	7/2017-6/2019	Moderate	Municipal/OB	1	1	1	1	1	0.5	0	**7.0**	0	0	-0.5	0	0	-0.5	0	**-1.5**	**5.5**
Install generators at critical facilities	X	X	X	X	X	X	X	X	X	BoS	7/2015-6/2020	High	Municipal/CI, HMA	1	1	1	1	1	1	0	**8.0**	0	0	0	0	0	-1	0	**-2.0**	**6.0**
Publish all Town ordinances and regulations on Selectmen the Town's website, particularly those dealing with hazard mitigation for storms, flood events, and other natural hazards or disasters	X	X	X	X	X	X	X	X	X	BoS	7/2015-6/2020	Low	Municipal/OB	1	1	1	1	1	0.5	0	**7.0**	0	0	0	0	0	0	0	**0.0**	**7.0**
Procure tree bucket to help remove dead, dying, dangerous or diseased trees					X	X	X	X	X	PW	7/2016-6/2019	High	Municipal/CI	1	1	1	0.5	1	1	1	**8.5**	0	0	0	0	0	-1	0	**-2.0**	**6.5**
Education on planting trees using Eversource Energy literature					X	X	X	X	X	LU	7/2015-6/2017	Low	Municipal/OB	1	0.5	0.5	1	1	0.5	0.5	**6.0**	0	0	0	0	0	0	0	**0.0**	**6.0**
WINDHAM STRATEGIES AND ACTIONS																													
Procure silt removal equipment to remove silt from the town's storm drainage system				X	X	X	X			PW	7/2015-6/2017	High	Municipal/CI	1	0.5	1	1	1	0.5	1	**7.0**	0	0	0	0	0	-1	0	**-2.0**	**5.0**
Upgrade stone box culvert on Old Brooklyn Turnpike				X	X	X	X			PW	7/2017-6/2019	High	Municipal/CI, HMA	1	0.5	1	1	1	0.5	0	**6.0**	-0.5	0	0	0	0	-1	0	**-2.5**	**3.5**
Improve low lying Bridge St. bridge crossing the Willimantic River; this bridge is an important rerouting structure which floods numerous times a year. Study whether to upgrade or blast and dredge	X			X	X	X	X			PW	7/2015-6/2020	High	Municipal/CI, HMA*	0.5	1	1	1	1	1	0	**7.5**	0	0	-0.5	0	-0.5	-1	-0.5	**-3.5**	**4.0**
Upgrade dry wells on Lovers Lane to larger capacity, upgrade drainage system, and improve roads				X	X	X	X			PW	7/2016-6/2018	High	Municipal/CI, HMA	1	1	1	1	1	0.5	0.5	**7.5**	-0.5	0	0	0	0	-1	0	**-2.5**	**5.0**
Upgrade or acquire generators at critical facilities, prioritizing: Public Works (critical need), Water Works, the Police/Fire Complex, and all Windham Public Schools	X	X	X	X	X	X	X	X	X	EM	7/2015-6/2020	High	Municipal/CI, HMA	1	1	1	1	1	1	0	**8.0**	0	0	0	0	0	-1	0	**-2.0**	**6.0**
Install Roller Doors to protect windows in TOWN EOC from damage					X	X	X	X		EM	7/2017-6/2018	Moderate	Municipal/CI, EOC	1	1	1	1	1	0.5	0	**7.0**	0	0	0	0	0	-0.5	0	**-1.0**	**6.0**
Continue to improve and upgrade communication system between the EOC and other service providers, including Eastern Connecticut State University	X		X	X	X	X	X	X	X	EM	7/2015-6/2020	Moderate	Municipal/CI, EOC	1	1	0.5	1	1	0.5	0	**6.5**	0	0	0	0	0	-0.5	0	**-1.0**	**5.5**
Use a multitude of communication methods - social media, town web site, government & local media channels, radio stations - to inform and update town residents on what to prepare for before, during and after an emergency event	X	X	X	X	X	X	X	X	X	EM	7/2015-6/2020	Low	Municipal/OB	1	1	1	1	1	0.5	0	**7.0**	0	0	0	0	0	0	0	**0.0**	**7.0**
Provide pamphlets and literature on natural disasters and preparedness at the Town Hall and Library	X	X	X	X	X	X	X	X	X	EM	7/2015-6/2017	Low	Municipal/OB	1	0.5	0.5	1	1	0.5	0	**5.5**	0	0	0	0	0	0	0	**0.0**	**5.5**

1. Responsible Department
   - BD = Building Department
   - BoS = Board of Selectmen
   - CC = Conservation Commission
   - EV = Eversource Energy (Formerly Connecticut Light & Power)
   - CT DOT = Connecticut Department of Transportation
   - EHHD = Eastern Highlands Health District
   - EM = Emergency Management
   - FM = Fire Marshal
   - FD = Fire Department
   - FS = First Selectman
   - HS = Human Services
   - IW = Inland Wetlands Agency
   - LU = Land Use Office
   - OS = Open Space Preservation Committee
   - PD = Police Department
   - PW = Public Works
   - PZ = Planning & Zoning Commission
   - SC = Sustainability Committee
   - TA =Town Administrator
   - TC = Town Council
   - TE = Town Engineer
   - TM = Town Manager
   - TP = Town Planner
   - TW = Tree Warden
   - W/WWC = UConn Water and Wastewater Policy Advisory Committee

2. Costs:
   - Minimal = To be completed by staff or volunteers where costs are primarily printing, copying, or meetings and costs are less than $1,000;
   - Low = Costs are less than $10,000;
   - Moderate = Costs are less than $100,000;
   - High = Costs are > than $100,000.

3. Funding sources:
   - Eversource = Formerly Connecticut Light & Power
   - ConnDOT = Connecticut Department of Transportation Local Bridge Program
   - EOC = Emergency Operations Center grant (not currently active)
   - HMA = Hazard Mitigation Assistance
     - A * by "HMA" indicates that it has a potential for a benefit-cost ratio above 1.0
   - Municipal/CI = Capital Improvement Plan budgets
   - Municipal/OB = Municipal operating budgets
   - PURA = Public Utilities Regulatory Authority Microgrid Grant and Loan Program
   - STEAP = Small Town Economic Assistance Program (State grant program)

4. STAPLEE Ratings:
   - 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)

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

_____

_____

Appendix V: Adoption Notices

TOWN OF COLUMBIA, CT RESOLUTION NO. 2015-06

A RESOLUTION OF THE TOWN OF COLUMBIA ADOPTING THE HAZARD MITIGATION PLAN UPDATE, 2015: A MULTI-JURISDICTIONAL PLAN FOR THE FORMER WINDHAM REGION COUNCIL OF GOVERNMENTS (WINCOG) TOWNS OF COLUMBIA, COVENTRY, LEBANON, MANSFIELD, WILLINGTON, AND WINDHAM

WHEREAS, the Town of Columbia has historically experienced damage from natural hazards and it continues to be vulnerable to the effects of those natural hazards profiled in the plan (i.e. *dam failure, drought, earthquakes, flooding, hurricanes, ice jams, severe winter storms, thunderstorms, tornadoes, and wildfires*) resulting in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS the Town of Columbia has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its hazard mitigation plan update entitled *Hazard Mitigation Plan Update, 2015* under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held between January 2013 and March 2014 regarding the development and review of the Plan; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedure for the Town of Columbia; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the Town of Columbia, 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 Columbia eligible for funding to alleviate the impacts of future hazards; now therefore be it

RESOLVED by the Town of Columbia Board of Selectmen:

1. The Plan is hereby adopted as an official plan of the Town of Columbia;
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 part of this resolution for a period of five (5) years from the date of this resolution;
4. An annual report on the progress of the implementation elements of the Plan shall be presented to the Board of Selectmen by the Town Administrator.

In accordance with Section 3.3(a)(5) of the Town Charter, the Town of Columbia Board of Selectmen hereby adopts the *Hazard Mitigation Plan Update, 2015*.

ADOPTED by a vote of 5 in favor, 0 against, and 0 abstaining this 6 day of Oct, 2015.

Catherine Clemens
First Selectman

10/7/15
Date

IN WITNESS THEREOF, the undersigned has affixed his signature and the corporate seal of the Town of Columbia.

Robin M Kemsley
Town Clerk

10/7/15
Date

TOWN OF COVENTRY, CT RESOLUTION NO. _____

**A RESOLUTION OF THE TOWN OF COVENTRY
ADOPTING THE HAZARD MITIGATION PLAN UPDATE, 2015: A MULTI-JURISDICTIONAL PLAN FOR THE FORMER WINDHAM REGION COUNCIL OF GOVERNMENTS (WINCOG) TOWNS OF COLUMBIA, COVENTRY, LEBANON, MANSFIELD, WILLINGTON, AND WINDHAM**

WHEREAS, the Town of Coventry has historically experienced damage from natural hazards and it continues to be vulnerable to the effects of those natural hazards profiled in the plan (i.e. *dam failure, drought, earthquakes, flooding, hurricanes, ice jams, severe winter storms, thunderstorms, tornadoes, and wildfires*) resulting in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS the Town of Coventry has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its hazard mitigation plan update entitled *Hazard Mitigation Plan Update, 2015* under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held between September 2013 and December 2013 regarding the development and review of the Plan; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedure for the Town of Coventry; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the Town of Coventry, 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 Coventry eligible for funding to alleviate the impacts of future hazards; now therefore be it

RESOLVED by the Town of Coventry Town Council:

1. The Plan is hereby adopted as an official plan of the Town of Coventry;
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 part of this resolution for a period of five (5) years from the date of this resolution;
4. An annual report on the progress of the implementation elements of the Plan shall be presented to the Board of Selectmen by the Emergency Management Director.

In accordance with Section 3-4 of the Town Charter, the Town of Coventry Town Council hereby adopts the *Hazard Mitigation Plan Update, 2015.*

ADOPTED by a vote of 7 in favor, 0 against, and 0 abstaining this 8th day of September 2015.

L. D. Thorn
Town Council Chair

10/1/15
Date

IN WITNESS THEREOF, the undersigned has affixed his signature and the corporate seal of the Town of Coventry.

Lori Hollmann
Town Clerk

10/1/15
Date

Town of Lebanon, CT

A RESOLUTION OF THE TOWN OF LEBANON
ADOPTING THE HAZARD MITIGATION PLAN UPDATE, 2015: A MULTI-JURISDICTIONAL PLAN
FOR THE FORMER WINDHAM REGION COUNCIL OF GOVERNMENTS (WINCOG) TOWNS OF COLUMBIA,
COVENTRY, LEBANON, MANSFIELD, WILLINGTON, AND WINDHAM

WHEREAS, the Town of Lebanon has historically experienced damage from natural hazards and it continues to be vulnerable to the effects of those natural hazards profiled in the plan (i.e. dam failure, drought, earthquakes, flooding, hurricanes, ice jams, severe winter storms, thunderstorms, tornadoes, and wildfires) resulting in loss of property and life, economic hardship and threats to public health and safety; and

WHEREAS, THE Town of Lebanon has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its hazard mitigation plan update entitled *Hazard Mitigation Plan Update, 2015* under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held between January 2013 and March 2014 regarding the development and review of the Plan; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedure for the Town of Lebanon; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the Town of Lebanon, 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 Lebanon eligible for funding to alleviate the impacts of future hazards; now therefore be it

RESOLVED by the Town of Lebanon Board of Selectmen:

1. The Plan is hereby adopted as an official Plan of the Town of Lebanon;
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 part of this resolution for a period of five (5) years from the date of this resolution;
4. An annual report on the progress of the implementation elements of the Plan shall be presented to the Board of Selectmen by the Public Works Director.

In accordance with the authority vested in the Town of Lebanon Board of Selectmen, they hereby adopt the *Hazard Mitigation Plan Update, 2015.*

ADOPTED by a vote of 3 in favor, 0 against, and 0 abstaining this 27th day of Oct., 2015.

Joyce R. Okonuk, First Selectman — Date: 10/29/15

IN WITNESS THEREOF, the undersigned has affixed her signature and the corporate seal of the Town of Lebanon.

Susan Coutu, Town Clerk — Date: October 29, 2015

TOWN OF MANSFIELD, CT RESOLUTION NO. _____

A RESOLUTION OF THE TOWN OF MANSFIELD
ADOPTING THE HAZARD MITIGATION PLAN UPDATE, 2015: A MULTI-JURISDICTIONAL PLAN FOR THE FORMER WINDHAM REGION COUNCIL OF GOVERNMENTS (WINCOG) TOWNS OF COLUMBIA, COVENTRY, LEBANON, MANSFIELD, WILLINGTON, AND WINDHAM

WHEREAS, the Town of Mansfield has historically experienced damage from natural hazards and it continues to be vulnerable to the effects of those natural hazards profiled in the plan (i.e. *dam failure, drought, earthquakes, flooding, hurricanes, ice jams, severe winter storms, thunderstorms, tornadoes, and wildfires*) resulting in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS the Town of Mansfield has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its hazard mitigation plan update entitled *Hazard Mitigation Plan Update, 2015* under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held between January 2013 and March 2014 regarding the development and review of the Plan; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedure for the Town of Mansfield; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the Town of Mansfield, 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 Mansfield eligible for funding to alleviate the impacts of future hazards; now therefore be it

RESOLVED by the Town of Mansfield Town Council:

1. The Plan is hereby adopted as an official plan of the Town of Mansfield;
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 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 by the Emergency Management Director.

In accordance with Section C303(B) of the Town Charter, the Town of Mansfield Town Council hereby adopts the *Hazard Mitigation Plan Update, 2015.*

ADOPTED by a vote of 8 in favor, 0 against, and 0 abstaining this 15 day of September, 2015.

Elizabeth C. Paterson
Mayor

9-17-2015
Date

IN WITNESS THEREOF, the undersigned has affixed his signature and the corporate seal of the Town of Mansfield.

Mary Stanton
Town Clerk

9/17/2015
Date

Former WINCOG Region Hazard Mitigation Plan Update
May 2015

A RESOLUTION OF THE TOWN OF WILLINGTON
ADOPTING THE HAZARD MITIGATION PLAN UPDATE, 2015:
A MULTI-JURISDICTIONAL PLAN FOR THE FORMER
WINDHAM REGION COUNCIL OF GOVERNMENTS (WINCOG) TOWNS OF
COLUMBIA, COVENTRY, LEBANON,
MANSFIELD, WILLINGTON, AND WINDHAM

WHEREAS, the Town of Willington has historically experienced damage from natural hazards and it continues to be vulnerable to the effects of those natural hazards profiled in the plan (i.e. dam failure, drought, earthquakes, flooding, hurricanes, ice jams, severe winter storms, thunderstorms, tornadoes, and wildfires) resulting in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS, the Town of Willington has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its hazard mitigation plan update entitled Hazard Mitigation Plan Update, 2015 under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held between September 2013 and December 2013 regarding the development and review of the Plan; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedure for the Town of Willington; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the Town of Willington, 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 Willington eligible for funding to alleviate the impacts of future hazards;

NOW THEREFORE BE IT RESOLVED by the Town of Willington Board of Selectmen:

1. The Plan is hereby adopted as an official plan of the Town of Willington;
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 part of this resolution for a period of five (5) years from the date of this resolution;
4. An annual report on the progress of the implementation elements of the Plan shall be presented to the Board of Selectmen by the Emergency Management Director.

The Town of Willington Board of Selectmen hereby adopts the Hazard Mitigation Plan Update, 2015.

ADOPTED by the Willington Board of Selectmen this 19th Day of October, 2015.

CERTIFICATION:

I, Donna J. Hardie, the Town Clerk of The Town of Willington, do hereby certify that the following is a true and correct copy of a resolution adopted by Willington Board of Selectmen at its duly called and held meeting on October 19, 2015, at which a quorum was present and acting throughout, and that the resolution has not been modified, rescinded, or revoked and is at present in full force and effect:

IN WITNESS THEREOF, the undersigned has affixed his signature and the corporate seal of the Town of Willington.

Donna J. Hardie TC — October 21, 2015

Donna J. Hardie, Town Clerk — Date

TOWN OF WINDHAM, CT RESOLUTION NO. 2665

**A RESOLUTION OF THE TOWN OF WINDHAM
ADOPTING THE HAZARD MITIGATION PLAN UPDATE, 2015: A MULTI-JURISDICTIONAL PLAN FOR THE FORMER WINDHAM REGION COUNCIL OF GOVERNMENTS (WINCOG) TOWNS OF COLUMBIA, COVENTRY, LEBANON, MANSFIELD, WILLINGTON, AND WINDHAM**

WHEREAS, the Town of Windham has historically experienced damage from natural hazards and it continues to be vulnerable to the effects of those natural hazards profiled in the plan (i.e. *dam failure, drought, earthquakes, flooding, hurricanes, ice jams, severe winter storms, thunderstorms, tornadoes, and wildfires*) resulting in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS the Town of Windham has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its hazard mitigation plan update entitled *Hazard Mitigation Plan Update, 2015* under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held between November 2013 and February 2014 regarding the development and review of the Plan; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedure for the Town of Windham; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the Town of Windham, 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 Windham eligible for funding to alleviate the impacts of future hazards; now therefore be it

RESOLVED by the Town of Windham Town Council:

1. The Plan is hereby adopted as an official plan of the Town of Windham;
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 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 by the Town Planner.

In accordance with Chapter V-3(a) of the Town Charter, the Town of Windham Town Council hereby adopts the *Hazard Mitigation Plan Update, 2015*.

ADOPTED by a vote of 9 in favor, 0 against, and 0 abstaining this 20th day of October, 2015.

Neal J. Bretto
Mayor Town Manager

11/23/15
Date

IN WITNESS THEREOF, the undersigned has affixed his signature and the corporate seal of the Town of Windham.

Barbara J. McKinney
Town Clerk Deputy

11/23/15
Date