

THE TOWN OF TOLLAND NATURAL HAZARD MITIGATION PLAN



Adopted by the Tolland Board of Selectmen on _____

Prepared by:
The Tolland Hazard Mitigation Planning Committee

and

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The Tolland Board of Selectmen extends special thanks to the Tolland Natural Hazards Mitigation Planning Committee as follows:

Ed Deming - Police Chief and Department of Public Works Superintendent
Mike Sullivan - Fire Chief
Tom Paine - Selectman and Planning and Zoning Commission
Ted Locke - Emergency Management Director and School Committee Representative
Phil Grannan - Grant Writer
Pat Storey - Council on Aging
Kathy Cowles - Planning Board

The Tolland Board of Selectmen offers thanks to the Massachusetts Emergency Management Agency (MEMA) for developing the Commonwealth of Massachusetts Natural Hazards Mitigation Plan (<http://www.state.ma.us/dem/programs/mitigate/index.htm>) which served as a model for this plan. In addition, special thanks are extended to the staff of the Pioneer Valley Planning Commission for professional services, process facilitation and preparation of this document.

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1: PLANNING PROCESS

Introduction

The Federal Emergency Management Agency (FEMA) and the Massachusetts Emergency Management Agency (MEMA) define Hazard Mitigation as any sustained action taken to reduce or eliminate long-term risk to people and property from natural hazards such as flooding, storms, high winds, hurricanes, wildfires, earthquakes, etc. Mitigation efforts undertaken by communities will help to minimize damages to buildings and infrastructure, such as water supplies, sewers, and utility transmission lines, as well as natural, cultural and historic resources.

Planning efforts, like the one undertaken by the Town of Tolland and the Pioneer Valley Planning Commission, make mitigation a proactive process. Pre-disaster planning emphasizes actions that can be taken before a natural disaster occurs. Future property damage and loss of life can be reduced or prevented by a mitigation program that addresses the unique geography, demography, economy, and land use of a community within the context of each of the specific potential natural hazards that may threaten a community.

Preparing a hazard mitigation plan before a disaster, can save the community money and facilitate post-disaster funding. Costly repairs or replacement of buildings and infrastructure, as well as the high cost of providing emergency services and rescue/recovery operations, can be avoided or significantly lessened if a community implements the mitigation measures detailed in the plan. FEMA requires that a community adopt a pre-disaster mitigation plan as a condition for mitigation funding. For example, the Hazard Mitigation Grant Program (HMGP), the Flood Mitigation Assistance Program (FMA), and the Pre-Disaster Mitigation Program are programs with this requirement.

Hazard Mitigation Committee

Planning for hazard mitigation in Tolland involved a seven-member committee:

- Ed Deming - Police Chief and Department of Public Works Superintendent
- Mike Sullivan - Fire Chief
- Tom Paine - Selectman and Planning and Zoning Commission
- Ted Locke - Emergency Management Director and School Committee Representative
- Phil Grannan - Grant Writer
- Pat Storey - Council on Aging
- Kathy Cowles - Planning Board

The hazard mitigation planning process for the Town included the following tasks:

- Reviewing and incorporating existing plans and other information.
- Identifying the natural hazards that may impact the community.
- Conducting a Vulnerability/Risk Assessment to identify the infrastructure at the highest risk for being damaged by the identified natural hazards, particularly flooding.
- Identifying and assessing the policies, programs, and regulations the community is currently implementing to protect against future disaster damages.
- Identifying deficiencies in the current strategies and establishing goals for updating, revising or adopting new strategies.
- Adopting and implementing the final Hazard Mitigation Plan.

The key product of this process was the development of an Action Plan with a Prioritized Implementation Schedule.

Hazard Mitigation Committee Meetings

Meetings of the Hazard Mitigation Committee, all of which took place at Tolland Town Hall, were held on the dates listed below.

June 25th, 2014, 6:00 p.m.

Committee meeting included hazard mitigation planning overview, assessing natural hazards that affect Tolland, and identification of the Town's critical facilities.

September 3rd, 2014, 6:00 p.m.

Committee revisited critical facilities and evacuation routes potentially affected, discussed history of natural hazard events, reviewed existing hazard mitigation measures and proposed future hazard mitigation strategies.

October 22nd, 2014, 6:00 p.m.

Committee reviewed and prioritized draft list of future mitigation strategies, history of natural hazard events, critical infrastructure, and plan review and maintenance procedures.

Agendas and sign-in sheets for each meeting can be found in Appendix B. While not all members of the Hazard Mitigation Committee were able to attend each meeting, all members collaborated on the plan and were updated on progress by fellow Committee members after meetings occurred as necessary.

Participation by Stakeholders

A variety of stakeholders were provided with an opportunity to be involved in the development of the Tolland Hazard Mitigation Plan. The different categories of stakeholders that were involved, and the engagement activities that occurred, are described below.

Local and regional agencies involved in hazard mitigation activities and surrounding community engagement and input

The Pioneer Valley Planning Commission is a regional planning agency for 43 towns and cities in Massachusetts' Hampden and Hampshire Counties. PVPC regularly engages with the Town of Tolland as part of its regional planning efforts, which include the following:

- Developing the Pioneer Valley Regional Land Use Plan, Valley Vision 2, which advocates for sustainable land use throughout the region and consideration for the impact of flooding and other natural hazards on development.
- Developing the Pioneer Valley Climate Action and Clean Energy Plan, which assesses the impact that climate change will have on the region and recommends strategies for mitigation that can be implemented by local municipalities and businesses.
- Collaborating with state agencies, such as the Department of Conservation and Recreation, to maintain inventories of critical infrastructure throughout the region.

All of these PVPC initiatives considered the impact of natural hazards on the region and strategies for reducing their impact to people and property through hazard mitigation activities. The facilitation of the Tolland Hazard Mitigation Plan by PVPC ensured that the information from these plans was incorporated into the Hazard Mitigation Planning process.

In addition, the Pioneer Valley Planning is actively involved in the Western Region Homeland Security Advisory Council (WRHSAC). WRHSAC, which includes representatives from Western Massachusetts municipalities, Fire Departments, Public Works Departments, Police Departments, area hospitals and regional transit from throughout the four counties of western Massachusetts, is responsible for allocating emergency preparedness funding from the US Department of Homeland Security. The representatives of these disciplines who serve on the WRHSAC are charged with sharing the information discussed at meetings with their colleagues at their regular meetings. PVPC staff attend all WRHSAC meetings and all WRHSAC members are aware of the fact that Tolland was updating its Hazard Mitigation plan. Meetings of WRHSAC regularly involve discussion about how to improve emergency preparedness in western Massachusetts, and hazard mitigation activities are included in this discussion.

For the update of this Hazard Mitigation Plan, PVPC provided feedback from WRHSAC on regional mitigation activities and natural hazards pertaining to Tolland. This was the method through which WRHSAC was engaged in the planning process.

In addition, PVPC staff regularly present to their Executive Committee and Commission (representatives from the 43 cities and towns that comprise the Pioneer Valley, when new projects are launched and

when funding opportunities are available). As result, all the communities in the region were informed of Tolland's Hazard Mitigation Plan update process and encouraged to comment.

PVPC staff included a summary article on the status of Hazard Mitigation planning in the region in the quarterly Regional Reporter that is mailed to area Chambers of Commerce, all member municipalities, area colleges and universities and other key stakeholders in the region. In this way, businesses, educational institutions and other key stakeholders were educated about and informed of Tolland's hazard mitigation planning work.

Agencies that have the authority to regulate development

There are several Town commissions, boards, and committees within the Town of Tolland that have the authority to regulate development. These entities are:

- Conservation Commission
- Planning Board
- Emergency Planning Committee
- Finance Committee

Feedback from the stakeholder agencies listed above was ensured through the participation of the Hazard Mitigation Committee members, who regularly meet and collaborate with members of these entities and Town staff who regularly staff meetings of these commissions, boards, and committees.

In addition, the Pioneer Valley Planning Commission, as a regional planning authority, works with all agencies that regulate development in Tolland, including the municipal entities listed above and state agencies, such as Department of Conservation and Recreation and MassDOT. This regular involvement ensured that during the development of the Tolland Hazard Mitigation Plan, the operational policies and any mitigation strategies or identified hazards from these entities were incorporated into the Hazard Mitigation Plan.

Existing Authorities Policies, Programs, & Resources and Ability to Expand on & Improve Existing Policies & Programs

Every town is unique and Tolland is no exception. Tolland is a small, well managed rural town with dedicated and experienced residents who volunteer to serve on municipal boards: The three member Board of Selectmen have 55 years of experience as selectmen; the Emergency Response Director has been 'on the job' for 14 years; the six member committee that prepared and will update the Hazard Mitigation Plan has 81 years of experience in their respective disciplines; the five member Finance Committee has 72 years of experience; the 5 member Planning Board has 43 years of experience; the three member Conservation Commission has 22 years of experience; the Town treasurer has 15 years of municipal experience; and the three person Highway department has 22 years on the job and over 60 years cumulative experience in the various trades who's skills are required in this department.

The good work these people do is reflected in Tolland's financial strength. The tax rate is \$6.88 per thousand, one of the lowest in the Commonwealth. The following data is from the audit performed by Scanlon and Assoc. for the fiscal year 2012 (the last audit performed.) Scanlon stated, "In our opinion the information is fairly stated in all material respects in relation to the financial statement as a whole."

“The Town’s assets exceeded its liabilities by \$2,507,748 (net assets) for the fiscal year reported.” “The General Fund’s total fund balance increased \$73,098 (10%) to \$824,866. The ending General fund balance is 59% of revenues and transfers in and 62% of expenditures and transfers out.” The town’s expenses, including education, for 2012 were \$1,473, 676.

In 2011 the town received a FEMA grant of \$260,538 to purchase a tanker for the Fire Department; the town contributed \$65,134 from taxes and the Fire Department provided over \$8,000 towards the purchase. More recently, Tolland received a \$990,000 SAFER grant from the state to repave Rt. 57 in town. Both these grants, as well as several smaller ones, were properly administered by the town staff. The town stands ready to fund important items and meet the changing realities of today’s world. Four years ago they voted to fund a \$2,000,000 Public Safety Complex and an upgrade of the town garage. At the 2015 town meeting a prop 2-1/2 override was passed (the first in many years) to fund road repairs. More recently the town voted to authorize funding to install wiring for high speed internet service.

Additional detail on plans and policies reviewed as part of this planning process starts on p. 61.

Participation by the Public, Businesses, and Neighboring Communities

Two public planning sessions were held as part of the development of the Tolland plan – on August 18th, 2014 and November 10th, 2014. Both meetings occurred after the Hazard Mitigation Committee had provided input on hazards and mitigation strategies relevant to the community. Notice of both public meetings was posted at Tolland Town Hall in compliance with the Commonwealth of Massachusetts’ open meeting law. Meeting agendas, notices, and minutes can be found in Appendix B.

Prior to the first public meeting, the PVPC released a press release announcing the meeting on August 18th, 2014. Notice was also placed in the local newspaper, the Tolland Tattler. The press release encouraged residents to attend the meeting or provide input by e-mailing or calling staff contacts at PVPC or the Town of Tolland.

On November 6th, 2014, the Pioneer Valley Planning Commission sent a press release to all area media outlets to inform the public that a draft of the Tolland Hazard Mitigation Plan had been placed on PVPC’s website. The release also indicated that hard copies were available at PVPC’s offices and at Tolland Town Hall, and that all residents, businesses and other concerned parties of Tolland and adjacent communities were encouraged to comment on the plan by e-mailing or calling staff contacts at PVPC or the Town of Tolland. The Draft Plan was also put on the Tolland website.

The two PVPC press releases, a screen shot of PVPC’s website showing the link to the press release, and newspaper articles can be found in Appendix B.

A list of media organizations that were sent all press releases is included in Appendix B, which are the television stations, radio stations, and newspapers located in western Massachusetts, northern Connecticut, and southern Vermont.

The Hazard Mitigation Committee determined that the most effective outreach strategy for engaging with the public, businesses and neighboring communities was through the media, and so this was the outreach strategy employed for reaching out to all three groups of stakeholders. The press release

indicated that residents of Tolland were invited to attend the event, which was also intended to include representatives of businesses in Tolland and residents of neighboring communities.

Businesses and neighboring communities were also provided with an opportunity to provide feedback through the Pioneer Valley Planning Commission. PVPC is regularly involved in land use, transportation, and environmental planning initiatives in Tolland and surrounding communities. Regular feedback received from these other initiatives were incorporated into the hazard mitigation planning process. Neighboring communities that were provided with an opportunity to comment included municipalities that directly border Tolland.

Additional outreach to surrounding communities occurred through the regular quarterly newsletter that PVPC sends out to its member communities about its recent activities. In these articles, adjacent municipalities were encouraged to reach out to PVPC about hazard mitigation plans by e-mailing or calling staff contacts at PVPC. These notices are included in Appendix B.

Feedback was received from the public at the first public meeting, as summarized below:

Hazard Identification

- The likelihood of hurricanes should be increased from low to moderate.
- Fire should be moderate instead of low probability - wildfires are not large but do happen, once every two years or so. Logging and debris from previous storms increase the likelihood of forest fires.
- How should the impact and extent of hurricanes be separated from flooding and severe winds, since these are the two primary symptoms of hurricanes?
- Are epidemics (such as Ebola or flu) considered within the scope of this plan?
- Large branches / trees can cause damage to dams during flooding and this should be incorporated into the analyses of dam failure.

Existing and Potential Mitigation Strategies

- Existing strategy: Council on Aging has established measures for checking on special needs populations during an emergency.
- Potential strategy: make improvements to the snow load capacity of the Town library.
- Potential strategy: ensure that local gas stations have electrical generators so they can still provide gas during power outages.

- Potential strategy: Maintain accessibility of roads during snow storms as much as possible. In most places in town there is only one road providing access. Town and WMECO currently trim trees to ensure that the number of fallen branches is minimal during a storm.
- Potential strategy: Replace box culvert that currently causes wash outs and should have been replaced approximately 10 years ago. This would be a project that qualifies for HMPG funding, and the Town can apply for this funding from MEMA once their Hazard Mitigation Plan is completed. The replacement of this culvert will be included in the plan.

This feedback was incorporated into the final draft of the plan as appropriate. No substantial feedback was received at the second public meeting, other than that the hazard mitigation meeting accurately reflected the town's priorities.

Public participation will be a critical component of the Hazard Mitigation Plan maintenance process. The Hazard Mitigation Committee will hold all meetings in accordance with Massachusetts open meeting laws.

Select Board Meeting

In 2013, the Select Board agreed to begin the process of developing a Hazard Mitigation Plan. Once the plan was provisionally approved by FEMA, the Select Board held a public hearing on the plan and adopted it.

2: LOCAL PROFILE

Community Setting

Geography

Located in the foothills of the southwestern Massachusetts Berkshires, the Town of Tolland consists of 31.64 square miles of mostly wooded terrain. Tolland is the westernmost municipality of Hampden County; however, it may share more characteristics with neighboring Berkshire County towns than with lower Pioneer Valley municipalities due to its hilly terrain, abundant forest and water resources and low population density. The southern town limits of Tolland form the Massachusetts-Connecticut state line and the boundaries of the Connecticut towns of Colebrook and Hartland. To the north, Tolland is bordered by Otis and Blandford, to the east by Granville, and to the west by the Town of Sandisfield.

The Town of Tolland sits atop a wooded hill, the western edge of which drops off steeply to the banks of the Farmington River. The rugged and steep western area, banking the West Branch, is undeveloped and forested. The rest of Tolland is best described as a plateau with several small hills providing vantage points for taking in the scenic views of forest, hills, ponds and pastures that are scattered throughout town.

Population Characteristics

The population of Tolland is 485, according to the 2010 Census; however, like other communities in the area, populations increase in the summer due to an influx of second-home owning, part-time residents.

The tenth least populated town in Massachusetts, Tolland remains a sparsely settled community in an increasingly urban state. The town's growth rates, while not contributing many people or housing units in absolute numbers, are significant. Its population has steadily increased over the last three decades to reach its current level. From 1990 to 2000, the town gained 137 people and approximately 70 housing units, representing a 47 percent increase in population.

Another significant characteristic of Tolland is the seasonal increase in residents. According to the 2010 US Census, 288 out of a total of 510 total housing units are for seasonal or recreational use. Summertime population counts more than double those of the Census. It is important to note, however, that growth in housing units over the last decade has consisted of primarily year-round residences. Most of the second homes are built as year round residences. Many of the owners choose to retire to these second homes which tends to increase the average age of Tolland's population.

Development Patterns

The town reached its peak population in the early 1800s at about 800 people. From that point until the 1970s, the population steadily decreased to just over 100 people (Johnson 1990). As a result of the importance of dairy farming, development in Tolland has historically been widely dispersed throughout town. Large farms coupled with a declining population left Tolland with few concentrated development areas.

Agriculture has declined in Tolland, yet the amount of open/undeveloped and natural lands have stayed steady or even slightly increased since 1971. According to the MacConnell Land Use Survey, since 1971, residential development has experienced the most growth, particularly in low-density residential types. The amount of natural and undisturbed land has remained a steady 91% of the town's land area over the last two decades.

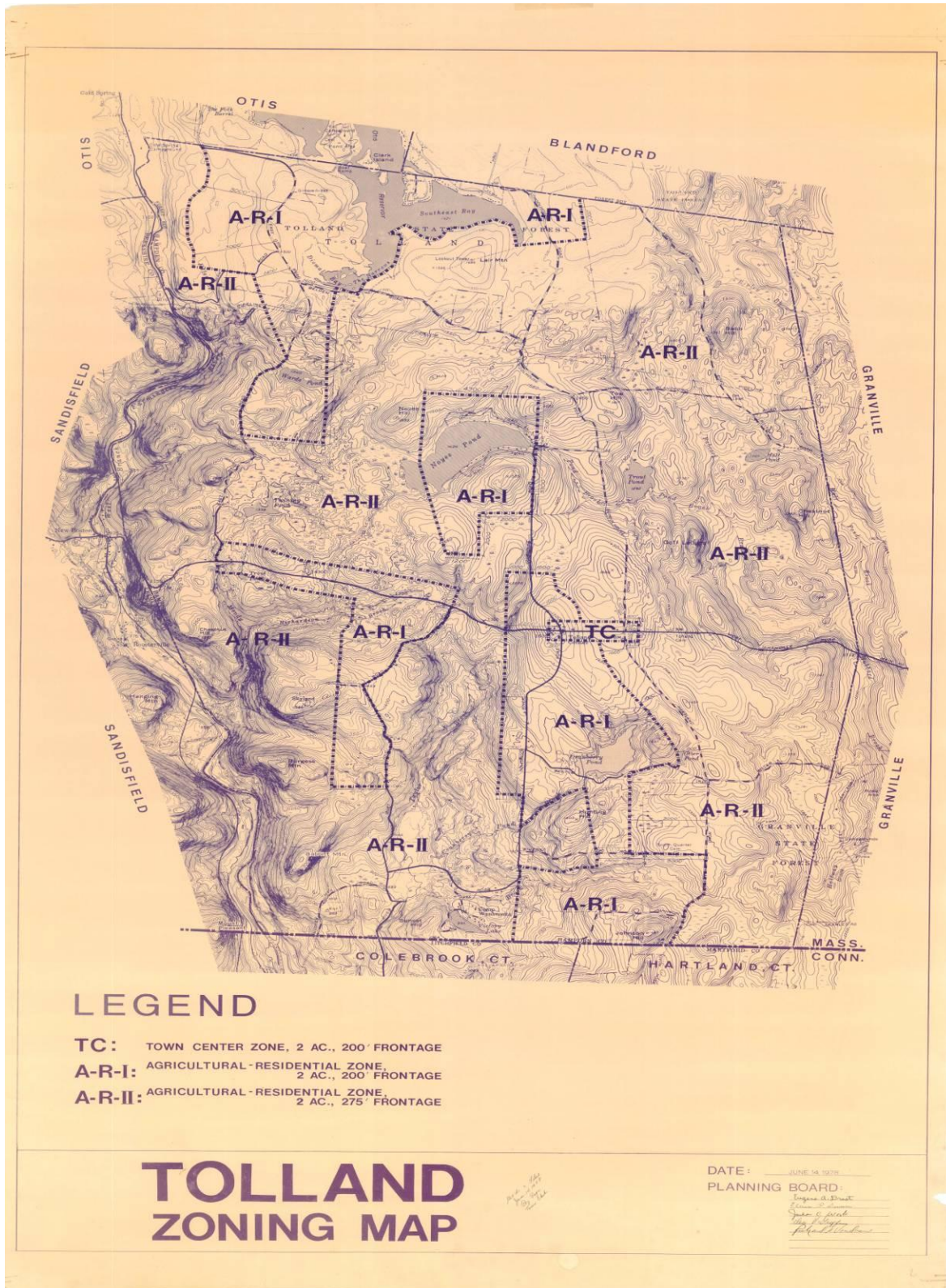
A 60-acre solar farm has been constructed on property located along Route 57.

The concentrated development that does exist in Tolland is generally located on three of the larger ponds in town: Noyes, Cranberry, and Otis Reservoir. The Tunxis Club, Wildwood, and North Tolland associations are private, lakeshore communities serving primarily seasonal second-home owners and are located on these ponds.

Zoning and Planning

Tolland has three zoning districts: Town Center (TC), Agricultural-Residential I (AR I) and Agricultural-Residential II (AR II). AR I is zoned for moderate density, while AR II is zoned for low density. The basic minimum lot size is 2 acres, with minimum frontages of 200 feet (TC and AR I) and 275 feet (AR II). The Zoning By-Law dates back to 1978 and was last updated in 2006.

Zoning Map



Infrastructure

Roads and Highways

Access to Tolland is limited by a lack of state roads. Route 57 offers primary access to and around Tolland from east to west, and is the only state numbered route running through town; it is maintained by the town. If the planned casino in Springfield is constructed, it will likely cause increased traffic on Route 57 that may affect the Town. Route 8 runs north-south through adjacent Otis and Sandisfield, offering access to the Massachusetts Turnpike. Routes 20 and 23, also in neighboring communities, provide access to the larger region. The most important local roads provide north-south access throughout town and include Clubhouse, Schoolhouse, Burt Hill, Hartland and Colebrook River Roads. East Otis Road is an important north-south roadway, with the Girl Scouts of Connecticut's Timber Trails Resident Camp located along this road.

There are a total of 49 miles of public roads in Town, about 50 percent of which are unpaved and often very steep. Limited paved and state routes make any significant development difficult. The North Central Berkshire Access Study recently suggested establishing an interchange in Becket off of Interstate 90 at Route 8, which would significantly impact nearby communities like Tolland. However, that suggestion is not strongly endorsed by the metropolitan planning organization, which is responsible for transportation planning (Berkshire Regional Planning Agency 2003). Therefore, a marked improvement in ease of access to Tolland is not likely to affect growth and development in the near future.

Rail, Bus, and Air Transportation

Tolland is located between the Berkshires and the Pioneer Valley. The Town is not affiliated with any regional transit authority and there is no rail service in the town, however the town has good access to Bradley Airport and rail facilities in Springfield and Pittsfield, due to its location along Route 57 and connecting roads.

Schools

The Town of Tolland is served by the Southwick-Tolland-Granville Regional School District. The schools in the district are: Granville Village School at 409 Main Road in Granville, Powder Mill Middle School at 94 Powder Mill Road in Southwick, Woodland Elementary School at 80 Powder Mill Road in Southwick, and Southwick-Tolland Regional High School at 93 Feeding Hills Road in Southwick.

Water Infrastructure

The Town has nine Transient Non-Community public water supply systems, . These supply systems service the Girl Scouts of Connecticut's Timber Trails Resident Camp (2), Camp Kinderland (2) ,Twin Brook Campground (1), The Tunxis Club (1), Wildwood (1) The Public Safety Complex (1) and Town Hall (1). No other public water supply systems are located in Tolland. Most homes are on private wells.

Wastewater

The only sewer system in town serves the Tolland State Forest campground. The system serves the needs of 90 camping sites located on a peninsula of the Otis Reservoir. At present, sparse settlement patterns in the rest of town do not warrant consideration of public sewerage systems.

Solid Waste

The Town is equipped with a transfer and recycling station utilizing a compactor for solid waste. The transfer station is located at 162 Colebrook River Road.

Natural Resources

Watersheds

The vast majority of Tolland (94.5%) is in the Farmington River Watershed, with the remainder located in the Westfield River Watershed. From its headwaters in nearby Becket to the Connecticut border, the Farmington River runs 18 miles through Massachusetts before crossing the state line and eventually winding its way to the Connecticut River in Connecticut. It is an important shared resource between neighboring towns as well as neighboring states. The West Branch of the Farmington forms or parallels the western boundary of Tolland for the entire length of the town.

An active Farmington River Watershed Association in Connecticut works for natural resource protection in and along the banks of the Farmington River, which serves the drinking needs of the greater Hartford region. The Massachusetts section of the watershed covers roughly one-third of the total watershed area. The Metropolitan District Commission, which supplies water to Hartford, Connecticut and the Springfield Water Commission, which supplies water to Springfield, Massachusetts, own much of the land in Tolland – MDC 2883 acres; Springfield Water – 707 acres. The Berkshire Regional Planning Commission developed an Action Plan for the Massachusetts section of the watershed in 1995 to address non-point source pollution. Concerns with runoff and other pollutants stemming from septic systems, erosion caused by logging and development and other pollutants are still a high priority in the Farmington Watershed, according to the Executive Office of Environmental Affairs (EOEA 2004).

Surface Waters

Tolland has numerous acres of ponds, lakes and streams within its borders, including 370 acres of the 1200-acre Otis Reservoir. There are nine prominent ponds that total about 700 acres (Natural Resources Technical Team 1975). There is a public boat launch at Otis Reservoir and on Noyes Pond, which is a Great Pond. Cranberry and Noyes are the two largest ponds, and as described earlier, are fully developed for residential use along their shores. Other significant ponds include Hall, Trout, Twining, Wards, and Victory Lake. The southwestern corner of Tolland encompasses a section of the Colebrook Reservoir of Connecticut. These ponds provide significant opportunities for water-based recreation, such as boating, swimming and fishing. However, several are on posted private lands and therefore are not open to the public.

Important streams within Tolland include Babcock Brook, Cranberry Pond Brook, Halfway Brook, Hall Pond Brook, Hubbard Brook, Moody Brook, Pond Brook, Richardson Brook, and Slocumb Brook (BRPC 1997). Again, some of these brooks are large enough to support fishing. However, private land ownership can limit public access.

Tolland borders the Farmington River for approximately 4.7 miles; about half of that frontage is publicly owned. The very steep and forested slopes leading to the River in Tolland represent some of the most pristine land in the watershed.

Forest

The Town of Tolland has over 19,000 acres of forest, which is 91 percent of total land area. The Tolland State Forest is located in the northeastern portion of Town. In 2011, the State of Massachusetts Department of Conservation purchased 585 acres of property from the Girl Scouts of Connecticut's Timber Trails Camp, and over 800 acres from a private owner expanding the total area of the park to over 5,800 acres. The state is the largest land owner in Tolland.

Geology, Soils and Topography

Tolland is in the transition zone between the Connecticut River Valley and the Berkshires. Elevation in town ranges from a low of 700 feet along the West Branch of the Farmington River to 1695 feet above sea level at the top of Lair Mountain, and averages 1500 feet. Glacial activity shaped the topography of the region, leaving behind many lakes, ponds, rivers and streams as well as glacial till.

The major soil association or group of geographically associated soil types present throughout Tolland is the Lyman-Tunbridge-Peru. The dominant features of this soil association include rolling and stony terrain. Lyman-Tunbridge-Peru soils are generally shallow, but can be deep and of medium texture. Loamy soils of this grouping, concentrated on hilltops, formed from glacial till and derived from schist, gneiss and granite. Soils within the association vary from well drained to excessively drained. Depth to bedrock is generally between 16 and 26 inches. Because of rocks, boulders and stones on the surface of the soil in addition to exposed bedrock, these soils are poorly suited to cultivated crops, hay and pasture. Furthermore, slope, shallowness to bedrock and surface stones limit building development and sanitary facilities. The more specific soil associations that dominate in Tolland are the Lyman-Tunbridge and the Peru-Marlow. Other soils present to minor extents include Pillsbury, Marlow and Berkshire.

Neither Lyman-Tunbridge, nor Peru-Marlow soils provide quality construction materials, such as roadfill, sand, gravel or topsoil. Slopes and rocks are the primary limiting factors to recreational developments such as camping areas, playgrounds and golf courses. Shallow depth to bedrock and steep slopes also pose "severe" to "moderate" restrictions on building development, i.e. these soils are unfavorable for development. Therefore, buildings may require special planning, design and/or maintenance, and construction costs may increase as a result. Moreover, these soils have a "moderate" to "high" potential for frost action (frost heaves) and a "moderate" to "high" risk for corrosion to concrete.

Similarly, for sanitary facilities, these soils pose "moderate" to "severe" restrictions on septic tank absorption fields. Again, slopes and shallow depth to bedrock make Lyman-Tunbridge and Peru-Marlow are the primary impediments to septic absorption. Finally, the soil survey classified these two associations as Class C hydrologic groups. Such soils have slow rates of water transmission either because of moderately

fine to finely textured soil or the existence of a layer that impedes downward water movement. These soils are slow to infiltrate when thoroughly wet.

There is one gravel pit in Town, located off of Route 57.

Aquifers

Tolland does not have any aquifers that supply public wells.

Floodways

Floodways include the watercourses (rivers and streams) and adjacent relatively low-lying areas subject to periodic flooding (the 100-year flood zone and 500-year flood zone). These adjoining lands are flood hazard zones and they vary in their predicted flood frequency. The 100-year flood zone has a one in 100 statistical probability (or one percent chance) of being flooded in a single year or is predicted to be flooded one year out of a 100-year period; while the 500-year flood zone is based on a 500-year period.

The following areas have been identified as floodways in Tolland:

- (1) Otis Reservoir
- (2) Noyes Pond
- (3) Twining Pond
- (4) Babcock and Taylor Brooks
- (5) The West Branch of the Farmington River
- (6) Slocum Brook
- (7) Hubbard Pond Brook
- (8) Cranberry Pond Brook

Owing to its hilltop location, the vast majority of Tolland is not within a floodplain. Zoning in accordance with the Rivers Protection Act helps to protect these floodplain areas. There are also streams headed by Wards Pond and Twining Pond that can cause localized flooding.

National Flood Insurance Program (NFIP)

The National Flood Insurance Program has produced maps that identify floodways across America. Tolland is a participating member of the National Flood Insurance Program, and had the following NFIP policy and claim statistics as of 2014:

- Flood Insurance Maps (FIRMs) are used for flood insurance purposes and are on file with the Tolland Planning Board.
- FIRMs have been effective since August 2, 1990 with the current map in effect since September 27, 2013.
- Tolland currently does not have any in-force policies, NFIP claims, or Repetitive Loss Properties.
- The Town will maintain compliance with the NFIP throughout the next 5-year Hazard Mitigation Planning cycle by monitoring its Flood Plain Overlay District and ensuring that the district accurately reflects the 100-year flood plain and FEMA Flood Insurance Rate Map (FIRM).

3: HAZARD IDENTIFICATION & RISK ASSESSMENT

The following section includes a summary of disasters that have affected or could affect Tolland. Historical research, conversations with local officials and emergency management personnel, available hazard mapping and other weather-related databases were used to develop this list. Identified hazards are the following:

- Floods
- Severe snowstorms / ice storms
- Hurricanes
- Severe thunderstorms / wind / tornadoes
- Wildfires / brushfires
- Earthquakes
- Dam failure
- Drought

Natural Hazard Analysis Methodology

The following section includes a summary of disasters that have affected or could affect Tolland. Historical research, conversations with local officials and emergency management personnel, available hazard mapping and other weather-related databases were used to develop this list. Identified hazards are the following:

Hazard Description

The natural hazards identified for Tolland are: floods, severe snowstorms/ice storms, hurricanes, severe thunderstorms / wind / tornadoes, wildfire/brushfire, earthquakes, dam failure, and drought. Many of these hazards result in similar impacts to a community. For example, hurricanes, tornadoes and severe snowstorms may cause wind-related damage.

Location

Location refers to the geographic areas within the planning area that are affected by the hazard. Some hazards affect the entire planning area universally, while others apply to a specific portion, such as a floodplain or area that is susceptible to wild fires. Classifications are based on the area that would potentially be affected by the hazard, on the following scale:

Location of Occurrence, Percentage of Town Impacted by Given Natural Hazard	
Location of Occurrence	Percentage of Town Impacted
Large	More than 50% of the town affected
Medium	10 to 50% of the town affected
Small	Less than 10% of the town affected

Extent

Extent describes the strength or magnitude of a hazard. Where appropriate, extent is described using an established scientific scale or measurement system. Other descriptions of extent include water depth, wind speed, and duration.

Previous Occurrences

Previous hazard events that have occurred are described. Depending on the nature of the hazard, events listed may have occurred on a local, state-wide, or regional level.

Probability of Future Events

The likelihood of a future event for each natural hazard was classified according to the following scale:

Frequency of Occurrence and Annual Probability of Given Natural Hazard	
Frequency of Occurrence	Probability of Future Events
Very High	70-100% probability in the next year
High	40-70% probability in the next year
Moderate	10-40% probability in the next year
Low	1-10% probability in the next year
Very Low	Less than 1% probability in the next year

Impact

Impact refers to the effect that a hazard may have on the people and property in the community, based on the assessment of extent described above. Impacts are classified according to the following scale:

Extent of Impacts, Magnitude of Multiple Impacts of Given Natural Hazard	
Extent of Impacts	Magnitude of Multiple Impacts
Catastrophic	Multiple deaths and injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of facilities for 30 days or more.
Critical	Multiple injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of facilities for more than 1 week.
Limited	Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of facilities for more than 1 day.
Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of facilities.

Vulnerability

Based on the above metrics, a hazard index rating was determined for each hazard. The hazard index ratings are based on a scale of 1 through 5 as follows:

- 1 – Highest risk
- 2 – High risk
- 3 – Medium risk
- 4 – Low risk
- 5 – Lowest risk

The ranking is qualitative and is based, in part, on local knowledge of past experiences with each type of hazard. The size and impacts of a natural hazard can be unpredictable. However; many of the mitigation strategies currently in place and many of those proposed for implementation can be applied to the expected natural hazards, regardless of their unpredictability.

Hazard Identification and Risk Analysis for Tolland

Type of Hazard	Location of Occurrence	Probability of Future Events	Impact	Hazard Risk Index Rating
Flooding	Medium	High	Limited	1 - Highest risk
Severe Snowstorms / Ice Storms	Large	High	Critical	2 - High risk
Severe Thunderstorms / Winds / Tornadoes	Small	Moderate	Limited	2 - High risk
Hurricanes	Large	Moderate	Limited	3 - Medium risk
Wildfire / Brushfire	Large	Moderate	Limited	3 - Medium risk
Earthquakes	Large	Very low	Critical	4 - Low risk
Dam Failure	Medium	Very low	Critical	4 - Low risk
Drought	Large	Low	Minor	5 - Very low risk
Natural Gas Pipeline Breakage	Medium	Low	Minor	5- Very low risk

Source: Adapted from FEMA Local Hazard Mitigation Planning Handbook (March 2013) Worksheet 5.1; Town of Holden Beach North Carolina Community-Based Hazard Mitigation Plan, July 15, 2003 and the Massachusetts Emergency Management Agency (MEMA).

Floods

Hazard Description

There are three major types of storms that can generate flooding in Tolland:

- Continental storms are typically low-pressure systems that can be either slow or fast moving. These storms originate from the west and occur throughout the year.
- Coastal storms, also known as nor'easters, usually occur in late summer or early fall and originate from the south. The most severe coastal storms, hurricanes, occasionally reach Massachusetts and generate very large amounts of rainfall.
- Thunderstorms form on warm, humid summer days and cause locally significant rainfall, usually over the course of several hours. These storms can form quickly and are more difficult to predict than continental and coastal storms.

A floodplain is the relatively flat, lowland area adjacent to a river, lake or stream. Floodplains serve an important function, acting like large “sponges” to absorb and slowly release floodwaters back to surface waters and groundwater. Over time, sediments that are deposited in floodplains develop into fertile, productive farmland like that found in the Connecticut River valley. In the past, floodplain areas were also often seen as prime locations for development. Industries were located on the banks of rivers for access to hydropower. Residential and commercial development occurred in floodplains because of their scenic qualities and proximity to the water. Although periodic flooding of a floodplain area is a natural occurrence, past and current development and alteration of these areas will result in flooding that is a costly and frequent hazard.

In addition to continental storms, coastal storms, and thunderstorms, ice jams present a hazard to homes and businesses located within a floodplain. As referenced in the Berkshire County Hazard Mitigation Plan, heavy snowfall and frigid temperatures throughout the Northeast increase the chance of flooding from snowmelt and ice jams. When river ice piles up at shallow areas, bends and islands it blocks the flow of water and may cause flooding of nearby homes and businesses. Ice jams that become lodged within the abutment of bridges can threaten the integrity of the structures. Heavy equipment, such as cranes with wrecking balls and explosives may have to be used to break up ice jams to reduce potential property and structural damages and losses.

Beaver dams are an additional source of flooding in Tolland. Damage to roadways from beaver dam flooding is a serious and chronic problem across the region. Beavers plug culverts and create impoundments that back up and over roadbeds. Hazardous driving conditions are created when roadways are flooded. Damage to the roadbed occurs when moving water erodes or undermines the road, and when the soil supporting the roadbed becomes saturated with water and settles or shifts. Gravel roads erode or are washed out. The overall stability of paved roads decreases as the pavement becomes stressed and potholes are formed.

Floods can be classified as one of two types: flash floods and general floods.

- **Flash floods** are the product of heavy, localized precipitation in a short time period over a given location. Flash flooding events typically occur within minutes or hours after a period of heavy precipitation, after a dam or levee failure, or from a sudden release of water from an ice jam. Most often, flash flooding is the result of a slow-moving thunderstorm or the heavy rains from a hurricane. In rural areas, flash flooding often occurs when small streams spill over their banks. However, in urbanized areas, flash flooding is often the result of clogged storm drains (leaves and other debris) and the higher amount of impervious surface area (roadways, parking lots, roof tops).
- **General floods** may last for several days or weeks and are caused by precipitation over a longer time period in a particular river basin. Excessive precipitation within a watershed of a stream or river can result in flooding particularly when development in the floodplain has obstructed the natural flow of the water and/or decreased the natural ability of the groundcover to absorb and retain surface water runoff (e.g., the loss of wetlands and the higher amounts of impervious surface area in urban areas).

Location

There are approximately 1370 acres of 100 year floodplain in Tolland. Areas that have been identified as prone to flooding are:

- Otis Reservoir
- Noyes Pond
- Twining Pond
- Babcock and Taylor Brooks
- Farmington River, West Branch
- Cranberry Pond and Brook
- Slocum Brook
- Otter Pond Brook
- East Otter Brook
- Harvey Mountain Road
- Ward Pond

Flooding of Otter Pond Brook would affect Rivers Road and Beetle Road. East Otter Brook flooding would affect the Twin Brook Camping Ground. Route 57 and Colebrook River Road are also susceptible to flooding. In addition, 13 properties have been identified as within the FEMA-designated 100-year floodplain, located on Colebrook River Road and Lands End Drive. Sixteen (16) properties have also been identified around Noyes Pond. The West Branch of the Farmington River, which passes through Tolland, is also subject to damages from ice jams.

The Town has determined the following culverts to be locations that are susceptible to flooding:

Tolland Culverts Most Susceptible to Flooding

Location	Comments
1418 New Boston Road	large diameter
1304 New Boston Road	-
514 New Boston Road	west of this address
33 New Boston Road	east of this address at the dry hydrant
236 New Boston Road	very deep under the road
441 West Granville Road	two culverts east of this address; no nearby houses
1064 Colebrook River Road	box culvert is very old and in poor condition
	Colebrook River Road at intersection with Rivers Road
365 Jeff Miller Road	-
	East Otis Road at second entrance to Twining Pond
	East Otis Road by Girl Scout Camp
	Schoolhouse Road where Noyes Pond Brook Passes under the road
2451 Schoolhouse Road	culvert is in Blandford, causes flooding in Tolland
228 Rivers Road	-

Near Noyes Pond, the houses on North Trail and South Trail are all waterfront properties, with the majority of these homes partially in the 100 year floodplain. These homes are listed below, along with their flood risk as assessed by Town staff and FEMA.

Regarding locations where beavers are likely to build dams and cause flooding, a 1999 Cornell University study found that beavers are usually more abundant along roadsides where woody vegetation (trees and shrubs) is present, where stream gradients were 2 percent or less, and where stream width is relatively narrow. The study also found that smaller culverts are more likely to be clogged, and arched or box culverts are less likely to be clogged. The north end of Schoolhouse Road, at the Tolland-Blandford line, is susceptible to flooding during large rainfalls, due to a large culvert on the Blandford side that floods when beaver dams give way.

Based on these flooding characteristics in Tolland, the location of occurrence of flooding is considered "medium," with 10 to 50 percent of the Town affected.

Extent

The Hazard Mitigation Committee indicated that all locations of localized flooding can receive high water marks of up to several feet during sufficiently large rainstorms. Water levels in Tolland's rivers, streams, and wetlands rise and fall seasonally and during high rainfall events. High water levels are typical in spring, due to snowmelt and ground thaw. This is the period when flood hazards are normally expected. Low water levels occur in summer due to high evaporation and plant uptake (transpiration).

At any time, heavy rainfall may create conditions that raise water levels in rivers and streams above bank full stage, which then overflow adjacent lands.

The average annual precipitation for Tolland and surrounding areas in western Massachusetts is 46 inches. For beaver dam flooding, unlike man-made dams, the exact size of the dams and the impoundments, and the condition of these dams is largely unknown. The extent of damage that would be caused by failure or breaching of any of these dams is therefore also unknown.

Previous Occurrences

The most significant flooding in Tolland occurred during Hurricane Diane in 1955, which caused considerable flooding to structures throughout the town. In nearby Westfield, Massachusetts, total rainfall from the storm was 19.75 inches, the highest rainfall related to the storm in the United States .

Hurricane Irene in August of 2011 caused significant flooding to School House Road and homes on Burt Hill Road, with basement pumping required. School House Road was also flooded in the Spring of 2007 during a heavy rainfall.

The largest annual rainfall in Tolland was 69 inches, which occurred in 2011. The largest amount of rainfall over a 2 month period was 24 inches, which occurred in August and September of that year. The largest precipitation during one storm event was 8.24 inches over 14 hours, occurring on August 28th, 2011 during Hurricane Irene.

In addition to these flooding occurrences, significant ice jam flooding has occurred on the West Branch of the Farmington River approximately 18 times since 1915, though only once since 1980 (January 21st, 1994). As noted in the Berkshire County Hazard Mitigation Plan, it is possible that fewer ice jams now occur due to natural occurrences, lack of records, or manmade intervention.

Beavers are active throughout Berkshire County. MassWildlife estimates that the beaver population has almost tripled between 1996 and 2004, from an estimated 24,000 to 70,000 (MassWildlife, 2004)). The exponential growth has been attributed to several factors, including an increase in suitable habitat, an increase in wetland protection and a decrease in the hunting and trapping of the animals.

Probability of Future Events

Based upon previous data, there is a "high" chance (between 40 percent and 70 percent in any given year) of flash flooding or general flooding occurring in Tolland. Flooding frequencies for the various floodplains in Tolland are defined by FEMA as the following:

- 10-year floodplain – 10 percent chance of flooding in any given year
- 25-year floodplain – 2.5 percent chance of flooding in any given year
- 100-year floodplain – 1 percent chance of flooding in any given year
- 500-year floodplain – 0.2 percent chance of flooding in any given year

In actuality, flooding occurs more frequently than this because the current FEMA-defined flood zones are based on historical patterns of rainfall intensity and frequency, and do not take into account the

impacts that climate change will have on Tolland. In future years, it is likely that the currently designated 10-year, 25-year, 100-year and 500-year floodplains will flood more frequently due to climate change.

The Berkshire County Hazard Mitigation Plan states that ice jam flooding will continue in the foreseeable future and continue to cause damage to bridges, roads, and buildings within the floodplain.

It is expected that beaver activity will continue to persist throughout the region, as the factors that have allowed them to expand their range (increase in suitable habitat, an increase in wetland protection and a decrease in the hunting and trapping) are expected to remain relatively constant over the next decade.

Impact

The Town faces a “limited” impact, with 10 percent to 25 percent of total area affected, from flooding.

There are at least 14 homes located within the 100-year floodplain. Utilizing the Town’s median home value of \$347,300 (ACS 2008-12), and assuming 100 percent damage to these structures, flooding could result in \$ 4,862,200 worth of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Vulnerability

Based on the above analysis, Tolland has a hazard index rating of “1 – highest risk” for flooding.

Severe Snowstorms / Ice Storms

Hazard Description

Severe winter storms can pose a significant risk to property and human life. The rain, freezing rain, ice, snow, cold temperatures and wind associated with these storms can cause the following hazards:

- Disrupted power and phone service
- Unsafe roadways and increased traffic accidents
- Infrastructure and other property are also at risk from severe winter storms and the associated flooding that can occur following heavy snow melt
- Tree damage and fallen branches that cause utility line damage and roadway blockages, resulting in more deadfall in forests that increases the risk of a major wildfire
- Damage to telecommunications structures
- Reduced ability of emergency officials to respond promptly to medical emergencies or fires

Location

The entire Town of Tolland is susceptible to severe snowstorms. Because these storms occur regionally, they would impact the entire town and the location of occurrence is "large," or over 50 percent of the Town affected.

The Town has had ice problems with all unpaved roads, as well as the following paved roadways:

- Colebrook River Road
- Route 57
- Burt Hill Road

Extent

The Northeast Snowfall Impact Scale (NESIS) developed by Paul Kocin of The Weather Channel and Louis Uccellini of the National Weather Service (Kocin and Uccellini, 2004) characterizes and ranks high-impact Northeast snowstorms. These storms have large areas of 10-inch snowfall accumulations and greater. NESIS has five categories: Extreme, Crippling, Major, Significant, and Notable. The index differs from other meteorological indices in that it uses population information in addition to meteorological measurements. Thus NESIS gives an indication of a storm's societal impacts.

NESIS scores are a function of the area affected by the snowstorm, the amount of snow, and the number of people living in the path of the storm. The aerial distribution of snowfall and population information are combined in an equation that calculates a NESIS score which varies from around one for smaller storms to over ten for extreme storms. The raw score is then converted into one of the five NESIS categories. The largest NESIS values result from storms producing heavy snowfall over large areas that include major metropolitan centers.

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

Source: <http://www.ncdc.noaa.gov/snow-and-ice/rsi/nesis>

Previous Occurrences

Tolland generally experiences at least one or two severe winter storms each year with varying degrees of severity. Severe winter storms typically occur during January and February; however, they can occur from late September through late April.

Based on data available from the National Oceanic and Atmospheric Administration, there are 47 winter storms since 1958 that have registered on the NESIS scale. Of these, approximately 26 storms resulted in snow falls in the Pioneer Valley of at least 10 inches. These storms are listed in the table on the next page, in order of their NESIS severity:

Winter Storms Producing Over 10 inches of Snow in Tolland, 1958-2013			
Date	NESIS Value	NASIS Category	NESIS Classification
3/12/1993	13.2	5	Extreme
3/2/1960	8.77	4	Crippling
2/15/2003	7.5	4	Crippling
2/2/1961	7.06	4	Crippling
1/21/2005	6.8	4	Crippling
1/19/1978	6.53	4	Crippling
12/25/1969	6.29	4	Crippling
2/10/1983	6.25	4	Crippling
2/14/1958	6.25	4	Crippling
2/5/1978	5.78	3	Major
2/23/2010	5.46	3	Major
2/8/1994	5.39	3	Major
1/9/2011	5.31	3	Major
2/18/1972	4.77	3	Major
12/11/1960	4.53	3	Major
2/7/2013	4.35	3	Major
2/22/1969	4.29	3	Major
1/18/1961	4.04	3	Major
2/8/1969	3.51	2	Significant
2/5/1967	3.5	2	Significant
4/6/1982	3.35	2	Significant
3/4/2013	3.05	2	Significant
3/15/2007	2.54	2	Significant
3/31/1997	2.29	1	Notable
2/2/1995	1.43	1	Notable
1/25/1987	1.19	1	Notable

Source: <http://www.ncdc.noaa.gov/snow-and-ice/rsi/nesis>

The local impact to Tolland of these major storms can vary greatly, due to differences in precipitation and temperature compared to the communities which are in lower altitude and closer to the Connecticut River. For example, the large snow storm in late October of 2011 that caused widespread tree damage and power outages throughout the region did not cause significant damage to Tolland. On the other hand, an ice storm occurred on December 14, 2008 that significantly affected the town, while this storm did not significantly affect the region as a whole.

The average annual snowfall in Tolland since 1999 is 71 inches, with the average melted precipitation of 50 inches. Since 1999, the largest winter snowfall was 107.5 inches, occurring during 2002-2003. The smallest winter snowfall was 34 inches, occurring the previous year.

FEMA-declared federal disasters affecting Tolland since 1993 are shown in the table below:

Disaster Name and Date	Disaster #
March Blizzard (March 1993)	FEMA-3103-EM
January Blizzard (January 1996)	FEMA-1090-EM
March Blizzard (March 2001)	FEMA-3165-EM
February Blizzard (February 17-18, 2003)	FEMA-3175-EM
December Blizzard (December 6-7, 2003)	FEMA-3175-EM
January Blizzard (January 22-23, 2005)	FEMA-3201-EM
April Nor'easter (April 15-25, 2007)	FEMA-1701-DR-MA
December Ice Storm (December 11, 2008)	FEMA-1813-DR-MA
January Snow Storm (January 11-12, 2011)	FEMA-DR-1959

Source: FEMA, 2014

Approximately every twenty years, western New England suffers from devastating ice storms, leaving heavy ice coating on trees and buildings, and resulting in hazardous conditions for residents. Major storms struck in 1921, 1942, 1961, 1983, 1998, and 2008, with the storm of December 29-30, 1942 disrupting power and closing roads throughout a broad swath of the northeast. The storm in 2008 resulted in the Town being without power for 9 days.

Probability of Future Events

Based upon the availability of records for Hampden County, the likelihood that a severe snow storm will affect Tolland is high (between 40 and 70 percent in the next year).

Research on climate change indicates that there is great potential for stronger, more frequent storms as the global temperature increases. More information about the effect of Climate Change can be found in the Pioneer Valley Planning Commission's Climate Action Plan, available at www.sustainableknowledgecorridor.org.

The Massachusetts State Climate Change Adaptation Report has additional information about the impact of climate change and can be accessed at www.mass.gov/eea/air-water-climate-change/climate-change/climate-change-adaptation-report.html.

Impact

The Town faces a “critical” impact or between 25 and 50 percent of total property damaged, from snowstorms.

To approximate the potential impact to property and people that could be affected by this hazard, the total value of all property in town, \$170,177,000 is used. An estimated 20 percent of damage would occur to 25 percent of structures, resulting in a total of \$8,508,850 worth of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Vulnerability

Based on the above assessment, Tolland has a hazard index rating of “2 — high risk” from snowstorms and ice storms.

Hurricanes

Hazard Description

Hurricanes are classified as cyclones and defined as any closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise in the Northern Hemisphere (or clockwise in the Southern Hemisphere) and whose diameter averages 10 to 30 miles across. The primary damaging forces associated with these storms are high-level sustained winds and heavy precipitation. Hurricanes are violent rainstorms with strong winds that can reach speeds of up to 200 miles per hour and which generate large amounts of precipitation. Hurricanes generally occur between June and November and can result in flooding and wind damage to structures and above-ground utilities.

Location

Because of the hazard's regional nature, all of Tolland is at risk from hurricanes. Ridgetops are more susceptible to wind damage. Thus, the location of occurrence of this hazard is considered "large," with over 50 percent of the Town's total area affected.

Extent

As an incipient hurricane develops, barometric pressure (measured in millibars or inches) at its center falls and winds increase. If the atmospheric and oceanic conditions are favorable, it can intensify into a tropical depression. When maximum sustained winds reach or exceed 39 miles per hour, the system is designated a tropical storm, given a name, and is closely monitored by the National Hurricane Center in Miami, Florida. When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane. Hurricane intensity is further classified by the Saffir-Simpson Hurricane Wind Scale, which rates hurricane wind intensity on a scale of 1 to 5, with 5 being the most intense.

Saffir-Simpson Scale	
Category	Maximum Sustained Wind Speed (MPH)
1	74–95
2	96–110
3	111–129
4	130–156
5	157 +

Source: National Hurricane Center, 2012

Previous Occurrences

Hurricanes that have occurred in the region including Tolland are shown in the following table.

Major Hurricanes in Region		
Hurricane/Storm Name	Year	Saffir/Simpson Category (when reached MA)
Great Hurricane of 1938	1938	3
Great Atlantic Hurricane	1944	1
Carol	1954	3
Edna	1954	1
Diane	1955	Tropical Storm
Donna	1960	Unclear, 1 or 2
Groundhog Day Gale	1976	Not Applicable
Gloria	1985	1
Bob	1991	2
Floyd	1999	Tropical Storm
Irene	2011	Tropical Storm
Sandy	2012	Super Storm

Source: National Hurricane Center, 2012

The NOAA Historical Hurricane tracks website shows three hurricanes that have tracked through Tolland: 1) the Great Hurricane of 1938, 2) Hurricane Able in 1952, and Hurricane Doria in 1971. The local Hazard Mitigation Committee determined that the Hurricane of 1938 washed out Schoolhouse Rd, the main east west road in town. This road remained closed for several years after the hurricane until money became available to rebuild it. There is no record of damage from Hurricanes Able or Doria.

The local Hazard Mitigation Committee and PVPC found no evidence of significant hail storms affecting the Town of Tolland.

Probability of Future Events

Tolland's location in western Massachusetts reduces the risk of extremely high winds that are associated with hurricanes, although it can experience some high wind events. Based upon past occurrences, it is reasonable to say that there is a "moderate" probability (10 to 40 percent in any given year) of hurricanes in Tolland.

Impact

A description of the damages that could occur due to a hurricane is described by the Saffir-Simpson scale, as shown below.

Hurricane Damage Classifications			
Storm Category	Damage Level	Description of Damages	Wind Speed (MPH)
1	MINIMAL	No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Also, some coastal flooding and minor pier damage. An example of a Category 1 hurricane is Hurricane Dolly (2008).	74-95
	Very dangerous winds will produce some damage		
2	MODERATE	Some roofing material, door, and window damage. Considerable damage to vegetation, mobile homes, etc. Flooding damages piers and small craft in unprotected moorings may break their moorings. An example of a Category 2 hurricane is Hurricane Francis in 2004.	96-110
	Extremely dangerous winds will cause extensive damage		
3	EXTENSIVE	Some structural damage to small residences and utility buildings, with a minor amount of curtain wall failures. Mobile homes are destroyed. Flooding near the coast destroys smaller structures, with larger structures damaged by floating debris. Terrain may be flooded well inland. An example of a Category 3 hurricane is Hurricane Ivan (2004).	111-129
	Devastating damage will occur		
4	EXTREME	More extensive curtain wall failures with some complete roof structure failure on small residences. Major erosion of beach areas. Terrain may be flooded well inland. An example of a Category 4 hurricane is Hurricane Charley (2004).	130-156
	Catastrophic damage will occur		
5	CATASTROPHIC	Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. Flooding causes major damage to lower floors of all structures near the shoreline. Massive evacuation of residential areas may be required. An example of a Category 5 hurricane is Hurricane Andrew (1992).	157+
	Catastrophic damage will occur		

The Town faces a “limited” impact from hurricanes, with 10 to 25 percent of Tolland affected.

Using a total a value of all structures in town of \$170,177,000 and an estimated wind damage of 10 percent to all structures with 10 percent damage to each structure, \$1,701,770 worth of damage would occur. With an estimated 20 percent of damage to 10 percent of structures would result in \$3,403,540 of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Vulnerability

Based on the above analysis, Tolland has a hazard index rating of “3 – medium risk” from hurricanes.

Severe Thunderstorms / Wind / Tornadoes

Hazard Description

A thunderstorm is a storm with lightning and thunder produced by a cumulonimbus cloud, usually producing gusty winds, heavy rain, and sometimes hail. Effective January 5, 2010, the NWS modified the hail size criterion to classify a thunderstorm as 'severe' when it produces damaging wind gusts in excess of 58 mph (50 knots), hail that is 1 inch in diameter or larger (quarter size), or a tornado (NWS, 2013).

Wind is air in motion relative to surface of the earth. For non-tropical events over land, the NWS issues a Wind Advisory (sustained winds of 31 to 39 mph for at least 1 hour or any gusts 46 to 57 mph) or a High Wind Warning (sustained winds 40+ mph or any gusts 58+ mph). For non-tropical events over water, the NWS issues a small craft advisory (sustained winds 25-33 knots), a gale warning (sustained winds 34-47 knots), a storm warning (sustained winds 48 to 63 knots), or a hurricane force wind warning (sustained winds 64+ knots). For tropical systems, the NWS issues a tropical storm warning for any areas (inland or coastal) that are expecting sustained winds from 39 to 73 mph. A hurricane warning is issued for any areas (inland or coastal) that are expecting sustained winds of 74 mph. Effects from high winds can include downed trees and/or power lines and damage to roofs, windows, etc. High winds can cause scattered power outages. High winds are also a hazard for the boating, shipping, and aviation industry sectors.

Tornadoes are swirling columns of air that typically form in the spring and summer during severe thunderstorm events. In a relatively short period of time and with little or no advance warning, a tornado can attain rotational wind speeds in excess of 250 miles per hour and can cause severe devastation along a path that ranges from a few dozen yards to over a mile in width. The path of a tornado may be hard to predict because they can stall or change direction abruptly. Within Massachusetts, tornadoes have occurred most frequently in Worcester County and in communities west of Worcester, including towns in eastern Hampshire County. High wind speeds, hail, and debris generated by tornadoes can result in loss of life, downed trees and power lines, and damage to structures and other personal property (cars, etc.).

Location

As per the Massachusetts Hazard Mitigation Plan, the entire town is at risk of high winds, severe thunderstorms, and tornadoes. The plan also identifies Tolland and the surrounding communities as having a high frequency of tornado occurrence within Massachusetts. However, the actual location of occurrence affected by thunderstorms, wind, or tornadoes is "small," with less than 10 percent of the town affected. Due to Tolland's high altitude, it tends to experience higher, shifting winds than surrounding communities.

Extent

An average thunderstorm is 15 miles across and lasts 30 minutes; severe thunderstorms can be much larger and longer. Tolland typically experiences 10 to 15 days per year with severe thunderstorms. Thunderstorms can cause hail, wind, and flooding.

Tornadoes are measured using the enhanced F-Scale, shown with the following categories and corresponding descriptions of damage:

Enhanced Fujita Scale Levels and Descriptions of Damage			
EF-Scale Number	Intensity Phrase	3-Second Gust (MPH)	Type of Damage Done
EF0	Gale	65–85	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.
EF1	Moderate	86–110	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
EF2	Significant	111–135	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
EF3	Severe	136–165	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
EF4	Devastating	166–200	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.

Previous Occurrences

Because thunderstorms and wind affect the town regularly on an annual basis, there are not significant records available for these events. As per the Massachusetts Hazard Mitigation Plan, there are approximately 10 to 30 days of thunderstorm activity in the state each year.

The strongest wind recorded since 1999 was a gust of 77 miles per hour, with steady winds throughout the same day in the 50s and 60s. This wind occurred in 1999 and was recorded by a local resident who maintains a weather station.

Sixteen incidents of tornado activity (all F2 or less) occurred in Hampden County between 1959 and 2014. Tornadoes that have affected areas near Tolland since 1950 are shown in the table below.

Tornados Affecting Areas Near Tolland 1950-2006

Date	Affected County	Magnitude	Start Lat/Log	End Lat/Log	Length	Width	Fatalities	Injuries	Property Damage
8		2	41°52'N / 72°15'W				0		25K
8/21/1951	Litchfield	2	41°37'N / 73°25'W	41°48'N / 72°36'W	43.90 Miles	100 Yards	0	9	250K
5/10/1954	Hartford	2	42°00'N / 72°53'W		0.80 Mile	17 Yards	0	0	3K
7/5/1955	Franklin	2	42°26'N / 72°34'W				0	0	3K
7/12/1955	Berkshire	2	42°06'N / 73°22'W		0.50 Mile	33 Yards	0	0	0K
7/11/1958	Franklin	2	42°35'N / 72°30'W		1.00 Mile	100 Yards	0	0	3K
8/14/1958	Hampshire	2	42°19'N / 72°38'W		1.00 Mile	67 Yards	0	0	250K
5/12/1959	Litchfield	2	42°00'N / 73°24'W		0.50 Mile	100 Yards	0	0	3K
7/21/1961	Hampshire	2	42°22'N / 72°38'W	42°18'N / 72°34'W	4.90 Miles	167 Yards	0	0	25K
5/24/1962	Hartford	3	41°34'N / 72°56'W	41°36'N / 72°53'W	2.30 Miles	120 Yards	0	5	2.5M
6/18/1962	Litchfield	2	41°46'N / 73°05'W		0.10 Mile	67 Yards	0	0	25K
5/20/1963	Franklin	2	42°24'N / 72°36'W	42°25'N / 72°34'W			0	0	25K
5/20/1963	Worcester	2	42°18'N / 72°12'W	42°21'N / 72°08'W	3.80 Miles	17 Yards	0	0	25K
3/1/1966	Berkshire	2	42°39'N / 73°09'W				0	0	25K
8/11/1966	Berkshire	2	42°03'N / 73°14'W	42°06'N / 73°05'W	8.00 Miles	33 Yards	0	0	25K
8/11/1966	Hampden	2	42°12'N / 72°38'W	42°16'N / 72°33'W	5.60 Miles	67 Yards	0	0	250K
8/11/1966	Litchfield	2	42°02'N / 73°18'W	42°03'N / 73°14'W	2.70 Miles	100 Yards	0	0	25K
9/13/1971	Hampshire	3	42°20'N / 72°40'W		0.50 Mile	7 Yards	0	0	25K
8/27/1972	Franklin	2	42°30'N / 72°30'W		1.00 Mile	100 Yards	0	0	25K
6/12/1973	Litchfield	2	41°37'N / 73°07'W		1.50 Miles	23 Yards	0	0	0K
8/28/1973	Berkshire	4	42°22'N / 73°25'W	42°16'N / 73°23'W	6.40 Miles	313 Yards	4	36	25.0M
8/28/1973	Columbia	4	42°25'N / 73°25'W	42°22'N / 73°25'W	3.40 Miles	313 Yards	0	0	25K
8/31/1973	Hartford	2	41°44'N / 72°44'W				0	0	25K

Date	Affected County	Magnitude	Start Lat/Log	End Lat/Log	Length	Width	Fatalities	Injuries	Property Damage
9/6/1973	Hartford	2	41°48'N / 72°32'W	41°49'N / 72°27'W	3.30 Miles	33 Yards	0	0	2.5M
9/18/1973	New Haven	2	41°36'N / 72°54'W				0	0	0K
7/13/1975	Berkshire	2	42°29'N / 73°10'W		0.30 Mile	27 Yards	0	0	25K
7/24/1975	Hampden	2	42°06'N / 72°40'W		0.30 Mile	33 Yards	0	0	25K
6/30/1976	Litchfield	2	42°00'N / 73°08'W		1.00 Mile	100 Yards	0	0	25K
10/3/1979	Hartford	4	41°53'N / 72°40'W	42°03'N / 72°42'W	11.30 Miles	1400 Yards	3	500	250.0M
7/5/1984	Hartford	2	41°40'N / 72°57'W	41°43'N / 72°50'W	3.00 Miles	200 Yards	0	0	0K
7/10/1989	Litchfield	2	41°50'N / 73°20'W	41°43'N / 73°14'W	10.00 Miles	73 Yards	0	4	25.0M
7/10/1989	Litchfield	2	41°36'N / 73°07'W	41°34'N / 73°05'W	2.00 Miles	100 Yards	0	20	25.0M
7/3/1997	Berkshire	2	42°11'N / 73°10'W	42°14'N / 73°06'W	3.70 Miles	600 Yards	0	0	1.5M
7/3/1997	Berkshire	2	42°10'N / 73°13'W	42°13'N / 73°09'W	4.50 Miles	600 Yards	0	0	1.5M
7/3/1997	Columbia	2	42°24'N / 73°25'W	42°24'N / 73°24'W	1.00 Mile	100 Yards	0	0	550K
6/23/2001	Litchfield	2	41°48'N / 73°07'W	41°48'N / 73°07'W	0.50 Mile	200 Yards	0	0	250K
7/21/2003	Columbia	2	42°24'N / 73°42'W	42°24'N / 73°42'W	1.30 Miles	50 Yards	0	1	200K
7/11/2006	Franklin	2	42°33'N / 72°24'W	42°33'N / 72°24'W	2.90 Miles	200 Yards	0	0	200K

Source: NOAA, 2014

In addition to these tornados, an EF2 tornado traveled between West Springfield and Southbridge on July 1st, 2011, and an EF0 tornado hit Lenox on August 20th, 2014.

The table below indicates the number of times that thunderstorms have produced winds over 50 miles per hour in Berkshire and Hampden County communities. Tolland had two instances of such winds between 1993 and 2013.

Severe Thunderstorms With Winds over 50 MPH in Hampden County, 1993-2013

Community	Thunderstorms
Agawam	13
Blandford	8
Brimfield	4
Chester	7
Chicopee	6
East Longmeadow	2
Granville	5
Hampden	2
Holland	1
Holyoke	12
Longmeadow	2
Ludlow	15
Monson	12
Montgomery	4
Palmer	11
Russell	2
Southwick	9
Springfield	19
Tolland	2
Wales	1
West Springfield	27
Westfield	19
Tolland	10

Source: NOAA, 2014

Severe Thunderstorms With Winds Over 50 MPH in Berkshire County, 1993-2013

Community	Thunderstorms
Adams	2
Alford	4
Becket	5
Cheshire	5
Dalton	2
Egermont	1
Florida	3
Great Barrington	14
Hancock	2
Hinsdale	2
Lanesborough	12
Lee	3
Lenox	14
Monterey	2
New Marlborough	4
North Adams	18
Otis	5
Peru	2
Pittsfield	33
Richmond	8
Sandisfield	1
Savoy	2
Sheffield	5
Stockbridge	8
Tyringham	1
Washington	2
West Stockbridge	2
Williamstown	5
Williamsville	1
Windsor	1

Rainfall records for a 24-hour period and per month are listed below:

Rainfall Records for Tolland, MA		
Month	24-Hour Record	Monthly Record
January	2.8"	8.9"
February	3.23"	7.68"
March	2.8"	7.72"
April	3.55"	8.75"
May	3.62"	11.54"
June	3.74"	10.4"
July	4.33"	9.73"
August	7.56"	18.68"
September	7.68"	3.23"
October	3.39"	9.06"
November	2.44"	7.56"
December	2.99"	7.25"

<http://www.myforecast.com/bin/almanac.m?city=571190&metric=false>
 Source: NOAA, 2014

Probability of Future Events

There are on average eight tornadoes per year in New England, with two or three of those in Massachusetts. Historically, Tolland's tornado activity is above the Massachusetts state average, and 31 percent greater than the U.S. Average. In western Massachusetts, the majority of sighted tornadoes have occurred in a swath east of Tolland, known as "tornado alley."

One measure of tornado activity is the tornado index value. It is calculated based on historical tornado events data using USA.com algorithms. It is an indicator of the tornado level in a region. A higher tornado index value means a higher chance of tornado events. Data was used for Hampden County to determine the Tornado Index Value as shown in the table below.

Tornado Index for Hampden County	
Hampden County	138.23
Massachusetts	87.60
United States	136.45

Source: USA.com
<http://www.usa.com/hampden-county-ma-natural-disasters-extremes.htm>

Based upon the available historical record, as well as Tolland's location in a high-density cluster of state-wide tornado activity, there is a "moderate" probability (10 to 40 percent chance in any given year) of a tornado affecting the town.

As per the Massachusetts Hazard Mitigation Plan, there are approximately 10 to 30 days of thunderstorm activity in the state each year. Thus, there is a "moderate" probability (10 to 40 percent chance in any given year) of a severe thunderstorm or winds affecting the town.

Impact

Overall, the Town faces a "limited" impact from severe thunderstorms, winds, or tornadoes with 10 to 25 percent of the Town affected.

The potential for locally catastrophic damage is a factor in any tornado, severe thunderstorm, or wind event. In Tolland, a tornado that hit the residential areas would leave much more damage than a tornado with a travel path that ran along the town's forested uplands, where little settlement has occurred. Most buildings in the Town of Tolland have not been built to Zone 1, Design Wind Speed Codes. The first edition of the Massachusetts State Building Code went into effect on January 1, 1975, with most of the Town's housing build before this date.

Using a total value of \$170,177,000 of all structures in Tolland, and an estimated 10 percent of structures damaged each by 20 percent, yields a total damage of \$3,403,540. This estimate does not include building contents, land values or damages to utilities.

Vulnerability

Based on the above assessment, Tolland has a hazard index rating of "2- high risk" from severe thunderstorms, winds, and tornadoes.

Wildfire / Brushfire

Hazard Description

Wildland fires are typically larger fires, involving full-sized trees as well as meadows and scrublands. Brushfires are uncontrolled fires that occur in meadows and scrublands, but do not involve full-sized trees. Both wildland fires and brushfires can consume homes, other buildings and/or agricultural resources. Typical causes of brushfires and wildfires are lightning strikes, human carelessness, and arson.

FEMA has classifications for 3 different classes of wildland fires:

- Surface fires – the most common type of wildland fire, surface fires burn slowly along the floor of a forest, killing or damaging trees.
- Ground fires burn on or below the forest floor and are usually started by lightning
- Crown fires move quickly by jumping along the tops of trees. A crown fire may spread rapidly, especially under windy conditions.

Location

Hampden County has approximately 273,000 acres of forested land, which accounts for 67 percent of total land area. Most of Tolland's acreage (91 percent) is forested, making the entire town susceptible to a fire. Because of this, the location of occurrence of this hazard is "large," with over 50 percent of the Town affected.

Because of the proximity of most houses in Tolland to wooded areas a relatively large wildfire would likely result in damage to several properties.

Extent

Wildfires can cause widespread damage to the areas that they affect. They can spread very rapidly, depending on local wind speeds and be very difficult to get under control. Fires can last for several hours up to several days. In Tolland approximately 91 percent of the Town's total land area is in forest, which is over 19,000 acres.

As described in the next section describing previous occurrences of wildfire, there have not been any major wildfires recorded in Tolland. However, based on other major wildfires that have occurred in western Massachusetts, it is estimated that such a fire would likely destroy around 50 to 500 acres of forested area.

Previous Occurrences

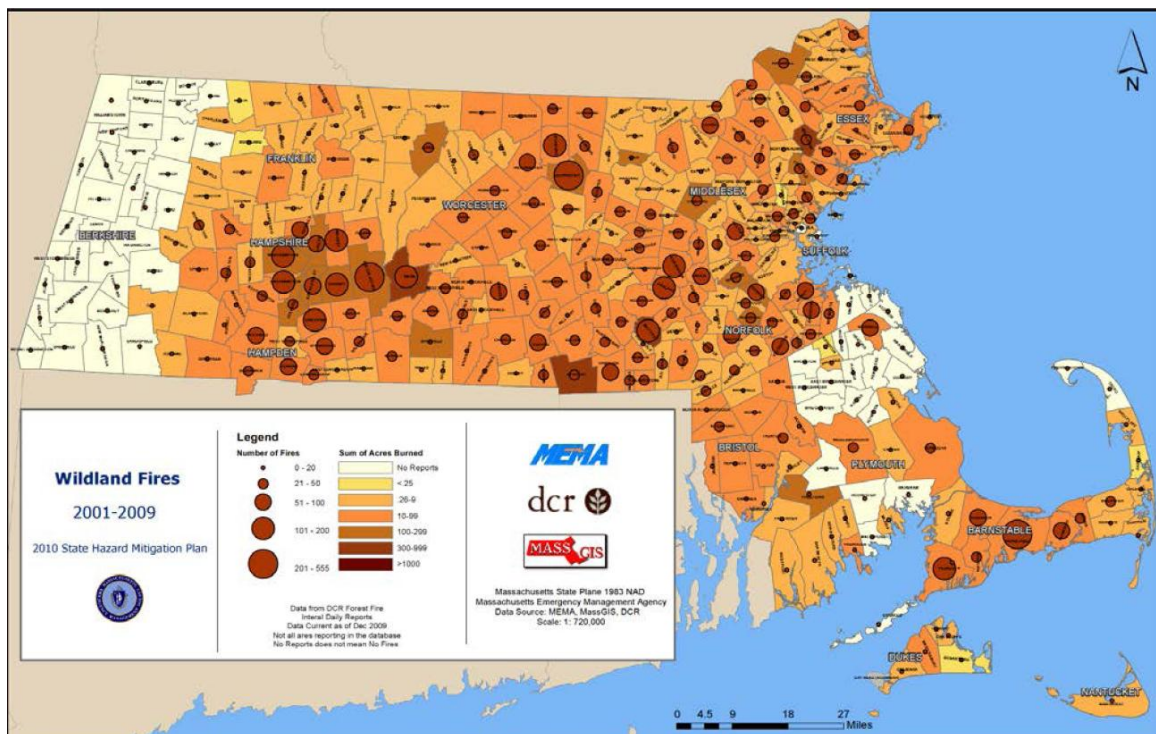
There are no records of wildfires or burned acreage available for Tolland. However, during the past 100 years, there have not been many wildfires occurring in the Pioneer Valley. However, several have occurred during the past 20 years, as shown in the list below:

- 1995 – Russell, 500 acres burned on Mt. Tekoa
- 2000 – South Hadley, 310 acres burned over 14 days in the Litchia Springs Watershed
- 2001 – Ware, 400 acres burned
- 2010 – Russell, 320 acres burned on Mt. Tekoa
- 2012 – Eastern Hampden County, dry conditions and wind gusts created a brush fire in Brimfield, and burned 50 acres

Over the past five years the town has averaged 4 brushfires a year.

. In addition, between 1995 and 2000, the neighboring community of Otis experienced 56 total fires, causing damage to 1,860 acres, or 33.21 acres per fire (MEMA, 2004). This information is not available by community for years after 2000.

Wildland Fires in Massachusetts, 2001-2009



Source: Massachusetts Hazard Mitigation Plan

Probability of Future Events

In accordance with the Massachusetts Hazard Mitigation Plan, the Town Hazard Mitigation Committee found it is difficult to predict the likelihood of wildfires in a probabilistic manner because the number of variables involved. However, given the proximity of previous wildfires, and their proximity to the Town, the Hazard Mitigation Committee identified the likelihood of a future wildfire to be "moderate," with a 10 to 40 percent chance in any given year.

Deadfall in woods, resulting from fallen trees during ice storms and snow storms (particularly the 2008 ice storm) and slash from logging operations, creates a buildup of dry fuel for a wildfire that would quickly ignite and expand the damage done by this hazard.

Climate scenarios project summer temperature increases between 2°C and 5°C and precipitation decreases of up to 15 percent. Such conditions would exacerbate summer drought and further promote high-elevation wildfires, releasing stores of carbon and further contributing to the buildup of greenhouse gases. Forest response to increased atmospheric carbon dioxide—the so-called “fertilization effect”—could also contribute to more tree growth and thus more fuel for fires, but the effects of carbon dioxide on mature forests are still largely unknown.

Impact

The Town faces a “limited” impact from wildfires, with 10 to 25 percent of property affected.

Using a total value of \$170,177,000 of all structures in Tolland, and an estimated 10 percent of structures damaged each by 50 percent, an estimated damage due to wildfire is \$8,508,850. This estimate does not include building contents, land values or damages to utilities.

The wooden sleeping structures found at youth camps in town would be particular susceptible to forest fire, due to their construction material and close proximity to forested areas.

Vulnerability

Based on the above assessment, Tolland has a hazard risk index of “3 – medium risk” from wildfires.

Earthquakes

Hazard Description

An earthquake is a sudden, rapid shaking of the ground that is caused by the breaking and shifting of rock beneath the Earth's surface. Earthquakes can occur suddenly, without warning, at any time of the year. New England experiences an average of 30 to 40 earthquakes each year although most are not noticed by people.¹ Ground shaking from earthquakes can rupture gas mains and disrupt other utility service, damage buildings, bridges and roads, and trigger other hazardous events such as avalanches, flash floods (dam failure) and fires. Un-reinforced masonry buildings, buildings with foundations that rest on filled land or unconsolidated, unstable soil, and mobile homes not tied to their foundations are at risk during an earthquake.²

Location

Because of the regional nature of the hazard, the entire town is susceptible to earthquakes, making the location of occurrence "large," with over 50 percent of the town affected.

Extent

The magnitude of an earthquake is measured using the Richter Scale, which measures the energy of an earthquake by determining the size of the greatest vibrations recorded on the seismogram. On this scale, one step up in magnitude (from 5.0 to 6.0, for example) increases the energy more than 30 times. The intensity of an earthquake is measured using the Modified Mercalli Scale. This scale quantifies the effects of an earthquake on the Earth's surface, humans, objects of nature, and man-made structures on a scale of I through XII, with I denoting a weak earthquake and XII denoting a earthquake that causes almost complete destruction.

¹ Northeast States Emergency Consortium Web site: www.nesec.org/hazards/earthquakes.cfm.

² Federal Emergency Management Agency Web site: www.fema.gov/hazards/earthquakes/quake.shtm.

Richter Scale Magnitudes and Effects	
Magnitude	Effects
< 3.5	Generally not felt, but recorded.
3.5 - 5.4	Often felt, but rarely causes damage.
5.4 - 6.0	At most slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1 - 6.9	Can be destructive in areas up to about 100 kilometers across where people live.
7.0 - 7.9	Major earthquake. Can cause serious damage over larger areas.
8 or >	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

Modified Mercalli Intensity Scale for and Effects			
Scale	Intensity	Description Of Effects	Corresponding Richter Scale Magnitude
I	Instrumental	Detected only on seismographs.	
II	Feeble	Some people feel it.	< 4.2
III	Slight	Felt by people resting; like a truck rumbling by.	
IV	Moderate	Felt by people walking.	
V	Slightly Strong	Sleepers awake; church bells ring.	< 4.8
VI	Strong	Trees sway; suspended objects swing, objects fall off shelves.	< 5.4
VII	Very Strong	Mild alarm; walls crack; plaster falls.	< 6.1
VIII	Destructive	Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged.	
IX	Ruinous	Some houses collapse; ground cracks; pipes break open.	< 6.9
X	Disastrous	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread.	< 7.3
XI	Very Disastrous	Most buildings and bridges collapse; roads, railways, pipes and cables destroyed; general triggering of other hazards.	< 8.1
XII	Catastrophic	Total destruction; trees fall; ground rises and falls in waves.	> 8.1

Source: US Federal Emergency Management Agency

Previous Occurrences

The most recent earthquakes in the region that includes Tolland are shown in the table below.

Largest Earthquakes in Region that Includes Tolland, 1924 – 2012		
Location	Date	Magnitude
Ossipee, NH	December 20, 1940	5.5
Ossipee, NH	December 24, 1940	5.5
Dover-Foxcroft, ME	December 28, 1947	4.5
Kingston, RI	June 10, 1951	4.6
Portland, ME	April 26, 1957	4.7
Middlebury, VT	April 10, 1962	4.2
Near NH Quebec Border, NH	June 15, 1973	4.8
West of Laconia, NH	January 19, 1982	4.5
Southwick, MA	July 16, 2000	3.3
Plattsburg, NY	April 20, 2002	5.1
Bar Harbor, NH	October 3, 2006	4.2
Hollis Center, ME	October 16, 2012	4.6

Source: Northeast States Emergency Consortium website, www.nesec.org/hazards/earthquakes.cfm

New England States Record of Historic Earthquakes		
State	Years of Record	Number Of Earthquakes
Connecticut	1668 - 2007	137
Maine	1766 - 2007	544
Massachusetts	1668 - 2007	355
New Hampshire	1638 - 2007	360
Rhode Island	1776 - 2007	38
Vermont	1843 - 2007	73
New York	1840 - 2007	755
<i>Total Number of Earthquakes within the New England states between 1638 and 1989 is 2262.</i>		

Source: Northeast States Emergency Consortium website, www.nesec.org/hazards/earthquakes.cfm

Probability of Future Events

One measure of earthquake activity is the Earthquake index value. It is calculated based on historical earthquake events data using USA.com algorithms. It is an indicator of the earthquake activity level in a region. A higher earthquake index value means a higher chance of earthquake events. Data was used for Hampden County to determine the Earthquake Index Value as shown in the table below.

Earthquake Index for Hampden County	
Hampden County	0.24
Massachusetts	0.70
United States	1.81

Based upon existing records, there is a "very low" probability, or less than 1 percent chance in any given year, of this hazard affecting Tolland.

Impact

Massachusetts introduced earthquake design requirements into their building code in 1975 and improved building code for seismic reasons in the 1980s. However, these specifications apply only to new buildings or to extensively-modified existing buildings. Buildings, bridges, water supply lines, electrical power lines and facilities built before the 1980s may not have been designed to withstand the forces of an earthquake. The seismic standards have also been upgraded with the 1997 revision of the State Building Code.

The town faces a "critical" impact from earthquakes, with 25 to 50 percent of Tolland affected.

Structures are mostly of wood frame construction in Tolland. Assuming a total value of all structures in town of \$170,177,000, an estimated loss of 25 percent of structures in town, and a 100 percent loss of those structures, an earthquake would result in \$42,544,250 worth of damage. The costs of repairing or replacing roads, bridges, power lines, telephone lines, or the contents of the structures are not included in this estimate.

Vulnerability

Based on the above analysis, Tolland has a hazard index rating of "4- low risk" from earthquakes.

Dam Failure

Hazard Description

Dams and their associated impoundments provide many benefits to a community, such as water supply, recreation, hydroelectric power generation, and flood control. However, they also pose a potential risk to lives and property. Dam failure is not a common occurrence, but dams do represent a potentially disastrous hazard. When a dam fails, the potential energy of the stored water behind the dam is released rapidly. Most dam failures occur when floodwaters above overtop and erode the material components of the dam. Often dam breaches lead to catastrophic consequences as the water rushes in a torrent downstream flooding an area engineers refer to as an "inundation area." The number of casualties and the amount of property damage will depend upon the timing of the warning provided to downstream residents, the number of people living or working in the inundation area, and the number of structures in the inundation area. Large branches and trees that fall during flooding are a significant potential factor in damage to dams in Tolland.

Many dams in Massachusetts were built during the 19th Century without the benefit of modern engineering design and construction oversight. Dams of this age can fail because of structural problems due to age and/or lack of proper maintenance, as well as from structural damage caused by an earthquake or flooding.

The Massachusetts Department of Conservation and Recreation Office of Dam Safety is the agency responsible for regulating dams in the state (M.G.L. Chapter 253, Section 44 and the implementing regulations 302 CMR 10.00). To be regulated, these dams are in excess of 6 feet in height (regardless of storage capacity) and have more than 15 acre feet of storage capacity (regardless of height). Dam safety regulations enacted in 2005 transferred significant responsibilities for dams from the State of Massachusetts to dam owners, including the responsibility to conduct dam inspections.

Location

The Massachusetts Emergency Management Agency (MEMA) identifies 10 dams in Tolland. Based on the location of these dams, the location of occurrence from this hazard is identified as "medium," with 10 to 50 percent of the Town affected.

Dams in Tolland	
Dam	Hazard Level
Camp Spruce Hill Dam	Low
Chamonix Chalet Dam	Low
H.E. Newell Pond Dam	Low
Twining Pond Lake Northern Dam	Low
Twining Pond Southern Dam	Significant
New Trout Pond Dam	NA
Noyes Pond Dam	Low
Penstock Dam	NA
Trout Pond Dam (this dam has failed)	Low
Wards Pond Dam	Low
Otter Pond Dam	Low

Extent

Often dam breaches lead to catastrophic consequences as the water ultimately rushes in a torrent downstream flooding an area engineers refer to as an “inundation area.” The number of casualties and the amount of property damage will depend upon the timing of the warning provided to downstream residents, the number of people living or working in the inundation area, and the number of structures in the inundation area.

Dams in Massachusetts are assessed according to their risk to life and property. The state has three hazard classifications for dams:

- *High Hazard:* Dams located where failure or improper operation will likely cause loss of life and serious damage to homes, industrial or commercial facilities, important public utilities, main highways, or railroads.
- *Significant Hazard:* Dams located where failure or improper operation may cause loss of life and damage to homes, industrial or commercial facilities, secondary highways or railroads or cause interruption of use or service of relatively important facilities.
- *Low Hazard:* Dams located where failure or improper operation may cause minimal property damage to others. Loss of life is not expected.

Previous Occurrences

To date, there have been no dam failures in Tolland. Trout Pond Dam has failed but there was no resulting damage.

Probability of Future Events

As Tolland’s dams age, and if maintenance is deferred, the likelihood of a dam bursting will increase, but currently the frequency of dam failures is "very low," with a less than 1 percent chance of a dam bursting in any given year.

Impact

The town faces a “critical” impact from failure of dams with a high hazard level, with 25 to 50 percent of Tolland affected.

Impact of Significant Hazard Dam Failures in Tolland			
Dam	Hazard Level	Percent of Town Affected	Cost
Twining Pond Southern Dam	Significant	25 percent	\$42,544,250

Vulnerability

Based on this analysis, Tolland has a hazard index rating of “4 – low risk” from dam failure.

Drought

Hazard Description

Drought is a normal, recurrent feature of climate. It occurs almost everywhere, although its features vary from region to region. In the most general sense, drought originates from a deficiency of precipitation over an extended period of time, resulting in a water shortage for some activity, group, or environmental sector. Reduced crop, rangeland, and forest productivity; increased fire hazard; reduced water levels; increased livestock and wildlife mortality rates; and damage to wildlife and fish habitat are a few examples of the direct impacts of drought. Of course, these impacts can have far-reaching effects throughout the region and even the country.

Location

Because of this hazard's regional nature, a drought would impact the entire town. The location of occurrence from this hazard is "large," with over 50 percent of the Town affected.

Extent

The severity of a drought would determine the scale of the event and would vary among town residents depending on whether the residents' water supply is derived from a private well or the public water system.

The U.S. Drought Monitor also records information on historical drought occurrence. Unfortunately, data could only be found at the state level. The U.S. Drought Monitor categorizes drought on a D0-D4 scale as shown below.

U.S. Drought Monitor		
Classification	Category	Description
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered
D1	Moderate Drought	Some damage to crops, pastures; streams, reservoirs, or wells low, some water shortages developing or imminent; voluntary water-use restrictions requested
D2	Severe Drought	Crop or pasture losses likely; water shortages common; water restrictions imposed
D3	Extreme Drought	Major crop/pasture losses; widespread water shortages or restrictions
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies

Source: US Drought Monitor, <http://droughtmonitor.unl.edu/classify.htm>

Previous Occurrences

In Massachusetts, six major droughts have occurred statewide since 1930.³ They range in severity and length, from three to eight years. In many of these droughts, water-supply systems were found to be inadequate. Water was piped in to urban areas, and water-supply systems were modified to permit withdrawals at lower water levels. The following table indicates previous occurrences of drought since 2000, based on the US Drought Monitor:

Annual Drought Status	
Year	Maximum Severity
2000	No drought
2001	D2 conditions in 21% of the state
2002	D2 conditions in 99% of the state
2003	No drought
2004	D0 conditions in 44% of the state
2005	D1 conditions in 7% of the state
2006	D0 conditions in 98% of the state
2007	D1 conditions in 71% of the state
2008	D0 conditions in 57% of the state
2009	D0 conditions in 44% of the state
2010	D1 conditions in 27% of the state
2011	D0 conditions in 0.01% of the state
2012	D2 conditions in 51% of the state

Source: US Drought Monitor

Tolland has not been impacted by any previous droughts in the state.

Probability of Future Events

In Tolland, as in the rest of the state, the probability of future drought events is "low," or between 1 to 10 percent in any given year.

Based on past events and current criteria outlined in the Massachusetts Drought Management Plan, it appears that western Massachusetts may be more vulnerable than eastern Massachusetts to severe drought conditions. However, many factors, such as water supply sources, population, economic factors (i.e., agriculture based economy), and infrastructure, may affect the severity and length of a drought event.

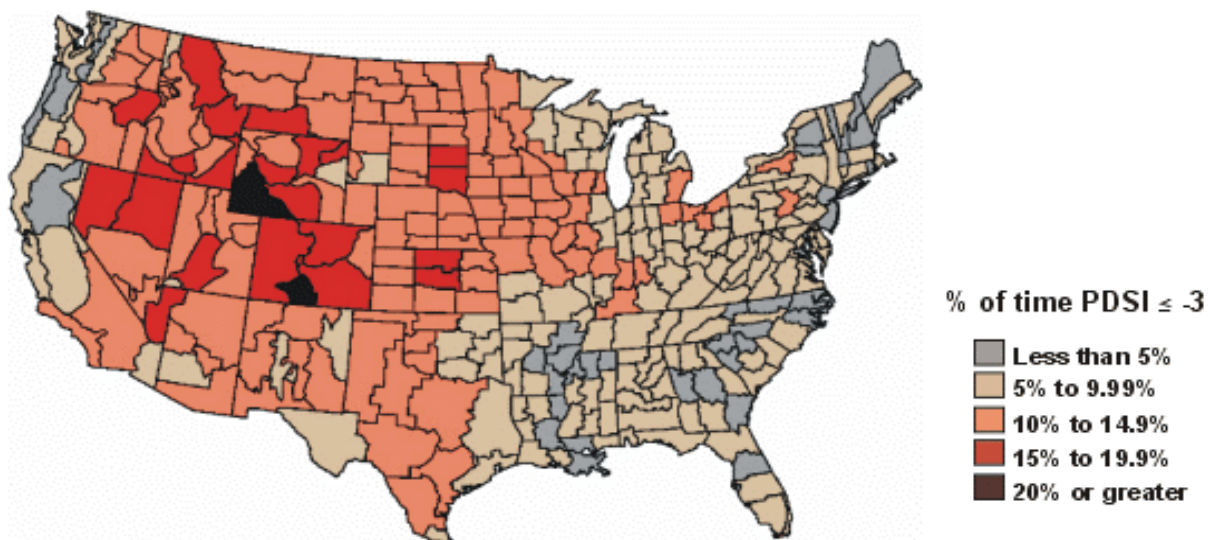
³ US Geological Survey Water-Supply Paper 2375. "National Water Summary 1989 – Floods and Droughts: Massachusetts." Prepared by S. William Wandle, Jr., US Geological Survey.

When evaluating the region’s risk for drought on a national level, utilizing a measure called the Palmer Drought Severity Index, Massachusetts is historically in the lowest percentile for severity and risk of drought.⁴ However, global warming and climate change may have an effect on drought risk in the region. With the projected temperature increases, some scientists think that the global hydrological cycle will also intensify. This would cause, among other effects, the potential for more severe, longer-lasting droughts.

Palmer Drought Severity Index

1895–1995

Percent of time in severe and extreme drought



Impact

Due to the water richness of Western Massachusetts, Tolland is unlikely to be adversely affected by anything other than a major, extended drought. While such a drought would require water saving measures to be implemented, there would be no foreseeable damage to structures or loss of life resulting from the hazard. The impact is thus classified as, "minor," with very little or no property damage.

Vulnerability

Based on the above assessment, Tolland has a hazard index rating of “5 – very low risk” from drought.

⁴ National Drought Mitigation Center – <http://drought.unl.edu>

Natural Gas Pipeline Break

Hazard Description

Tennessee Gas Pipeline Company (TGPL) owns over 13,000 miles of natural gas transmission pipelines which travel from the Gulf of Mexico to New England. Should a leak or disruption occur to the pipeline, a large amount of flammable natural gas can be released and ignite, causing a major explosion or fire that can greatly affect people or property. A disruption would most likely cause from faulty infrastructure of the pipe itself, resulting from corrosion or equipment malfunction. The pipeline does have check valves installed that provide a warning when there is a drop in the pressure of the gas due to a leak, which helps reduce the extent of natural gas that would be released. However, a sufficiently large earthquake or large forest fire could also cause a break.

Location

The Tennessee Gas Pipeline is 18" and 24" in sections of Tolland and travels east-west, on its way to update New York from Boston. The location of occurrence is determined to be "medium," or between 10 percent to 50 percent of the town affected.

Extent

The extent of a natural gas pipeline break will greatly depend on the amount of natural gas released and whether this gas is ignited, resulting in an explosion. Most explosions occur far away from people and property and so their extent is minimal. However, when an explosion does occur in populated areas, significant damage to people and property can occur. The extent is similar to that of a forest fire, with additional characteristics including windows being blown out and structures being leveled due to the explosion's shock wave. Natural gas tends to rise, meaning a potential explosion would likely act as a geyser and cause minimal surface damage.

Previous Occurrences

There have been no disruptions of the Tennessee pipeline in Tolland. However, from 2006 to 2014, pipelines had 92 "significant incidents" which caused over \$88 million in property damage nationwide. Overall the cause of the majority of these incidents was faulty infrastructure, including corrosion, equipment malfunctions, manufacturing defects, faulty welds, and incorrect installation. Failures may be escalating as pipelines age.

Probability of Future Events

The likelihood of a future disruption to the pipeline is largely dependent on a significant enough earthquake affecting the region that the pipe would break, or a large wildfire engulfing the pipeline. The likelihood of either occurrence is considered to be "low," or between a 1 to 10 percent chance in any given year.

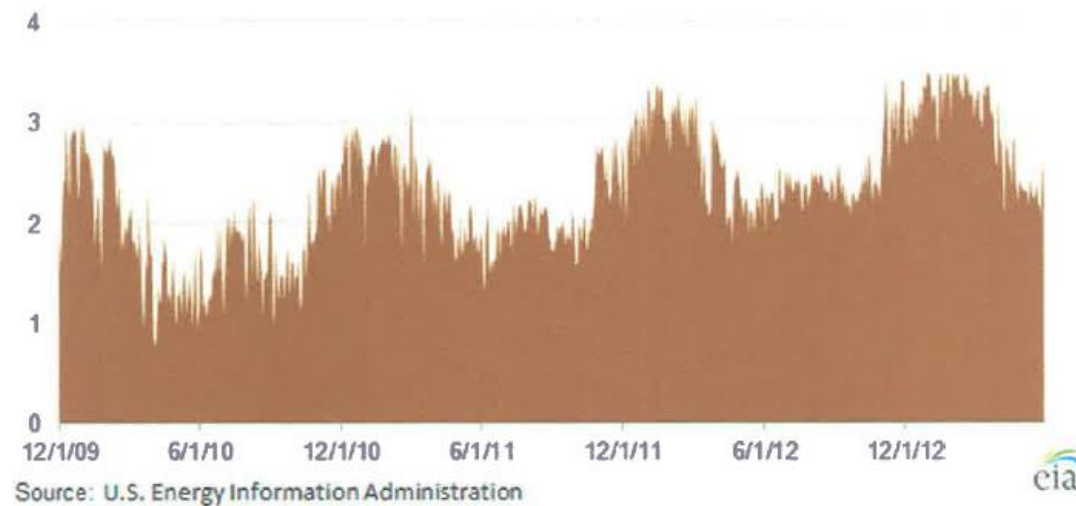
Impact

The pipeline passes mostly through forested, rural areas of Town. Thus it is likely an explosion would not cause property damage directly, and any eventual property damage would be the result of an explosion-induced forest fire. Because of this, the town faces a “minor” impact from a pipeline disruption, with very few injuries or damages to properties.

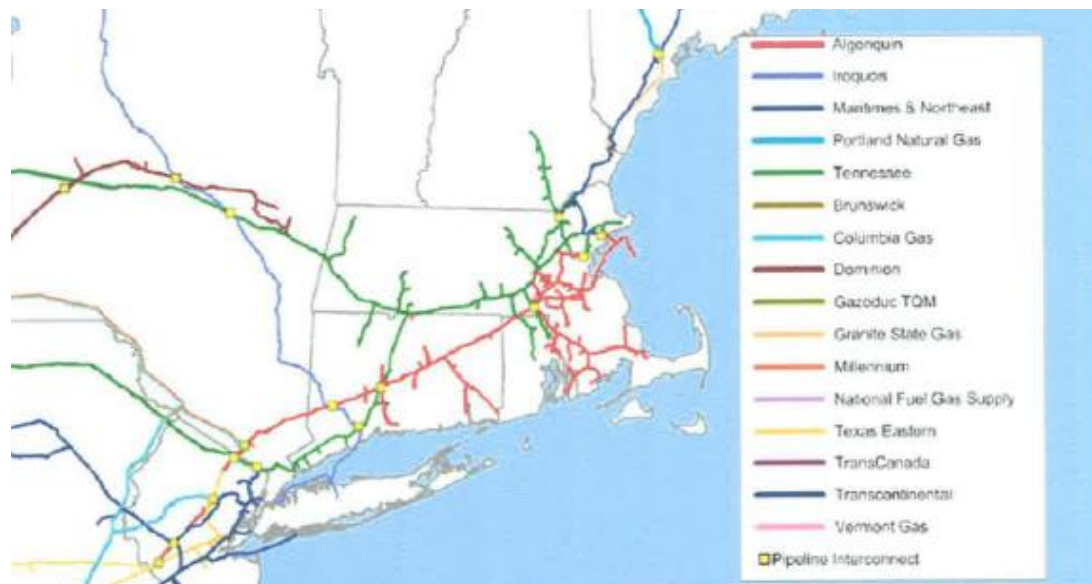
Vulnerability

Based on the above assessment, Tolland has a hazard index rating of “5 – very low risk” from Natural Gas Pipeline Breaks.

New England Natural Gas Supply from TGP & AGT (billion cubic feet per day)



Pipelines in New England Region



Other Hazards

In addition to the hazards identified above, the Hazard Mitigation Team reviewed the full list of hazards listed in the Massachusetts Hazard Mitigation Plan. Due to the location and context of the Town, coastal erosion, landslides, and tsunamis, were determined to not be a threat.

Extreme temperatures, while identified in the State Hazard Mitigation Plan, was determined by the Tolland Hazard Mitigation Committee to not currently be a primary hazard to people, property, or critical infrastructure in Tolland. Since 1999, the highest recorded temperature of 98 degrees Fahrenheit occurred in 2010, and the lowest of -14 degrees Fahrenheit occurred in 2011. These extremes were recorded by a local resident who maintains a weather station. While extreme temperatures can result in increased risk of wildfire, this effect is addressed as part of the "Wildfire/Brushfire" hazard assessment. Due to climate change, extreme temperatures are likely to have a larger effect on the Town in the future. The Hazard Mitigation Committee will continue to assess the impact of extreme temperature and update the Hazard Mitigation Plan accordingly.

Ice jams, another hazard identified in the state Hazard Mitigation Plan, was similarly determined by the Tolland Hazard Mitigation Committee to not be a primary hazard to people, property, or critical infrastructure in town. To the extent that ice jams do result in flooding, ice jams are addressed in the "Flooding" section of this chapter.

4: CRITICAL FACILITIES

Facility Classification

A Critical Facility is defined as a building, structure, or location which:

- Is vital to the hazard response effort
- Maintains an existing level of protection from hazards for community residents and property
- Would create a secondary disaster if a hazard were to impact it

The Critical Facilities List for the Town of Tolland has been identified utilizing a Critical Facilities List provided by the State Hazard Mitigation Officer. Tolland's Hazard Mitigation Committee has broken up this list of facilities into three categories:

- Facilities needed for emergency response in the event of a hazard event.
- Facilities identified as non-essential and not required in an emergency response event, but which are considered essential for the everyday operation of the Town.
- Facilities or institutions that include special populations which would need additional attention in the event of a hazard event.

The critical facilities and evacuation routes potentially affected by hazard areas are identified following this list. The Past and Potential Hazards/Critical Facilities Map (Appendix D) also identifies these facilities.

Category 1 – Emergency Response Services

The Town has identified the Emergency Response Facilities and Services as the highest priority in regards to protection from natural and man-made hazards.

1. **Emergency Operations Center**
Public Safety Complex - 204 West Granville Road
2. **Fire Station**
Tolland Fire Department Headquarters – 206 West Granville Road
3. **Police Station**
Public Safety Complex – 204 West Granville Road
4. **Department of Public Works**
Department of Public Works Headquarters – 162 Colebrook River Road

5. **Water**

Public well at Public Safety Complex - 204 West Granville Road

6. **Emergency Fuel Stations**

L&M Auto, 2000 East Otis Road, East Otis, MA

7. **Emergency Electrical Power Facility**

Public Safety Complex - 204 West Granville Road

Department of Public Works - 162 Colebrook River Road

Girl Scouts of Connecticut's Timber Trails Resident Camp - 1266 East Otis Road

Wildwood Clubhouse - 254 Beetle Road

Additional mobile generators owned by Fire Department - 206 West Granville Road

Camp Kinderland - 1543 Colebrook River Road

Tunxis Clubhouse - 945 Clubhouse Road

Many private residences have backup power generator

8. **Emergency Shelters**

None (shelter in place is the strategy employed by Town)

9. **Utilities**

Cell phone towers at:

Department of Public Works - 162 Colebrook River Road

East Otis Road

Harvey Mountain Road

West Granville Road

60-acre solar facility at 1403 New Boston Road

Pipeline (running east-west through town)

10. **Primary Evacuation Routes**

State Route 57

East Otis Road

Clubhouse Road

Schoolhouse Road

Hartland Road

Burt Hill Road

Colebrook River Road

Category 2 – Non Emergency Response Facilities

The town has identified these facilities as non-emergency facilities; however, they are considered essential for the everyday operation of Tolland.

1. **Problem Culverts**

33 New Boston Road

236 New Boston Road

514 New Boston Road
1304 New Boston Road
1418 New Boston Road
441 West Granville Road
1064 Colebrook River Road
Colebrook River Road at intersection with Rivers Road
365 Jeff Miller Road
East Otis Road at entrance to Twining Pond
East Otis Road by Girl Scout Camp
Schoolhouse Road where Noyes Pond Brook passes under road
2451 Schoolhouse Road (in Blandford)
228 Rivers Road

2. Wastewater

The only sewer system in town serves the Tolland State Forest campground. The system serves the needs of 90 camping sites located on a peninsula of the Otis Reservoir. At present, sparse settlement patterns in the rest of town do not warrant consideration of public sewerage systems.

Category 3 – Facilities/ Institutions with Special Populations

The third category contains people and facilities that need to be protected in event of a disaster.

1. Hospitals & Health Facilities

None

2. Special Needs Populations

None

3. Recreation Areas

Camp Kinderland - 1543 Colebrook River Road
Girl Scouts of Connecticut's Timber Trails Resident Camp - 1266 East Otis Road
Tolland State Forest
Twin Brook Farm and Camping Areas

4. Schools

None

5. Churches

None

6. Employment Centers

None

5: MITIGATION STRATEGIES

One of the steps of this Hazard Mitigation Plan is to evaluate all of the Town’s existing policies and practices related to natural hazards and identify potential gaps in protection. After reviewing these policies and the hazard identification and assessment, the Town Hazard Mitigation Committee developed a set of hazard mitigation strategies it would like to implement.

The Town of Tolland has developed the following goal to serve as a framework for mitigation of the hazards identified in this plan.

Goal Statement

To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to the following hazards: flooding, severe snowstorms/ice storms, severe thunderstorms, hurricanes, tornadoes, wildfires/brushfires, earthquakes, dam failures, and drought.

For the extent of this analysis, the Committee reviewed the following Town documents:

- Zoning Bylaws
- Comprehensive Emergency Management Plan
- Town Open Space and Recreation Plan

Tolland's Administrative and Technical Capabilities to Mitigate Consequences of Natural Disasters

While Tolland is a very small residential community (population 485), the community does have a Superintendent of Public Works, a Planning Board and a local Emergency Management Director, who worked together on this plan and who have the administrative and technical capacity to oversee implementation of the mitigation strategies recommended in this plan. The Town is also served by the Pioneer Valley Planning Commission, and can take advantage of no cost technical assistance to address any questions about federal and state funding availability and program requirements. The Town also has a Comprehensive Emergency Management Plan and has up to date land use regulations, including zoning, in place that conforms to all state laws designed to mitigate the negative consequences of natural disasters such as prohibitions on development in wetlands, design standards for drainage and Fire Department review of subdivisions. These strategies are detailed in the table on pp 64-66.

Overview of Mitigation Strategies by Hazard

An overview of the general concepts underlying mitigation strategies for each of the hazards identified in this plan is as follows:

Flooding

The key factors in flooding are the water capacity of water bodies and waterways, the regulation of waterways by flood control structures, and the preservation of flood storage areas and wetlands. As more land is developed, more flood storage is demanded of the town's water bodies and waterways. The Town currently addresses this problem with a variety of mitigation tools and strategies. Flood-related regulations and strategies are included in the Town's zoning bylaw, such as ensuring restricting development in the flood plain, requiring facility design for street surface drainages that accommodate the 25-year storm, regulating earth removal during development, requiring site plan reviews to show drainage plans, and conforming to the Wetlands Protection Act.

Severe Snowstorms / Ice Storms

Winter storms can be especially challenging for emergency management personnel. The Massachusetts Emergency Management Agency (MEMA) serves as the primary coordinating entity in the statewide management of all types of winter storms and monitors the National Weather Service (NWS) alerting systems during periods when winter storms are expected. The Town's current mitigation strategy is to restrict the location and height of telecommunications facilities. To the extent that some of the damages from a winter storm can be caused by flooding, flood protection mitigation measures also assist with severe snowstorms and ice storms.

Hurricanes

Hurricanes provide the most lead warning time of all identified hazards, because of the relative ease in predicting the storm's track and potential landfall. MEMA assumes "standby status" when a hurricane's location is 35 degrees North Latitude (Cape Hatteras) and "alert status" when the storm reaches 40 degrees North Latitude (Long Island). Even with significant warning, hurricanes can cause significant damage – both due to flooding and severe wind.

The flooding associated with hurricanes can be a major source of damage to buildings, infrastructure and a potential threat to human lives. Flood protection measures can thus also be considered hurricane mitigation measures. The high winds that often accompany hurricanes can also damage buildings and infrastructure, similar to tornadoes and other strong wind events. Meeting the requirements of the State Building code also reduce damages from hurricanes.

Severe Thunderstorms / Winds / Tornadoes

Most damage from tornadoes and severe thunderstorms come from high winds that can fell trees and electrical wires, generate hurtling debris and, possibly, hail. Adherence to the Massachusetts Building Code is a primary current mitigation strategy. In addition, current land development regulations, such as restrictions on the height of telecommunications towers, also help prevent wind damages.

Wildfires / Brushfires

The current mitigation strategy is to enforce the fire protection measures in the State Fire Code. The Town is also actively training Fire Department personnel regarding how to effectively fight forest fires, and acquiring equipment for doing so.

Earthquakes

Although there are five mapped seismological faults in Massachusetts, there is no discernible pattern of previous earthquakes along these faults nor is there a reliable way to predict future earthquakes along these faults or in any other areas of the state. Consequently, earthquakes are arguably the most difficult natural hazard for which to plan.

Most buildings and structures in the state were constructed without specific earthquake resistant design features. However, the Building Code helps maintain the structural integrity of structures and helps to mitigate earthquakes.

Dam Failure

Dam failure is a highly infrequent occurrence, but a severe incident could prove catastrophic. In addition, dam failure most often coincides with flooding, so its impacts can be multiplied, as the additional water has nowhere to flow. The only mitigation measures currently in place are the regular inspections required by the Massachusetts DCR.

Drought

Although Massachusetts does not face extreme droughts like many other places in the country, it is susceptible to dry spells and drought. The Town does not have any drought-specific hazard mitigation strategies currently in place.

Natural Gas Pipeline Breakage

Natural gas pipeline breakages would occur due to faulty infrastructure, earthquake, or forest fire. Thus the current mitigation measures to prevent impacts from a breakage are the same as those addressing wildfire and earthquakes.

Existing Mitigation Capabilities

The Town of Tolland has a list of existing mitigation strategies that were in place prior to the development of this Hazard Mitigation Plan. As part of the development of this plan, the Hazard Mitigation Committee evaluated each mitigation strategy / resource to determine its effectiveness and whether any improvements could be made.

Existing Mitigation Capabilities and Resources				
Capability	Action Type	Description	Hazards Mitigated	Effectiveness
Stormwater drainage requirements for subdivision developments	Zoning	Requires a definitive plan that identifies stormwater drainage, permanent open space, flood plains, public water supply proposals, and a utilities layout.	Flooding	Effective
Design Standards for Drainage	Zoning State Regulations US Army Corps of Engineers Regulations	Facility design for street surface drainages (storm sewers, swales) – 25 year storm; Detention basins – 50 year storm; Watercourses, drainage ways, channels or streams – 100 year storm; Culverts, bridges, other water crossings – 100 year storm. Water velocities in pipes and paved gutters shall be between 2 and 10 feet per second, and not more than 5 feet per second on unpaved surfaces.	Flooding	Effective
Fire department review of subdivisions	Zoning	All proposed subdivision developments must be reviewed by Fire Department to ensure conformance with fire safety requirements	Wildfire / Brushfire	Effective
Protection of natural flood-related features	Zoning	Requires the protection of natural features such as significant trees, historic sites, ledges, waterways.	Flooding	Effective
Earth removal regulations	Zoning	Requires a cover crop of vegetation, and mandates that six inches of topsoil must be returned to the entire site to promote growth.	Flooding	Effective

Existing Mitigation Capabilities and Resources

Capability	Action Type	Description	Hazards Mitigated	Effectiveness
Site plan review	Zoning	Requires that plans show storm drainage. Requires that the natural setting of a parcel will be preserved in a natural state insofar as is practicable; contains standards for surface water drainage that require measures to handle and manage increased runoff, while maintaining vehicular access.	Flooding	Effective
Flood Plain Overlay District	Zoning	Purpose includes preserving natural flood control characteristics and flooding storage capacity of the flood plain.	Flooding	Effective
State Building Code	State regulation	The Town of Tolland has adopted the Massachusetts State Building Code, which promotes construction of buildings that can withstand hazards to a certain degree.	All	Effective
Zoning regulations Personal Wireless Services Facility	Zoning	New towers greater than 35 feet shall be located at least 1.5 times the height of the Tower from all boundaries of the site upon which the Tower is located.	Severe Snowstorms / Ice storms Tornadoes Hurricanes	Effective
Mobile Homes	Zoning	Mobile homes, recreation vehicles, motor homes, tents, campers, house or travel trailers shall not be kept within the boundaries of the town unless they are in bona fide storage or the Planning Board gives written approval for use as a temporary dwelling during construction of a permanent residence.	Hurricanes Tornadoes	Effective
Replacement of Fire truck pumpers	Town operations	Town is developing a plan for eventual replacement of fire fighting equipment which is overdue for replacement	Wildfire / Brushfire	Effective
Conformance with Wetlands Protection Act	Zoning	Require all new development to conform to regulations set forth in Wetlands Protection Act.	Flooding	Effective

Existing Mitigation Capabilities and Resources

Capability	Action Type	Description	Hazards Mitigated	Effectiveness
Fire Department training and equipment for forest fires	Town operations	Town is developing a training program for Fire Department personnel on how to fight forest fires, as well as acquiring equipment for doing so (mobile equipment such as ATVs and Humvees).	Wildfire / Brushfire	Effective
Electrical backup generators	Town operations	Town has electrical generators installed at the Public Safety Complx and Highway Department, with portable generator also available for Town Hall.	All	Effective
Council on Aging contact with senior citizens	Town operations	The Town's Council on Aging has plans in place to knock on doors of identified elderly residents during an emergency.	All	Effective
Retrofitting of public buildings to withstand snow loads and prevent roof collapse	Town operations	Town Hall has been retrofitted to accommodate high snow loads. Public Safety Complex was constructed to withstand large snow loads.	Severe Snowstorms / Ice storms	Effective
Fire education for students	School district operations	The Southwick-Tolland-Granville Regional School District provides fire education and safety to all Tolland students.	Wildfire / Brushfire	Effective
Dry hydrant inspections	Town operations	All dry hydrants are routinely inspected.	Wildfire / Brushfire	Effective
Grates on culverts	Town operations	Culverts currently have trash grates installed to prevent debris from clogging passage.	Flooding	Effective
Identification of problem stormwater drainage areas	Town operations	The Town has completed an inventory of all culverts and drainage areas that need improvements to prevent flooding.	Flooding	Effective, next step is to implement drainage improvements
Burn permit	Town operations	Town residents are required to annually apply for a seasonal burn permit and notify Fire Department on day they wish to burn.	Wildfire / Brushfire	Effective
Tree trimming	Town operations	Town and Western Massachusetts Electrical Company currently trim trees to ensure that the number of fallen branches is minimal during a storm.	Severe Snowstorms / Ice storms	Effective

Prioritization Methodology

The Tolland Hazard Mitigation Planning Committee reviewed and prioritized a list of new mitigation strategies using the following criteria:

Application to multiple hazards – Strategies are given a higher priority if they assist in the mitigation of several natural hazards.

Time required for completion – Projects that are faster to implement, either due to the nature of the permitting process or other regulatory procedures, or because of the time it takes to secure funding, are given higher priority.

Estimated benefit – Strategies which would provide the highest degree of reduction in loss of property and life are given a higher priority. This estimate is based on the Hazard Identification and Analysis Chapter, particularly with regard to how much of each hazard’s impact would be mitigated.

Cost effectiveness – in order to maximize the effect of mitigation efforts using limited funds, priority is given to low-cost strategies. For example, regular tree maintenance is a relatively low-cost operational strategy that can significantly reduce the length of time of power outages during a winter storm. Strategies that have identified potential funding streams, such as the Hazard Mitigation Grant Program, are also given higher priority.

Eligibility Under Hazard Mitigation Grant Program – The Hazard Mitigation Grant Program (HMGP) provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. Funding is made available through FEMA by the Massachusetts Emergency Management Agency. Municipalities apply for grants to fund specific mitigation projects under MEMA requirements.

The following categories are used to define the priority of each mitigation strategy:

Low – Strategies that would not have a significant benefit to property or people, address only one or two hazards, or would require funding and time resources that are impractical

Medium – Strategies that would have some benefit to people and property and are somewhat cost effective at reducing damage to property and people

High – Strategies that provide mitigation of several hazards and have a large benefit that warrants their cost and time to complete

Very High – extremely beneficial projects that will greatly contribute to mitigation of multiple hazards and the protection of people and property. These projects are also given a numeric ranking within the category.

Cost Estimates

Each of the following implementation strategies is provided with a cost estimate. Projects that already have secured funding are noted as such. Where precise financial estimates are not currently available, categories were used with the following assigned dollar ranges:

- **Low** – cost less than \$50,000
- **Medium** – cost between \$50,000 – \$100,000
- **High** – cost over \$100,000

Cost estimates take into account the following resources:

- Town staff time for grant application and administration (at a rate of \$25 per hour)
- Consultant design and construction cost (based on estimates for projects obtained from town and general knowledge of previous work in town)
- Town staff time for construction, maintenance, and operation activities (at a rate of \$25 per hour)

Project Timeline

Each strategy is provided with an estimated length of time it will take for implementation. Where funding has been secured for the project, a specific future date is provided for when completion will occur. However, some projects do not currently have funding and thus it is difficult to know exactly when they will be completed. For these projects, an estimate is provided for the amount of time it will take to complete the project once funding becomes available.

New Mitigation Strategies Prioritized

Status	Action Name	Action Type	Description	Hazards Mitigated	Responsible Agency	Priority	Cost	Funding Source	Timeframe <i>once funding becomes available</i>
New	Fire detector inspection	Town operations	Develop a voluntary program for inspection of fire detectors in all public and private buildings	Wildfire / brushfire	Fire Department	High	Low	Fire Department	7 months
New	Box culvert	Capital construction	Replacement of the box culvert at 1064 Colebrook River Road	Flood	DPW	High	Medium	DPW HMPG funding	1.5 years
New	Pumper replacement	Town operations	Replacement of existing fire pumper equipment	Wildfire / brushfire	Fire Department	High	Medium	Fire Department and Grants	9 months
New	Testing of generators	Town operations	Regularly test backup electrical generators	All hazards	EMD	High	Low	EMD	3 months to develop annual inspection plan and then annual impl
New	Training of volunteers and first responders	Town operations	Recruit residents to serve as volunteer emergency personnel and first responders	All hazards	Fire Department, EMD	High	Low	Town	6 months repeat as needed

New Mitigation Strategies Prioritized

Status	Action Name	Action Type	Description	Hazards Mitigated	Responsible Agency	Priority	Cost	Funding Source	Timeframe <i>once funding becomes available</i>
New	Evaluation of bridges and culverts	Town operations	Evaluate all bridges and culverts situated along Route 57 and produce an engineering report of prioritized culverts to be replaced/repared.	Flooding	DPW	High	Low	DPW	1.5 years
New	Reverse 911 system	Town operations	Town is currently in the process of incorporating Tolland into the Berkshire County Sherriff's Office Reverse 911 system that automatically notifies residents of emergency situations	All	DPW, Police Department, Fire Department, Select Board	High	Low	Police Department, HMPG funding	1.5 years
New	Dam Emergency Action Plan	Town operations	Develop an Emergency Action Plan for Twining Pond Southern Dam and Noyes Pond Dam	Dam failure	DPW, Fire Department	Medium	Low	DPW	2 years
New	Drainage improvements	Capital construction	Implement top priority improvements identified in the "Evaluation of bridges and culverts" listed in row above.	Flooding	DPW	Medium	High	DPW HMPG funding	1.5 years ea

New Mitigation Strategies Prioritized

Status	Action Name	Action Type	Description	Hazards Mitigated	Responsible Agency	Priority	Cost	Funding Source	Timeframe <i>once funding becomes available</i>
New	Education for homeowners in floodplain	Education and Outreach	An article will be published in the Tolland Tattler discussing the flood maps, how to check on weather a particular home is in a flood zone and an explanation of potential insurance requirements.	Flooding	Council on Aging	Medium	Low	COA	1.5 months
New	Snow load capacity improvements	Capital construction	Make improvements to the snow load capacity of the Town library by strengthening the existing roof trusses and installing additional trusses as needed.	Severe snowstorms / Ice storms	DPW, Select Board	Medium	Medium	Town	9 months

6: PLAN REVIEW, EVALUATION, IMPLEMENTATION, AND ADOPTION

Plan Adoption

Upon completion of the draft Hazard Mitigation Plan, a public meeting was held on November 10th, 2014 to request comments. The Hazard Mitigation Plan was then submitted to the Massachusetts Emergency Management Agency (MEMA) and the Federal Emergency Management Agency for their review. Upon receiving conditional approval of the plan by FEMA, the plan was presented to the Town Select Board and adopted.

Plan Implementation

The implementation of this plan began upon its formal adoption by the Town Select Board and approval by MEMA and FEMA. Those town departments and boards responsible for ensuring the development of policies, bylaw revisions, and programs as described in Sections 5 and 6 of this plan will be notified of their responsibilities immediately following approval. The Town's Hazard Mitigation Committee will oversee the implementation of the plan.

Incorporation with Other Planning Documents

Existing plans, studies, reports and technical information were incorporated throughout the planning process. This included a review and incorporation of significant information from the following key documents:

- *Tolland Comprehensive Emergency Management Plan* (particularly the Critical Infrastructure Section) – the Critical Infrastructure section was used to identify those infrastructure components in Tolland that have been identified as crucial to the function of the Town; also, this resource was used to identify special needs populations as well as potential emergency shortcomings.
- *Tolland Zoning Bylaw* - The Town's Zoning Bylaw was used to gather identify those actions that the Town is already taking that are reducing the potential impacts of a natural hazard (i.e. floodplain regulations) to avoid duplicating existing successful efforts.
- *State of Massachusetts - Hazard Mitigation Plan* - This plan was used to insure that the Town's PDM was consistent with the State's Plan.

The Hazard Mitigation Plan will also be incorporated into updates of the Tolland CEM Plan.

During regular update meetings for the Hazard Mitigation Plan, the Hazard Mitigation Committee will review whether any of these plans are in the process of being updated. If so, the Hazard Mitigation Committee will provide copies of the Hazard Mitigation Plan to relevant Town staff and brief them on the content of the Hazard Mitigation Plan. The Hazard Mitigation Committee will also review current City programs and policies to ensure that they are consistent with the mitigation strategies described in this plan.

Plan Monitoring and Evaluation

The Town's Emergency Management Director or his designee will call meetings of all responsible parties to review plan progress on an annual basis. The public will be notified of these meetings in advance through a posting of the agenda at Town Hall. Responsible parties identified for specific mitigation actions will be asked to submit their reports in advance of the meeting.

Meetings will involve evaluation and assessment of the plan, regarding its effectiveness at achieving the plan's goals and stated purpose. The following questions will serve as the criteria that is used to evaluate the plan:

Plan Mission and Goal

- Is the Plan's stated goal and mission still accurate and up to date, reflecting any changes to local hazard mitigation activities?
- Are there any changes or improvements that can be made to the goal and mission?

Hazard Identification and Risk Assessment

- Have there been any new occurrences of hazard events since the plan was last reviewed? If so, these hazards should be incorporated into the Hazard Identification and Risk Assessment.
- Have any new occurrences of hazards varied from previous occurrences in terms of their extent or impact? If so, the stated impact, extent, probability of future occurrence, or overall assessment of risk and vulnerability should be edited to reflect these changes.
- Is there any new data available from local, state, or Federal sources about the impact of previous hazard events, or any new data for the probability of future occurrences? If so, this information should be incorporated into the plan.

Existing Mitigation Strategies

- Are the current strategies effectively mitigating the effect of any recent hazard events?
- Has there been any damage to property since the plan was last reviewed?
- How could the existing mitigation strategies be improved upon to reduce the impact from recent occurrences of hazards? If there are improvements, these should be incorporated into the plan.

Proposed Mitigation Strategies

- What progress has been accomplished for each of the previously identified proposed mitigation strategies?
- How have any recently completed mitigation strategies affected the Town's vulnerability and impact from hazards that have occurred since the strategy was completed?
- Should the criteria for prioritizing the proposed mitigation strategies be altered in any way?
- Should the priority given to individual mitigation strategies be changed, based on any recent changes to financial and staffing resources, or recent hazard events?

Review of the Plan and Integration with Other Planning Documents

- Is the current process for reviewing the Hazard Mitigation Plan effective? Could it be improved?
- Are there any Town plans in the process of being updated that should have the content of this Hazard Mitigation Plan incorporated into them?
- How can the current Hazard Mitigation Plan be better integrated with other Town planning tools and operational procedures, including the zoning bylaw, the Comprehensive Emergency Management Plan, and plans for funding infrastructure?

Following these discussions, it is anticipated that the Committee may decide to reassign the roles and responsibilities for implementing mitigation strategies to different town departments and/or revise the goals and objectives contained in the plan. The Committee will review and update the Hazard Mitigation Plan every five years.

Public participation will be a critical component of the Hazard Mitigation Plan maintenance process. The Hazard Mitigation Committee will hold all meetings in accordance with Massachusetts open meeting laws. In addition, the Town will post notice at Town Hall that residents can submit any questions or concerns about the plan through a designated e-mail or mailing address. All comments will be reviewed by the Hazard Mitigation Committee and incorporated as appropriate.

7: APPENDICES

Appendix A – Technical Resources

1) Agencies

Massachusetts Emergency Management Agency (MEMA).....	508/820-2000
Hazard Mitigation Section	617/626-1356
Federal Emergency Management Agency (FEMA)	617/223-4175
MA Regional Planning Commissions:	
Berkshire Regional Planning Commission (BRPC).....	413/442-1521
Cape Cod Commission (CCC).....	508/362-3828
Central Massachusetts Regional Planning Commission (CMRPC).....	508/693-3453
Franklin Regional Council of Governments (FRCOG).....	413/774-3167
Martha’s Vineyard Commission (MVC).....	508/693-3453
Merrimack Valley Planning Commission (MVPC).....	978/374-0519
Metropolitan Area Planning Council (MAPC).....	617/451-2770
Montachusett Regional Planning Commission (MRPC).....	978/345-7376
Nantucket Planning and Economic Development Commission (NP&EDC).....	508/228-7236
Northern Middlesex Council of Governments (NMCOG).....	978/454-8021
Old Colony Planning Council (OCPC).....	508/583-1833
Pioneer Valley Planning Commission (PVPC).....	413/781-6045
Southeastern Regional Planning and Economic Development District (SRPED).....	508/823-1803
MA Board of Building Regulations & Standards (BBRS).....	617/227-1754
MA Coastal Zone Management (CZM).....	617/626-1200
DCR Water Supply Protection.....	617/626-1379
DCR Waterways.....	617/626-1371
DCR Office of Dam Safety.....	508/792-7716
DFW Riverways.....	617/626-1540
MA Dept. of Housing & Community Development.....	617/573-1100
Woods Hole Oceanographic Institute.....	508/457-2180
UMass-Amherst Cooperative Extension.....	413/545-4800
National Fire Protection Association (NFPA).....	617/770-3000
New England Disaster Recovery Information X-Change (NEDRIX – an association of private companies & industries involved in disaster recovery planning).....	781/485-0279
MA Board of Library Commissioners.....	617/725-1860
MA Highway Dept, District 2.....	413/582-0599
MA Division of Marine Fisheries.....	617/626-1520
MA Division of Capital & Asset Management (DCAM).....	617/727-4050
University of Massachusetts/Amherst.....	413/545-0111
Natural Resources Conservation Services (NRCS).....	413/253-4350
MA Historical Commission.....	617/727-8470
U.S. Army Corps of Engineers.....	978/318-8502
Northeast States Emergency Consortium, Inc. (NESEC).....	781/224-9876
National Oceanic and Atmospheric Administration: National Weather Service.....	508/824-5116
US Department of the Interior: US Fish and Wildlife Service	413/253-8200
US Geological Survey.....	508/490-5000

2) Mitigation Funding Resources

404 Hazard Mitigation Grant Program (HMGP)	MA Emergency Management Agency
406 Public Assistance and Hazard Mitigation	MA Emergency Management Agency
Community Development Block Grant (CDBG).....	DHCD, also refer to RPC
Dam Safety Program.....	MA Division of Conservation and Recreation
Disaster Preparedness Improvement Grant (DPIG)	MA Emergency Management Agency
Emergency Generators Program by NESEC‡	MA Emergency Management Agency
Emergency Watershed Protection (EWP) Program.....	USDA, Natural Resources Conservation
Service Flood Mitigation Assistance Program (FMAP).....	MA Emergency Management Agency
Flood Plain Management Services (FPMS).....	US Army Corps of Engineers
Mitigation Assistance Planning (MAP).....	MA Emergency Management Agency
Mutual Aid for Public Works.....	Western Massachusetts Regional Homeland Security Advisory Council
National Flood Insurance Program (NFIP) †	MA Emergency Management Agency
Power of Prevention Grant by NESEC‡	MA Emergency Management Agency
Roadway Repair & Maintenance Program(s).....	Massachusetts Highway Department
Section 14 Emergency Stream Bank Erosion & Shoreline Protection	US Army Corps of Engineers
Section 103 Beach Erosion.....	US Army Corps of Engineers
Section 205 Flood Damage Reduction.....	US Army Corps of Engineers
Section 208 Snagging and Clearing	US Army Corps of Engineers
Shoreline Protection Program.....	MA Department of Conservation and Recreation
Various Forest and Lands Program(s).....	MA Department of Environmental Protection
Wetlands Programs	MA Department of Environmental Protection

‡NESEC – Northeast States Emergency Consortium, Inc. is a 501(c)(3), not-for-profit natural disaster, multi-hazard mitigation and emergency management organization located in Wakefield, Massachusetts. Please, contact NESEC for more information.

† Note regarding National Flood Insurance Program (NFIP) and Community Rating System (CRS): The National Flood Insurance Program has developed suggested floodplain management activities for those communities who wish to more thoroughly manage or reduce the impact of flooding in their jurisdiction. Through use of a rating system (CRS rating), a community’s floodplain management efforts can be evaluated for effectiveness. The rating, which indicates an above average floodplain management effort, is then factored into the premium cost for flood insurance policies sold in the community. The higher the rating achieved in that community, the greater the reduction in flood insurance premium costs for local property owners. MEMA can provide additional information regarding participation in the NFIP-CRS Program.

3) Internet Resources

Sponsor	Internet Address	Summary of Contents
Natural Hazards Research Center, U. of Colorado	http://www.colorado.edu/litbase/hazards/	Searchable database of references and links to many disaster-related websites.
Atlantic Hurricane Tracking Data by Year	http://wxp.eas.purdue.edu/hurricane	Hurricane track maps for each year, 1886 – 1996
National Emergency Management Association	http://nemaweb.org	Association of state emergency management directors; list of mitigation projects.
NASA – Goddard Space Flight Center “Disaster Finder:	http://www.gsfc.nasa.gov/ndrd/disaster/	Searchable database of sites that encompass a wide range of natural disasters.
NASA Natural Disaster Reference Database	http://ftpwww.gsfc.nasa.gov/ndrd/main/html	Searchable database of worldwide natural disasters.
U.S. State & Local Gateway	http://www.statelocal.gov/	General information through the federal-state partnership.
National Weather Service	http://nws.noaa.gov/	Central page for National Weather Warnings, updated every 60 seconds.
USGS Real Time Hydrologic Data	http://h20.usgs.gov/public/realtime.html	Provisional hydrological data
Dartmouth Flood Observatory	http://www.dartmouth.edu/artsci/geog/floods/	Observations of flooding situations.
FEMA, National Flood Insurance Program, Community Status Book	http://www.fema.gov/fema/csb.html	Searchable site for access of Community Status Books
Florida State University Atlantic Hurricane Site	http://www.met.fsu.edu/explores/tropical.html	Tracking and NWS warnings for Atlantic Hurricanes and other links
The Tornado Project Online	http://www.tornadoject.com/	Information on tornadoes, including details of recent impacts.

Sponsor	Internet Address	Summary of Contents
National Severe Storms Laboratory	http://www.nssl.uoknor.edu/	Information about and tracking of severe storms.
Independent Insurance Agents of America IIAA Natural Disaster Risk Map	http://www.iaa.iix.com/ndcmap.html	A multi-disaster risk map.
Earth Satellite Corporation	http://www.earthsat.com/	Flood risk maps searchable by state.
USDA Forest Service Web	http://www.fs.fed.us/land	Information on forest fires and land management.

Appendix B – Documentation of the Planning Process

Tolland Hazard Mitigation Committee Meeting Agenda

**Tolland Town Hall
June 25, 2014, 6:00 p.m.**

1. Introductions
2. Overview of Hazard Mitigation Planning Process
 - a. Background on Hazard Mitigation Planning
 - b. Planning process and requirements
 - i. 3 committee meetings
 - ii. 2 public committee meetings
 - iii. MEMA / FEMA review
 - iv. Select Board adoption
 - c. Proposed timeline for Tolland Hazard Mitigation Plan
 - Committee Meeting #1 Wednesday, June 25
 - Public Outreach Meeting #1 Monday, August 18
 - Committee Meeting #2 Wednesday, September 3
 - Committee Meeting #3 Wednesday, October 29
 - Public Outreach Meeting #2 Monday, November 24
3. Review of Chapter 1: Planning Process
4. Review of Chapter 2: Local Profile
5. Review of Chapter 3: Hazard Identification and Risk Assessment

**Tolland Hazard Mitigation Committee Meeting
Sign-In Sheet
June 25, 2014, 6:00 p.m.**

Name	Position	E-mail
Pat Storey	CWA	epstorey@yahoo.com
Phil GRANAWAY	GRANT WRITER	philgranaway@yahoo.com
Tom Baine	Selectman	cwsarg44@gmail.com
Mike Sullivan	Fire Chief	firedept@tolland- ma.com
ED Deming	Police / DPW	DPW@tolland- ma.com



Catalyst for Regional Progress

PVPC

Timothy W. Brennan, Executive Director

MEDIA RELEASE

CONTACT: Josiah Neiderbach, PVPC Planner, (413) 781-6045 or jneiderbach@pvpc.org
Pat Storey, Town of Tolland, (413) 269-8575 or epstorey@yahoo.com

FOR IMMEDIATE RELEASE
August 13, 2014

Town of Tolland Hazard Mitigation Plan Public Engagement Event to Be Held

Tolland residents are invited to provide comments on the development of the Town of Tolland's first natural hazard mitigation plan **Monday, August 18** at 7:00 p.m. at the Public Safety Complex, 206 West Granville Road. All members of the public are welcome to attend.

The meeting will include an introduction to the hazard mitigation planning process, information on the location of the Town's critical facilities, and a summary of existing mitigation initiatives. Municipal officials and Pioneer Valley Planning Commission staff will be available to answer questions and listen to comments from the public.

This planning effort is being undertaken to help the Town of Tolland assess the risks faced from natural hazards, identify action steps that can be taken to prevent damage to property and loss of life, and prioritize funding for mitigation efforts. A mitigation action is any action taken to reduce or eliminate the long-term risk to human life and property from hazards.

The plan is being produced by the Town with assistance from the Pioneer Valley Planning Commission and is funded by the Federal Emergency Management Agency (FEMA) and the Massachusetts Emergency Management Agency (MEMA).

For more information, please contact PVPC's Josiah Neiderbach at jneiderbach@pvpc.org or (413) 781-6045.

—30—

Media Organizations Sent Press Releases

Media Organization	Address	Town	State	Zip Code
African American Point of View	688 Boston Road	Springfield	MA	01119
Agawam Advertiser News	23 Southwick Street	Feeding Hills	MA	01030
Amherst Bulletin	115 Conz Street	Northampton	MA	01060
Belchertown Sentinel	1 Main Street	Belchertown	MA	01007
Berkshire Eagle	75 South Church Street	Pittsfield	MA	01202
Brattleboro Reformer	62 Black Mountain Rd.	Brattleboro	VT	05301
CBS 3 Springfield	One Monarch Place	Springfield	MA	01144
Chicopee Register	380 Union Street	West Springfield	MA	01089
CommonWealth Magazine	18 Tremont Street	Boston	MA	02108
Country Journal	5 Main Street	Huntington	MA	01050
Daily Hampshire Gazette	115 Conz Street	Northampton	MA	01060
El Sol Latino	P.O. Box 572	Amherst	MA	01004
Going Green	PO Box 1367	Greenfield	MA	01302
Hilltown Families	P.O. Box 98	West Chesterfield	MA	01084
Holyoke Sun	138 College Street	South Hadley	MA	01075
Journal Register	24 Water Street	Palmer	MA	01069
La Voz Hispana	133 Maple Street #201	Springfield	MA	01105
Ludlow Register	24 Water Street	Palmer	MA	01069
MA Municipal Association	One Winthrop Street	Boston	MA	02110
Quaboag Current	80 Main Street	Ware	MA	01082
Recorder	14 Hope Street	Greenfield	MA	01302
Reminder	280 N. Main Street	East Longmeadow	MA	01028
Southwick Suffield News	23 Southwick Street	Feeding Hills	MA	01030
State House News Service	State House	Boston	MA	02133
Tantasqua Town Common	80 Main Street	Ware	MA	01082
The Longmeadow News	62 School Street	Westfield	MA	01085
The Republican	1860 Main Street	Springfield	MA	01102
The Westfield News	62 School Street	Westfield	MA	01085
Town Reminder	138 College Street	South Hadley	MA	01075
Urban Compass	83 Girard Avenue	Hartford	CT	06105
Valley Advocate	115 Conz Street	Northampton	MA	01061
Vocero Hispano	335 Chandler Street	Worcester	MA	01602
WAMC Northeast Public Radio	1215 Tolland Road	Springfield	MA	01119
Ware River News	80 Main Street	Ware	MA	01082
West Springfield Record	P.O. Box 357	West Springfield	MA	01098
WFCR-Public Radio	131 County Circle	Amherst	MA	01003

WGBY-Public TV	44 Hampden Street	Springfield	MA	01103
WGGB ABC40/FOX 6 News	1300 Liberty Street	Springfield	MA	01104
WHMP-FM	15 Hampton Avenue	Northampton	MA	01060
Tolland-Hampden Times	2341 Boston Road	Tolland	MA	01095
Worcester Telegram & Gazette	20 Franklin Street	Worcester	MA	01615
WRNX/WHYN/WPKR Radio	1331 Main Street	Springfield	MA	01103
WWLP-TV 22	PO Box 2210	Springfield	MA	01102

The Tolland Tattler



Town of Tolland to Hold Public Engagement Event for Hazard Mitigation Plan

Tolland residents are invited to provide comments on the development of the Town of Tolland's first Natural Hazard Mitigation Plan at 7:00 p.m. on Monday, August 18, at the Public Safety Complex, 206 West Granville Road. The plan is being produced by the Town with assistance from the Pioneer Valley Planning Commission and is funded by the Federal Emergency Management Agency (FEMA) and the Massachusetts Emergency Management Agency (MEMA). It is a requirement that towns have a Hazard Mitigation Plan in place to be eligible for certain grants from FEMA and MEMA. All members of the public are welcome to attend the event.

The meeting will include an introduction to the hazard mitigation planning process, information on the location of the Town's critical facilities, and a summary of existing mitigation initiatives. Municipal officials and PVPC staff will be available to answer questions and listen to comments from the public.

This planning effort is being undertaken to help the Town of Tolland assess the risks faced from natural hazards, identify action steps that can be taken to prevent damage to property and loss of life, and prioritize funding for mitigation efforts. The type of hazards considered include floods, severe snow and ice storms, Hurricanes, severe thunder storms/ wind/ tornados, wildfires/brushfires/earthquakes, dam failure, and drought. A mitigation action is any action taken to reduce or eliminate the long-term risk to human life and property from hazards.

For more information, please contact PVPC's Josiah Neiderbach at jnciderbach@pvpc.org or (413) 781-6045 or Pat Storey at ep-storey@yahoo.com or (413)269-8575.

We hope to see many of you there.

**Tolland Natural Hazard Mitigation Plan
Public Input and Workshop**

Agenda

**Tolland Public Safety Complex
August 18, 2014, 7:00 p.m.**

1. Welcome and introductions
2. Overview of hazard mitigation planning process
3. Hazard identification and risk assessment
 - a. Types of hazards affecting Tolland
 - b. Previous occurrences, extent, location, impact, future probability, and vulnerability of each hazard
4. Existing mitigation measures
5. Recommended new mitigation strategies or changes to existing mitigation strategies
6. Discussion
7. Next steps

Tolland Hazard Mitigation Plan Public Outreach Event
August 18th, 7:00 p.m.
Tolland Public Safety Complex, 206 West Granville Road

Sign-In Sheet

Name	Address	E-mail
Ruth Burkman	152 Slope Rd	ruthbine@lysiua@gmail.com
Sean Armitago	55 Lakeside Dr	jarmclark@verizon.net
David Spidal	84 Lakeview Ln	Spidoe@AOL.com
Karen Spidal	84 Lakeview Ln.	spidoc@aol.com
Ted Locke	135 N. Trail	cdl1efl@ msn.com msn.com
Phil GRANHAM	26 S. TRAIL	philgrannen@gchoo.co
Michael Sullivan	507 Colebrook River Rd	firedeptheat@tolland-MA.SIOM
Steven DellaGiustina	228 Rivers Rd.	TMBS06@gmail.com
Thomas Pine	1266 East Otis Rd	CW5A744@gmail.com
Eric R Munson Jr	956 EAST OTIS RD	EMUNSONJR@GMAIL.COM
Joanne Donald	1072 Burt Hill Rd	Hcmalamvte@highcountrykenel.com
Eel Deming	1249 New Boston Rd	dPw@TOLLAND-MA.COM

**Public Comments from Tolland Hazard Mitigation Public Outreach Meeting
August 18, 2014, 7:00 p.m.
Tolland Public Safety Complex**

Hazard Identification

- The likelihood of hurricanes should be increased from low to moderate.
- Fire should be moderate instead of low probability - wildfires are not large but do happen, once every two years or so. Logging and debris from previous storms increase the likelihood of forest fires.
- How should the impact and extent of hurricanes be separated from flooding and severe winds, since these are the two primary symptoms of hurricanes?
- Are epidemics (such as Ebola or flu) considered within the scope of this plan?
- Large branches / trees can cause damage to dams during flooding and this should be incorporated into the analyses of dam failure.

Existing and Potential Mitigation Strategies

- Existing strategy: Council on Aging has established measures for checking on special needs populations during an emergency.
- Potential strategy: make improvements to the snow load capacity of the Town library.
- Potential strategy: ensure that local gas stations have electrical generators so they can still provide gas during power outages.
- Potential strategy: Maintain accessibility of roads during snow storms as much as possible. In most places in town there is only one road providing access. Town and WMECO currently trim trees to ensure that the number of fallen branches is minimal during a storm.
- Potential strategy: Replace box culvert that currently causes wash outs and should have been replaced approximately 10 years ago. This would be a project that qualifies for HMPG funding, and the Town can apply for this funding from MEMA once their Hazard Mitigation Plan is completed. The replacement of this culvert will be included in the plan.

**Tolland Hazard Mitigation Committee
Meeting Agenda**

**Tolland Town Hall
September 3, 2014, 6:00 p.m.**

6. Recap of public engagement meeting
7. Review of changes from previous Hazard Mitigation Committee meeting
8. Critical infrastructure
9. Existing mitigation strategies
10. Proposed mitigation strategies

Tolland Hazard
Mitigation Committee
Meeting Sign-in
September 3rd, 6:00 pm
Tolland Public Safety Complex

Name	E-mail	Position
Phil Grannen	philgrannen@ycow.com	Grant writer
Pat Storey	epstorey@yahoo.com	CoA
Steve Stronie	estronie@sbcglobal.net	resident
Ted Locke	CDLTPL@mvn.com	EMD
Tom Bine	cwsarg44@gmail.com	Secretary / Planning board
Mike Sullivan	firedepartment@ tolland-ma.com	Fire Chief

**Tolland Hazard Mitigation Committee
Meeting Agenda**

**Tolland Public Safety Complex
October 22, 2014, 6:00 p.m.**

1. Review of changes and edits from previous Hazard Mitigation Committee meeting
2. Existing mitigation strategies
3. Prioritization and review of proposed mitigation strategies
4. Next steps / public outreach meeting

Tolland Hazard Mitigation Committee Meeting
Sign-In Sheet
October 22nd, 2014 6:00 p.m.

Name	Position	E-mail
Michael Sullivan	Fire chief	Firechief@tolland-ct.gov
Phil GRANMAN	GRANT WRITER	philgranman@yahoo.com
JOHN MURPHY	RUPC ASSISTANT	jmurphy@eco.umass.edu
Kathy Cowles	PLANNING Bd, Sec.	maeida@aol.com
Pat Storey	COA	epstorey@yahoo.com
Ted Locke	EMD	TFL@TFL@MSN.COM



Catalyst for Regional Progress

PVPC

Timothy W. Brennan, Executive Director

MEDIA RELEASE

CONTACT: Josiah Neiderbach, PVPC Planner, (413) 781-6045 or jneiderbach@pvpc.org
Pat Storey, Town of Tolland, (413) 269-8575 or epstorey@yahoo.com

FOR IMMEDIATE RELEASE
November 6, 2014

Town of Tolland to Hold Public Engagement Event for Hazard Mitigation Plan

Tolland residents are invited to provide comments on a completed draft of the Town's first hazard mitigation plan on Monday, November 10th, from 7:00 p.m. to 8:00 p.m. in Tolland Public Safety Complex, 206 West Granville Road. The meeting will include an introduction to the planning process, a summary of existing mitigation initiatives, and an outline of recommended strategies for addressing natural hazards in Tolland. The plan can be viewed on the Town of Tolland's website at www.tolland-ma.gov or the PVPC website at www.pvpc.org.

This planning effort is being undertaken to help the Town of Tolland assess the risks faced from natural hazards, identify action steps that can be taken to prevent damage to property and loss of life, and prioritize funding for mitigation efforts. A mitigation action is any action taken to reduce or eliminate the long-term risk to human life and property from hazards.

The plan was produced by the Town with assistance from the Pioneer Valley Planning Commission and is funded by the Federal Emergency Management Agency (FEMA) and the Massachusetts Emergency Management Agency (MEMA). Municipal officials and staff from PVPC will be available to answer questions and listen to comments on the draft plan.

For more information, please contact PVPC's Josiah Neiderbach at jneiderbach@pvpc.org or (413) 781-6045.

**Tolland Hazard Mitigation Plan
Public Input and Workshop**

Agenda

**Tolland Public Safety Complex
November 10, 2014, 7:00 p.m.**

1. Welcome and introductions
2. Overview and benefits of hazard mitigation
3. Tolland Hazard Mitigation Plan development process
4. Identification of hazards and their risk
5. Existing mitigation strategies
6. Recommended new mitigation strategies
7. Questions and discussion

Tolland Natural Hazard Mitigation Plan

Public Outreach Event

November 10, 2014



Agenda

- Overview and benefits of hazard mitigation
- Plan development process
- Identified hazards and mitigation strategies
- Questions and discussion



What is Hazard Mitigation?

3



FEMA

“Any sustained action taken to reduce or eliminate long-term risk to people and property from natural hazards.”



Examples:

- Limiting development in high-risk areas
- Retrofitting structures to protect them from floods, high winds, etc.
- Minor drainage flood control projects in areas of localized flooding
- Fire safety education

Mitigation and Preparedness

4

Hazard Mitigation

Planning and zoning

Open space preservation

Education and outreach

Drainage improvements

Emergency Preparedness

Evacuation plans and emergency shelters

Radio communications equipment

Emergency response drills

Benefits of Hazard Mitigation

5

- ❑ Makes community eligible to apply for MEMA/FEMA grant opportunities for hazard mitigation projects
- ❑ Mitigation is less expensive than disaster clean up
- ❑ Having a plan provides an approach for using limited resources more effectively



Components of a Hazard Mitigation Plan

6

Questions considered:

- What are the hazards in Tolland?
- How is Tolland affected by these hazards?
- How effective are current mitigation strategies?
- What new strategies could be implemented?



Overview of Planning Process

7

- Three Hazard Mitigation Committee meetings:
June 25th, September 3rd, and October 22nd
- Hazard Mitigation Committee members:
 - ▣ Ed Deming - Police Chief and DPW Superintendent
 - ▣ Mike Sullivan - Fire Chief
 - ▣ Tom Paine - Selectman and Planning and Zoning Commission
 - ▣ Ted Locke - Emergency Management Director and School Committee Representative
 - ▣ Phil Grannan - Town Grant writer
 - ▣ Pat Storey – Council on Aging
 - ▣ Kathy Cowles – Planning Board

Overview of Planning Process (continued)

8

- Two public outreach meetings:
August 18th and November 10th
- After this meeting, the plan will be revised with comments incorporated and submitted to MEMA and FEMA for comment
- Select Board will then review and adopt

Hazard Assessment Summary

9

Type of Hazard	Location of Occurrence	Probability of Future Events	Impact	Hazard Risk Index Rating
Flooding	Medium	High	Limited	1 - Highest risk
Severe Snowstorms / Ice Storms	Large	High	Critical	2 - High risk
Severe Thunderstorms / Winds / Tornadoes	Small	Moderate	Limited	2 - High risk
Hurricanes	Large	Moderate	Limited	3 - Medium risk
Wildfire / Brushfire	Large	Moderate	Limited	3 - Medium risk
Earthquakes	Large	Very low	Critical	4 - Low risk
Dam Failure	Medium	Very low	Critical	4 - Low risk
Drought	Large	Low	Minor	5 - Very low risk
Natural Gas Pipeline Breakage	Medium	Low	Minor	5 - Very low risk

General Mitigation Strategies

10

Strategies that assist in mitigating all hazards:

Current strategies

- Electrical backup generators at the Public Safety Complex and Highway Department, with portable generator also available
- Council on Aging contact list for senior citizens
- Conformance to State Building Code

Future strategies

- Regularly test backup electrical generators
- Recruit residents to serve as volunteer emergency personnel and first responders
- Join Berkshire County Sheriff's Office Reverse 911 system that automatically notifies residents of emergency situations

Flooding: 1 – Highest Risk

11

Locations	Current strategies	Future strategies
<ul style="list-style-type: none"> • Otis Reservoir • Noyes Pond • Twining Pond • Babcock and Taylor Brooks • Farmington River, West Branch • Cranberry Pond • Slocum Brook • Otter Pond Brook • East Otter Brook • Harvey Mountain Road 	<ul style="list-style-type: none"> • Town has completed inventory of all culverts and drainage areas that need improvements • Culverts currently have trash grates installed to prevent debris clogging • New development must meet state drainage design standards, protect natural flood-related resources • Flood Overlay District restricts development in the 100-year floodplain 	<ul style="list-style-type: none"> • Replacement of box culvert at 1064 Colebrook River Road • Evaluate all bridges and culverts situated along Route 57 • Implement drainage improvements for all previously-identified flooding problem areas • Educate and notify all residents who live within the FEMA 100-year floodplain and encourage them to purchase flood insurance

Severe Snowstorms / Ice Storms: 2 – High Risk

12

Locations	Current strategies	Future strategies
<ul style="list-style-type: none"> • Entire Town • Ice problems on Colebrook River Road, Route 57, and Burt Hill Road 	<ul style="list-style-type: none"> • Town Hall was retrofitted to accommodate high snow loads • Public Safety Complex built to withstand large snow loads • Town works with WMECO to trim trees to prevent interference with electrical lines 	<ul style="list-style-type: none"> • Make improvements to the snow load capacity of the Town Library • General hazard mitigation strategies

Severe Thunderstorms/ Wind/ Tornadoes: 2 – High Risk

13

Locations	Current strategies	Future strategies
<ul style="list-style-type: none">• Entire Town	<ul style="list-style-type: none">• Town regulates telecommunications facilities, requires minimum distance from property lines• Permanent use of mobile homes is prohibited	<ul style="list-style-type: none">• General hazard mitigation strategies

Hurricanes: 3 – Medium Risk

14

Locations	Current strategies	Future strategies
<ul style="list-style-type: none">• Entire Town	<ul style="list-style-type: none">• Flooding strategies• Town regulates telecommunications facilities, requires minimum distance from property lines• Permanent use of mobile homes is prohibited	<ul style="list-style-type: none">• General hazard mitigation strategies

Wildfires / Brushfires: 3 – Medium Risk

15

Locations	Current strategies	Future strategies
<ul style="list-style-type: none"> • Entire Town 	<ul style="list-style-type: none"> • Proposed development must be reviewed by Fire Dept. to ensure conformance with fire safety requirements • Development of plan for eventual replacement of fire truck pumpers • Burn permits • Dry hydrant inspections • Fire education for students in school district • Training of firefighters on forest fires 	<ul style="list-style-type: none"> • Replace current pumper equipment • Develop a voluntary fire detector inspection program for all public and private buildings • Recruit residents to serve as volunteer emergency personnel and first responders

Earthquakes: 4 – Low Risk

16

Locations	Current strategies	Future strategies
<ul style="list-style-type: none"> • Entire Town 	<ul style="list-style-type: none"> • Conformance to state building code 	<ul style="list-style-type: none"> • Continued conformance to state building code • General hazard mitigation strategies

Dam Failure: 4 – Low Risk

17

Locations	Current strategies	Future strategies
<ul style="list-style-type: none"> • Camp Spruce Hill Dam • Chamonix Chalet Dam • Newell Pond Dam • Lost Wilderness Lake Northern Dam • Lost Wilderness Lake Southern Dam • New Trout Pond Dam • Noyes Pond Dam • Penstock Dam • Trout Pond Dam • Wards Pond Dam 	<ul style="list-style-type: none"> • Meeting requirements of Massachusetts DCR for inspection of high and significant hazard dams • DCR permitting requirements for new dams 	<ul style="list-style-type: none"> • Develop an Emergency Action Plan for Lost Wilderness Lake Southern Dam and Noyes Pond Dam

3/19/2015

Drought: 5 – Very Low Risk

18

Locations	Current strategies	Future strategies
<ul style="list-style-type: none"> • Entire Town 	<ul style="list-style-type: none"> • Conformance with Wetlands Protection Act helps protect groundwater 	<ul style="list-style-type: none"> • Continued conformance with Wetlands Protection Act • General hazard mitigation strategies

Natural Gas Pipeline Breakage: 5 – Very Low Risk

19

Locations	Current strategies	Future strategies
<ul style="list-style-type: none">• Areas adjacent to pipeline	<ul style="list-style-type: none">• Tennessee Gas Pipeline Company regularly inspects line	<ul style="list-style-type: none">• Continued inspection of pipeline

Question and Comments

20

Contact information:

Josiah Neiderbach

Planner, Pioneer Valley Planning Commission

E-mail: jneiderbach@pvpc.org

Phone: 413-781-6045

Screen shot of Pioneer Valley Planning Commission website, with press release about public meeting for Tolland Hazard Mitigation Plan

www.pvpc.org/TollandHazardMitigationPlan

pvpc Catalyst for Regional Progress PIONEER VALLEY PLANNING COMMISSION

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ABOUT PLANNING DOING MEASURING


Tags Tolland

Town of Tolland Hazard Mitigation Plan

View Edit

Unpublish Add article

06 Nov 2014



This draft of the Town of Tolland Hazard Mitigation Plan was completed to help the Town of Tolland assess the risks faced from natural hazards, identify action steps that can be taken to prevent damage to property and loss of life, and prioritize funding for mitigation efforts.

Documents

TOLLAND HAZARD MITIGATION PLAN
Draft of the Hazard Mitigation Plan developed for the Town of Tolland.
Tolland_HMP_11-5-14.doc

Tweet +1 in Share

Pioneer Valley Planning Commission Regional Reporter January 2015

Let PVPC Guide Your Community Through the Hazard Mitigation Planning Process!

Over the past 10 years, PVPC has helped 40 communities in the Pioneer Valley develop hazard mitigation plans, making them eligible for grant opportunities from the Federal Emergency Management Agency (FEMA) and the Massachusetts Emergency Management Agency (MEMA).

Through the hazard mitigation planning process, communities assess their vulnerability to natural hazards, such as flooding, snowstorms, hurricanes, wildfire, and tornadoes. They also prioritize a set of mitigation strategies that will help eliminate the long-term risk to human life and property from these hazards. Common mitigation strategies that are eligible for grant funding from FEMA and MEMA include minor localized flood reduction projects, structural retrofitting of existing buildings, culvert improvements, installation of emergency backup generators, and infrastructure retrofits.

PVPC provides guidance in all aspects of the development of hazard mitigation plans, including identification and mapping of natural hazards, collaboration with municipal officials to prioritize mitigation strategies, and public outreach. PVPC can also assist communities in applying for grants to fund mitigation projects, through its Local Technical Assistance (*LTA*) program. Contact Josiah Neiderbach at jneiderbach@pvpc.org to find out more.

Pioneer Valley Planning Commission Regional Reporter April 2013

The Pioneer Valley Planning Commission is currently working with 23 member municipalities to create new hazard mitigation plans and update expiring plans. These plans, approved by the Federal Emergency Management Agency (FEMA), make these municipalities eligible to apply for hazard mitigation grant funds to address identified top community priorities to mitigate the long-term consequences of natural disasters.

PVPC is currently in the process of creating or updating plans for 10 communities. This includes developing new hazard mitigation plans for Granville, Longmeadow, Montgomery, Russell, and Wales, as well as updating the current plans for Agawam, Easthampton, Hampden, Southwick, and Ware.

PVPC also recently applied for funds from FEMA to create or update plans for an additional 13 communities. This includes creating new plans for Blandford and Tolland, as well as updating existing plans for Chesterfield, Hadley, Hatfield, Holyoke, Ludlow, Monson, Northampton, South Hadley, Southampton, Westhampton, and Tolland.

Copies of approved hazard mitigation plans are available on PVPC's website at <http://www.pvpc.org/activities/landuse-mitplans-2011.shtml>. For more information please contact PVPC's Josiah Neiderbach at (413) 781-6045 or jneiderbach@pvpc.org.

**Pioneer Valley Planning Commission Regional Reporter
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PVPC working with member communities to mitigate the long term consequences of natural hazards

PVPC is working with 10 member municipalities to update and/or develop new Hazard Mitigation plans. Granville, Longmeadow, Montgomery, Russell, and Wales are all developing their first Hazard Mitigation plans; while Agawam, Easthampton, Hampden, Southwick, and Ware are working on updates.

PVPC was also engaged by the University of Massachusetts Amherst campus to write their campus Hazard Mitigation plan, and PVPC has just submitted a grant application to MEMA to update plans for Hadley, Hatfield, Holyoke, Ludlow, Monson, Northampton, South Hadley, Southampton, Westhampton, and Tolland.

Having a FEMA approved Hazard Mitigation plan makes each municipality eligible to apply for Hazard Mitigation grant funds to address identified top community priorities to mitigate the long-term consequences of natural disasters.

For more information, please contact Catherine Ratté at cratte@pvpc.org or 413/781-6045.

Appendix C – List of Acronyms

FEMA	Federal Emergency Management Agency
MEMA	Massachusetts Emergency Management Agency
PVPC	Pioneer Valley Planning Commission
EPA	Environmental Protection Agency
DEP	Massachusetts' Department of Environmental Protection
NWS	National Weather Service
HMGP	Hazard Mitigation Grant Program
FMA	Flood Mitigation Assistance Program
SFHA	Special Flood Hazard Area
CIS	Community Information System
DCR	Massachusetts Department of Conservation and Recreation
FERC	Federal Energy Regulatory Commission
TRI	Toxics Release Inventory
FIRM	Flood Insurance Rate Map
NFIP	National Flood Insurance Program
CRS	Community Rating System
BOS	Board of Selectmen
DPW	Department of Public Works
LEPC	Local Emergency Planning Committee
EMD	Emergency Management Director
Con Com	Conservation Commission
Ag Com	Agricultural Commission
EOC	Emergency Operations Center
CEM Plan	Comprehensive Emergency Management Plan
EMA	Emergency Management Agency
RACES	Radio Amateur Civil Emergency Service
WMECO	Western Massachusetts Electric Company
HAZMAT	Hazardous Materials

Appendix D – Past and Potential Hazards/Critical Facilities Map

CERTIFICATE OF ADOPTION

Town of Tolland, MASSACHUSETTS

BOARD OF SELECTMEN

A RESOLUTION ADOPTING THE TOWN OF TOLLAND NATURAL HAZARD MITIGATION PLAN

WHEREAS, the Town of Tolland established a Committee to prepare the Natural Hazard Mitigation plan; and

WHEREAS, the Town of Tolland participated in the development of the Town of Tolland Natural Hazard Mitigation Plan;

and WHEREAS, the Town of Tolland Natural Hazard Mitigation Plan contains several potential future projects to mitigate potential impacts from natural hazards in the Town of Tolland, and

WHEREAS, a duly-noticed public meeting was held by the Board of Selectmen on _____ for the public and municipality to review prior to consideration of this resolution; and

WHEREAS, the Town of Tolland authorizes responsible departments and/or agencies to execute their responsibilities demonstrated in the plan, and

NOW, THEREFORE BE IT RESOLVED that the Town of Tolland Board of Selectmen formally approves and adopts the Town of Tolland Natural Hazard Mitigation Plan, in accordance with M.G.L. c. 40.

ADOPTED AND SIGNED this _____, _____

ATTEST