NATURAL HAZARD MITIGATION PLAN
FOR THE CENTRAL CONNECTICUT REGION

2016-2021 Update
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Introduction

The purpose of the Central Connecticut Region’s Natural Hazard Mitigation Plan (“the Plan”) is to assess hazard risks at the regional and local levels, review existing mitigation strategies, and recommend additional strategies that can help to reduce economic disruption, loss of life, and destruction of property resulting from natural disasters.

Natural disasters can and do inflict damage on the same locations year after year, requiring repeated reconstruction efforts that become more expensive as the years go by. Hazard mitigation breaks this expensive cycle of recurrent damage and escalating reconstruction costs by preventing damage up front and taking a long-term view of rebuilding and recovery following natural disasters. This requires long-term strategies including planning, policy-making, programs, projects, and other activities.

The plan will take into consideration the following natural disasters: floods, severe winter storms, and tropical cyclones (hurricanes and tropical storms), tornadoes, wildfires, drought, earthquakes, and dam failure. Each of these risks will be evaluated for likelihood of occurrence and potential for loss of life and property.

Municipalities in the region currently have a variety of formal and informal hazard mitigation strategies in place. The Plan identifies and assesses these existing strategies, and proposes new strategies that address identified gaps in current mitigation efforts. Lastly, the Plan prioritizes the mitigation strategies and proposes an overall implementation strategy.

Authority and Funding

The Agency board and participating municipalities have adopted the Natural Disaster Hazard Mitigation Plan for the Central Connecticut Region effective XXX 2015. The Plan was developed and complies with current state and federal regulations governing hazard mitigation plan updates, including the Stafford Act and Title 44 Code of Federal Regulations § 201.6, necessary for FEMA approval and eligibility to apply for FEMA Hazard Mitigation Assistance grant programs.

Funding for this Plan was provided by the Federal Emergency Management Agency (as administered by the Connecticut Division of Emergency Management & Homeland Security) per P.L. 106-390, Section 102, with the required match from the Central Connecticut Regional Planning Agency.

Regional Overview

The Central Connecticut Region is small, but richly varied. The region comprises seven municipalities that span two counties (Hartford and Litchfield): the cities of New Britain and Bristol, and the towns of Berlin, Burlington, Plainville, Plymouth, and Southington. These seven municipalities are diverse in many ways: urban, suburban, and rural; hilly and flat; young and old; dense and sparsely populated. They have differing levels of wealth, educational attainment, and ethnic diversity. They enjoy varying levels of accessibility via highways, rail lines, and bus routes. However they share many common goals, including a strong commitment to protecting their economic interests and businesses from the ravages of natural hazards.
Population & Demographics

The Central Connecticut Region covers 166.3 square miles and is home to 235,878 residents (2010 Census). At roughly 1,418 people per square mile, the region is nearly twice as densely populated as Connecticut, which has 701 people per square mile. However, the density varies greatly across the seven municipalities. New Britain has 73,206 people living in only 13.4 square miles for a density of 5,463 people per square mile. This density is over twice that of Bristol, the second densest municipality in the region. In contrast, the least dense municipality, Burlington, has 305 people per square mile.
Since 2000, the population of the region has grown by about 4%. The fastest growth was seen in Burlington, with a 14% increase. The slowest growth was in Bristol, which had less than 1% growth.
According to the Connecticut State Data Center, the Central Connecticut Region is expected to grow at a moderate pace over the next fifteen years. Population projections show the region is expected to grow by 4.7% through 2025. While the region overall is expected to grow, projections for individual municipalities vary. The populations of Burlington and Berlin are projected to grow 8.28% and 7.67% respectively while Bristol is projected to increase 0.38%, the lowest increase of the seven municipalities. As the entire state of Connecticut is aging, so too is the population in the Central Connecticut region. According to the 2010 Census, 20% of the region’s total population is 60 years old or older. In every town the percent of the population aged 60 years and older will increase by 2025. In Burlington, the population aged 60 and older will nearly double, from 1,550 people in 2010 to 3,099 by 2025. The total population of the Central Connecticut Region in 2025 is projected to be 247,057, of which 68,025 or 27.5% will be 60 or older.

This demographic shift presents potential difficulties in hazardous conditions. An older population may be less mobile, more dependent on neighbors and family, and less able to evacuate or survive in isolation. They may also be unable to endure extended periods without heat or electricity. Facilities caring for the older population need to be equipped with supplies that can allow residents to shelter in place. Municipalities must also consider added need for medical sheltering. Therefore resilience plans for an aging population must address protection of critical facilities and vulnerable populations to ensure that all residents are able to weather the storms.
Vulnerable populations may include not only senior citizens and persons who are less mobile, but also low-income and minority populations, some of whom may have difficulty evacuating or protecting their homes, or may miss critical information due to limited ability to speak and understand English. In four of the region’s municipalities, more than 15% of the population does not speak English at home. New Britain in particular has large Spanish (22%) and Polish (12%) speaking populations. Public education efforts must take into account each town’s particular language groups and make sure that information is made available to them, so that mitigation planning efforts do not systematically discriminate against non-English speaking communities.

<table>
<thead>
<tr>
<th></th>
<th>Berlin</th>
<th>Bristol</th>
<th>Burlington</th>
<th>New Britain</th>
<th>Plainville</th>
<th>Plymouth</th>
<th>Southington</th>
<th>Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>18,871</td>
<td>57,106</td>
<td>8,651</td>
<td>67,190</td>
<td>16,872</td>
<td>11,603</td>
<td>40,696</td>
<td>220,989</td>
</tr>
<tr>
<td>Speak only English</td>
<td>85.5%</td>
<td>84.4%</td>
<td>91.7%</td>
<td>51.5%</td>
<td>85.1%</td>
<td>94.1%</td>
<td>89.1%</td>
<td>76.2%</td>
</tr>
<tr>
<td>Spanish or Spanish Creole</td>
<td>1.4%</td>
<td>5.8%</td>
<td>1.4%</td>
<td>28.1%</td>
<td>2.6%</td>
<td>1.9%</td>
<td>2.0%</td>
<td>10.9%</td>
</tr>
<tr>
<td>Polish</td>
<td>4.5%</td>
<td>2.4%</td>
<td>0.9%</td>
<td>12.3%</td>
<td>3.7%</td>
<td>0.4%</td>
<td>2.0%</td>
<td>5.4%</td>
</tr>
<tr>
<td>French (incl. Patois, Cajun)</td>
<td>2.4%</td>
<td>3.2%</td>
<td>2.5%</td>
<td>1.5%</td>
<td>4.6%</td>
<td>1.3%</td>
<td>1.8%</td>
<td>2.3%</td>
</tr>
<tr>
<td>Italian</td>
<td>2.7%</td>
<td>0.7%</td>
<td>1.0%</td>
<td>1.3%</td>
<td>1.0%</td>
<td>0.5%</td>
<td>1.4%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Other Indo-European languages</td>
<td>0.0%</td>
<td>0.6%</td>
<td>0.0%</td>
<td>0.3%</td>
<td>0.0%</td>
<td>0.6%</td>
<td>0.6%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Portuguese or Portuguese Creole</td>
<td>0.4%</td>
<td>0.1%</td>
<td>0.5%</td>
<td>0.3%</td>
<td>0.1%</td>
<td>0.4%</td>
<td>0.4%</td>
<td>0.3%</td>
</tr>
<tr>
<td>German</td>
<td>0.2%</td>
<td>0.2%</td>
<td>0.5%</td>
<td>0.2%</td>
<td>0.3%</td>
<td>0.5%</td>
<td>0.3%</td>
<td>0.3%</td>
</tr>
<tr>
<td>Vietnamese</td>
<td>0.0%</td>
<td>0.5%</td>
<td>0.0%</td>
<td>0.4%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Chinese</td>
<td>0.0%</td>
<td>0.3%</td>
<td>0.0%</td>
<td>0.3%</td>
<td>0.5%</td>
<td>0.0%</td>
<td>0.1%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Other Asian languages</td>
<td>0.0%</td>
<td>0.3%</td>
<td>0.0%</td>
<td>0.2%</td>
<td>0.5%</td>
<td>0.0%</td>
<td>0.2%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Arabic</td>
<td>0.0%</td>
<td>0.1%</td>
<td>0.0%</td>
<td>0.5%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.2%</td>
</tr>
</tbody>
</table>

Table X. Languages spoken at home, by municipality.

The region is less racially diverse than the State of Connecticut. In 2012, 77% of the population identified as “white alone” (non-hispanic), while 71% of the state did. By far, New Britain has the lowest percentage of people identifying as “white alone” (non-hispanic): 49%. As the next largest city, one would expect Bristol to be the second most diverse municipality in the region, which it is, but Bristol’s “white alone” population is just 84% of its total.
The largest non-white racial group is “Black or African American”, which makes up 5% of the region’s non-hispanic or latino population. Statewide, people identifying as “Black or African American” represent 9% of the population. The region’s largest concentration of this racial group is New Britain, where 10% of the population identifies as “Black or African American”.

<table>
<thead>
<tr>
<th>Total</th>
<th>White alone</th>
<th>Black or African American alone</th>
<th>Asian alone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berlin</td>
<td>19,694</td>
<td>18,221</td>
<td>275</td>
</tr>
<tr>
<td>Bristol</td>
<td>60,473</td>
<td>50,672</td>
<td>2,004</td>
</tr>
<tr>
<td>Burlington</td>
<td>9,191</td>
<td>8,707</td>
<td>113</td>
</tr>
<tr>
<td>New Britain</td>
<td>73,055</td>
<td>36,014</td>
<td>7,525</td>
</tr>
<tr>
<td>Plainville</td>
<td>17,670</td>
<td>15,921</td>
<td>322</td>
</tr>
<tr>
<td>Plymouth</td>
<td>12,218</td>
<td>11,527</td>
<td>18</td>
</tr>
<tr>
<td>Southington</td>
<td>42,731</td>
<td>39,834</td>
<td>480</td>
</tr>
<tr>
<td>Region</td>
<td>235,032</td>
<td>180,896</td>
<td>10,737</td>
</tr>
<tr>
<td>Connecticut</td>
<td>3,572,213</td>
<td>2,542,435</td>
<td>333,894</td>
</tr>
</tbody>
</table>

Table X. Racial makeup of the region.

While the vast majority of the region does not identify as “Hispanic or Latino”, a growing percentage does. In the 2000 Census, just 10% of the region identified with that ethnicity. In 2012, that percentage had grown to 15%. Statewide, the percentage went from 9% to 13%. Again, New Britain has the largest concentration of people identifying as “Hispanic or Latino”, 38%, up from 27% in 2000. Most of the municipalities in the region have “Hispanic or Latino” populations that makeup around 3% of the total population.

<table>
<thead>
<tr>
<th>Total</th>
<th>White alone</th>
<th>Race other than white</th>
<th>Any race, Hispanic or Latino</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berlin</td>
<td>19,694</td>
<td>18,221</td>
<td>1,473</td>
</tr>
<tr>
<td>Bristol</td>
<td>60,473</td>
<td>50,672</td>
<td>9,801</td>
</tr>
<tr>
<td>Burlington</td>
<td>9,191</td>
<td>8,707</td>
<td>484</td>
</tr>
<tr>
<td>New Britain</td>
<td>73,055</td>
<td>36,014</td>
<td>37,041</td>
</tr>
<tr>
<td>Plainville</td>
<td>17,670</td>
<td>15,921</td>
<td>1,749</td>
</tr>
<tr>
<td>Plymouth</td>
<td>12,218</td>
<td>11,527</td>
<td>691</td>
</tr>
<tr>
<td>Southington</td>
<td>42,731</td>
<td>39,834</td>
<td>2,897</td>
</tr>
<tr>
<td>Region</td>
<td>235,032</td>
<td>180,896</td>
<td>54,136</td>
</tr>
<tr>
<td>Connecticut</td>
<td>3,572,213</td>
<td>2,542,435</td>
<td>1,029,778</td>
</tr>
</tbody>
</table>

Table X. Racial and ethnic makeup of the region.

For the purposes of this analysis, people identifying as Hispanic or Latino are considered separately.
Housing

According to the 2011 5-year American Community Survey, there are 100,718 housing units in the Central Connecticut Region. Of those, the vast majority, 59%, are single unit buildings. The percentage of one unit buildings varies considerably from town to town, with a low of 34% in New Britain and a high of 98% in Burlington. Statewide, 65% of housing structures are single-unit. Most of the multi-family buildings in the region, and the state, have at least five units. These buildings make up 18% of the housing stock for the region and the state.
The number of housing units in the region has grown at a faster pace than the population. From 2000 to 2010, the number of housing units increased by 6%. The fastest growth occurred in Berlin and Burlington, which both saw a 17% increase. New Britain saw the slowest growth, with less than 1% change (new units were constructed, but the city also conducted a number of demolitions of dilapidated housing). Meanwhile, as noted above, the population of the region grew by just 4%.

### Table X. Change in housing units.

A recent report on housing in the Central Connecticut Region highlighted a change in housing dynamics. That report noted that the rate of population growth, and the rate of household formation have diverged. In 1970, 67,000 households lived in Central Connecticut; by 2010, the region had almost
94,000. This equates to a 39.9% increase. Population growth over the same period was just 9.6%. As with population, growth in households varied by municipality. Burlington experienced the fastest percentage growth, averaging over 3.0% annually and nearly tripling its total households over the fifty-year period. In absolute terms, however, larger suburban communities like Bristol and Southington gained the most households, approximately 200 new households a year from 1970 to 2010. While the difference between population growth and household formation was greatest in the 1970s and 1980s, the trend continues today.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Population</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change</td>
<td>215,147</td>
<td>216,003</td>
<td>227,676</td>
<td>226,695</td>
<td>235,878</td>
</tr>
<tr>
<td>% Change</td>
<td>---</td>
<td>856</td>
<td>11,673</td>
<td>-981</td>
<td>9,183</td>
</tr>
<tr>
<td><strong>Households</strong></td>
<td>67,024</td>
<td>77,861</td>
<td>87,644</td>
<td>89,997</td>
<td>93,774</td>
</tr>
<tr>
<td>Change</td>
<td>---</td>
<td>10,837</td>
<td>9,783</td>
<td>2,353</td>
<td>3,777</td>
</tr>
<tr>
<td>% Change</td>
<td>---</td>
<td>16.2%</td>
<td>12.6%</td>
<td>2.7%</td>
<td>4.2%</td>
</tr>
<tr>
<td>Average household size</td>
<td>3.21</td>
<td>2.77</td>
<td>2.60</td>
<td>2.52</td>
<td>2.52</td>
</tr>
</tbody>
</table>

Table X. Population change in the Central Connecticut Region, 1970-2010.

The faster growth of households than population shows that household structure in the region is changing. Smaller households, including singles and non-cohabitating couples, single parents, families with fewer children, and empty nesters, are becoming more common. From 1970 to 2010, the average household shrank by nearly one person. As households get smaller, more units are needed to house the same total population. Not only does this increase the amount of land that is needed for housing, but it spreads the population over a greater area, potentially impacting emergency response times.

While families continue to make up the majority of households in the region, the size of the majority as well as the structure of families in those households is changing. In 2010, over a third of the region’s residents lived in a non-family household, a 9.0% increase over one decade earlier. (Family households, in comparison, only increased 1.8%.) The mix of household types also varies among municipalities. Regionally, nearly two-thirds of households are families, but the breakdown ranges from a low of 60% family households in New Britain and Plainville to a high of over 80% in Burlington.

<table>
<thead>
<tr>
<th>Geography</th>
<th>Nonfamily households 2000</th>
<th>Nonfamily households 2010</th>
<th>Difference</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berlin</td>
<td>1,637</td>
<td>2,217</td>
<td>580</td>
<td>35.43%</td>
</tr>
<tr>
<td>Bristol</td>
<td>8,707</td>
<td>9,487</td>
<td>780</td>
<td>8.96%</td>
</tr>
<tr>
<td>Burlington</td>
<td>422</td>
<td>608</td>
<td>186</td>
<td>44.08%</td>
</tr>
<tr>
<td>New Britain</td>
<td>11,616</td>
<td>11,285</td>
<td>(331)</td>
<td>-2.85%</td>
</tr>
<tr>
<td>Plainville</td>
<td>2,739</td>
<td>3,015</td>
<td>276</td>
<td>10.08%</td>
</tr>
<tr>
<td>Southington</td>
<td>3,796</td>
<td>4,778</td>
<td>982</td>
<td>25.87%</td>
</tr>
<tr>
<td>Plymouth</td>
<td>1,226</td>
<td>1,450</td>
<td>224</td>
<td>18.27%</td>
</tr>
<tr>
<td>Region</td>
<td>30,143</td>
<td>32,840</td>
<td>2,697</td>
<td>8.95%</td>
</tr>
</tbody>
</table>

Table X. Change in nonfamily households.
<table>
<thead>
<tr>
<th>Geography</th>
<th>Family households 2000</th>
<th>Family households 2010</th>
<th>Difference</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berlin</td>
<td>5,155</td>
<td>5,591</td>
<td>436</td>
<td>8.46%</td>
</tr>
<tr>
<td>Bristol</td>
<td>16,179</td>
<td>15,833</td>
<td>(346)</td>
<td>-2.14%</td>
</tr>
<tr>
<td>Burlington</td>
<td>2,418</td>
<td>2,683</td>
<td>265</td>
<td>10.96%</td>
</tr>
<tr>
<td>New Britain</td>
<td>16,942</td>
<td>16,873</td>
<td>(69)</td>
<td>-0.41%</td>
</tr>
<tr>
<td>Plainville</td>
<td>4,646</td>
<td>4,565</td>
<td>(81)</td>
<td>-1.74%</td>
</tr>
<tr>
<td>Southington</td>
<td>11,287</td>
<td>12,036</td>
<td>749</td>
<td>6.64%</td>
</tr>
<tr>
<td>Plymouth</td>
<td>3,227</td>
<td>3,353</td>
<td>126</td>
<td>3.90%</td>
</tr>
<tr>
<td>Region</td>
<td>59,854</td>
<td>60,934</td>
<td>1,080</td>
<td>1.80%</td>
</tr>
</tbody>
</table>

Table X. Change in family households.

Such a shift in household formation dynamics impact the way we respond to disasters. A greater number of households generally equates to a greater amount of impervious surface cover, which has negative repercussions for flooding. More households also means more structures that can be damaged, or contribute to runoff. Furthermore, the population is now spread among a greater number of structures, making rescue operations more difficult. While there are only 9% more people than there were in 1970, there are nearly 40% more structures. That is 40% more structures that may need to be visited or searched. Finally, the growth of nonfamily households can have serious implications. Coupled with the changes in age dynamics discussed above, it is reasonable to conclude that the region is seeing an increase in the number of senior households. Such households may require changes in the way we respond to disasters, setup shelters, and distribute information about emergencies.

Land Cover
Municipalities in the region exhibit a typical development pattern for New England: dense population centers (often more than one per municipality) clustered around rivers, where mills and other businesses were once located. These population centers may have a rich mix of uses, with additional residential development spiraling outward, creating relatively compact villages. Development in recent years has largely abandoned the traditional centralized pattern, and followed a more sprawling pattern, with new development radiating out ever further from traditional population centers, and filling in the open space and former agricultural fields that once separated village centers.

Much of the development the region has seen since 1985 has come at the cost (mainly) of its agricultural land and deciduous and coniferous forests. The maps on the following page, derived from the UConn Center for Land-Use Education and Research (CLEAR), show a snapshot of current land cover as well as where land cover has changed since 1985. The rate of land cover change can be seen in the table below. The diagram does not include land cover classes which did not change between 1985 and 2010 (known as land cover persistence). As the table shows, the most endangered land, by far, is agricultural land, 30% of which has been lost to development.

Between 1985 and 2010, the region increased its developed area by 18%. During that same period, turf (lawns) increased by 16%. At the same time, agricultural land decreased by 29%. Deciduous forests lost 10% of their area and coniferous forests lost 6% of theirs. In each of these cases, land conversion is occurring more rapidly than it is for the entire state.
In general, the region is much more developed than the state. In 2010, 31% of the region’s land was developed, while just 17% of the state was. Both were up from the 1985 figures, which were 27% and 14% respectively (not shown in tables).

In Table X, the changes in land cover from 1985 to 2010 are presented for the region and each city. The data show a significant increase in developed areas, such as buildings and infrastructure, while other land cover types, like forests and wetlands, have decreased.

Table X. Land cover in 2010.
The rate of land change has slowed recently, however, possibly as a result of the recession. From 1985 to 2006, land was being converted to “developed” at a rate of 0.85% annually (in some parts of the region, it was over 1% annually). Between 2006 and 2010, that rate decreased to 0.13% annually. As discussed later in this section, the rate of population growth has also decreased, and began to decrease prior to the recession, indicating that these results are part of a longer trend.

<table>
<thead>
<tr>
<th></th>
<th>1985-2006</th>
<th>2006-2010</th>
<th>1985-2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berlin</td>
<td>1.15%</td>
<td>0.03%</td>
<td>0.97%</td>
</tr>
<tr>
<td>Bristol</td>
<td>0.81%</td>
<td>0.10%</td>
<td>0.69%</td>
</tr>
<tr>
<td>Burlington</td>
<td>1.79%</td>
<td>0.45%</td>
<td>1.58%</td>
</tr>
<tr>
<td>New Britain</td>
<td>0.24%</td>
<td>0.01%</td>
<td>0.20%</td>
</tr>
<tr>
<td>Plainville</td>
<td>0.77%</td>
<td>0.20%</td>
<td>0.68%</td>
</tr>
<tr>
<td>Plymouth</td>
<td>0.77%</td>
<td>0.07%</td>
<td>0.65%</td>
</tr>
<tr>
<td>Southington</td>
<td>1.11%</td>
<td>0.25%</td>
<td>0.97%</td>
</tr>
<tr>
<td><strong>Region</strong></td>
<td><strong>0.85%</strong></td>
<td><strong>0.13%</strong></td>
<td><strong>0.74%</strong></td>
</tr>
</tbody>
</table>

Table X. Changes in annual rates of development.

As development in the region increases, the magnitude of the damage caused by the disasters also increases. Total damages increase for two reasons. First, because there are more homes, businesses, and other assets in a given area, more homes, businesses and assets are affected by the disaster. Second, impermeable surface is linked to more severe and rapid flooding events. Continued development has caused the percentage of impermeable surface area within the region to increase. Therefore when heavy rain events hit the region the resulting storm water quickly flows through storm drains and across parking lots and lawns, into brooks and rivers leading to a higher peak elevation flood surge. This phenomenon, created by development, has increased the damages associated with severe weather conditions.

Geography & Transportation

The region acts as something of a crossroads between three of the state’s urban centers: Hartford, to the northeast, bordered by the city of New Britain; Waterbury, to the southwest, bordered by Plymouth; and New Haven, far to the south but accessible via Routes 5/15, a major road in Berlin. Interstate 84, which serves ¾ of the state and connects Interstate 90 (the Massachusetts Turnpike) and northern New England with major highways in New York, New Jersey, and Pennsylvania, passes through New Britain, Plainville, and Southington. In Hartford, I-84 connects to the state’s north-south interstate, I-91, which provides a connection to New Haven and I-95. Route 9 is another major freeway which passes through Berlin and New Britain and provides a connection to I-91 that bypasses Hartford. Burlington, Bristol, and Plainville access these freeways via Route 72, a small freeway connecter that joins I-84 in Plainville and terminates in Bristol. To the west of the region, Route 8 provides a north-south connection to Waterbury.

Residents of the region spend, on average, 45 minutes per day commuting to and from work on these freeways, as the majority of the region is not well served by public transit. According to the 2009-2013 American Community Survey, of the 114,839 workers in the region, 83.6% drive to work alone, 8.5%
carpool, and 1.4% take public transit. Some residents also walk (1.8%) and bike (.1%). The region also has a fairly significant population of residents who are employed at home, making up 2.7% of the workforce.

<table>
<thead>
<tr>
<th></th>
<th>Total Workers</th>
<th>Drove alone</th>
<th>Carpoled</th>
<th>Public Transportation</th>
<th>Bicycle</th>
<th>Walked</th>
<th>Worked at Home</th>
<th>Avg. Commute Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berlin</td>
<td>10,598</td>
<td>86.5%</td>
<td>7.1%</td>
<td>0.4%</td>
<td>0.0%</td>
<td>0.8%</td>
<td>3.6%</td>
<td>40.4</td>
</tr>
<tr>
<td>Bristol</td>
<td>29,568</td>
<td>85.1%</td>
<td>8.8%</td>
<td>0.9%</td>
<td>0.1%</td>
<td>1.2%</td>
<td>2.7%</td>
<td>47.0</td>
</tr>
<tr>
<td>Burlington</td>
<td>4,932</td>
<td>85.9%</td>
<td>8.3%</td>
<td>0.4%</td>
<td>0.3%</td>
<td>0.2%</td>
<td>5.0%</td>
<td>58.0</td>
</tr>
<tr>
<td>New Britain</td>
<td>32,286</td>
<td>76.5%</td>
<td>10.7%</td>
<td>3.5%</td>
<td>0.1%</td>
<td>3.5%</td>
<td>1.9%</td>
<td>41.2</td>
</tr>
<tr>
<td>Plainville</td>
<td>9,431</td>
<td>90.0%</td>
<td>5.5%</td>
<td>0.5%</td>
<td>0.7%</td>
<td>1.1%</td>
<td>1.3%</td>
<td>40.2</td>
</tr>
<tr>
<td>Plymouth</td>
<td>6,142</td>
<td>88.0%</td>
<td>6.4%</td>
<td>0.5%</td>
<td>0.0%</td>
<td>1.8%</td>
<td>3.0%</td>
<td>53.0</td>
</tr>
<tr>
<td>Southington</td>
<td>21,882</td>
<td>86.1%</td>
<td>7.5%</td>
<td>0.5%</td>
<td>0.0%</td>
<td>1.5%</td>
<td>3.5%</td>
<td>47.0</td>
</tr>
<tr>
<td>Region</td>
<td>114,839</td>
<td>83.6%</td>
<td>8.5%</td>
<td>1.4%</td>
<td>0.1%</td>
<td>1.8%</td>
<td>2.7%</td>
<td>45.0</td>
</tr>
</tbody>
</table>

*Table X. Commuting modes.*

The Longitudinal Employer-Household Dynamics data identify 104,963 employed people living within the region, but only 81,859 jobs within the region. This imbalance leads to considerable cross-commuting. Only 36,214 people both work and live within the region. The other 68,749 employed residents of the region commute to nearby municipalities. Conversely, 45,645 workers commute into the region every day for their jobs. Over time, this imbalance has worsened. In 2002 39% of workers both lived and worked in the region. In 2011, that figure had dropped to 35%.

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>Share</td>
<td>Count</td>
</tr>
<tr>
<td>Living in the Region</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Living and Employed in the Region</td>
<td>104,963</td>
<td>100.0%</td>
</tr>
<tr>
<td>Living in the Region but Employed Outside</td>
<td>36,214</td>
<td>34.5%</td>
</tr>
<tr>
<td>Employed in the Region</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed and Living in the Region</td>
<td>68,749</td>
<td>65.5%</td>
</tr>
<tr>
<td>Employed in the Region but Living Outside</td>
<td>81,859</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed and Living in the Region</td>
<td>36,214</td>
<td>44.2%</td>
</tr>
<tr>
<td>Employed in the Region but Living Outside</td>
<td>45,645</td>
<td>55.8%</td>
</tr>
</tbody>
</table>

*Table X. Worker and workplace dynamics.*
The high number of residents commuting by car is due in part to limited bus service in the region. Busses do not serve all the towns in the region (see the map below), transfers between routes are notoriously difficult, and service hours are limited, making the bus an often inconvenient and difficult option even for those without cars.

Despite limited bus service, some residents in the region have no choice but to rely on public transportation. Across the region, 7.9% of households did not have access to a vehicle (according to the 2009-2013 American Community Survey). The carless are largely concentrated in New Britain (15.9% of the city) and Bristol (6.7% of the city). While these residents have some access to public transportation, hundreds of households in municipalities with no public transportation lack access to a vehicle. These individuals may find it difficult to evacuate or access designated shelters and other resources in the event of a disaster.
Transit options are being improved. In 2015, CTftrak, a bus-rapid transit service, will begin operation. This service will provide frequent and fast service between New Britain and Hartford, with connecting routes to Bristol, Plainville, and Berlin. Other routes are also being considered. In addition to the new service, existing service will be lengthened. The region is also home to an Amtrak train station (in Berlin) on the New Haven-Hartford-Springfield line (recently renamed the Hartford Line). The rail line that serves this station is currently being upgraded to allow for a greater number of daily trains, as well as faster service. Riders will be able to take the train from Berlin to Hartford, New Haven, Stamford, Bridgeport, and on to New York City.

While the region is well connected with a variety of transportation routes traversing its seven municipalities, it is essential that these routes remain passable during and following a disaster to allow residents to access shelters and also provide efficient and timely recovery of the region’s businesses.

Geology and Hydrology
One concern raised by this continuing, a-centric development pattern is its impact on natural systems, particularly hydrologic systems. Due to its geographic location, actions taken in the region have the potential to impact areas that are quite distant.

The Central CT Region sits at the transition of Connecticut’s Western Highlands to its Central Valley. The Highlands are characterized by rolling hills, and thin, rocky soil, with rugged slopes in the northwest corner of the state. The Central Valley is a flatter expanse that lies between the Western and Eastern Highlands, and boasts rich Soil Types in Central Connecticut agricultural soils. The Valley is divided by the rocky Metacomet Ridge (orange and red on the Soil Types map, above). According to CT-DEP:

_The fertile soils of the Central Valley were formed through a combination of fine-grained glacial lake sediments and loamy or sandy alluvial deposits. Glacial till soils in the Western and Eastern Highlands, derived from crystalline rocks, tend to be rocky with little organic accumulation._


Town at the western end of the region (Burlington and Plymouth) have hilly topography and forested slopes. Other towns are relatively flat, with higher concentrations of prime and statewide- important farmland soils. The Metacomet Ridge divides the easternmost towns in the region (New Britain and Berlin) from the rest, and provides a recreational and scenic amenity.
Water from the region drains into three of the state’s major watershed basins: the Housatonic, Connecticut, and South Central Coast. En route to its final destination, the water navigates five regional and 23 sub-regional basins that reach from Massachusetts nearly all the way to Connecticut’s shoreline, touching a total of 52 towns in Connecticut on their way.

Several rivers run through the region, including the Quinnipiac, Mattabessett, and the Pequabuck. These rivers along with myriad streams and brooks feed into and flow from several lakes, ponds, and reservoirs.

Historic development patterns in the region’s municipalities favored sites near bodies of waters. Rivers provided power for mills and factories, transportation of people and goods, and water for irrigation of agricultural fields. While development along these rivers provided economic and aesthetic benefits, many have been polluted and their uses are restricted by the Connecticut Department of Energy and Environmental Protection (DEEP). Within the region the Pequabuck is rated as impaired for habitat for fish, other aquatic life and wildlife, and recreation from headwaters to its confluence with the Farmington River. The Quinnipiac is also rated as impaired for habitat for fish, other aquatic life and wildlife, and recreation from headwaters to Hamilton Pond where it remains impaired for the above listed uses and also becomes impaired for fish consumption.

The concentration of development next to bodies of water, rivers in particular, also introduced increased risk of flooding and erosion. Flooding from these rivers already has dramatic impacts on the
region’s towns. Catastrophic flood events punctuate the region’s historical record and have left indelible marks on the natural and built environment. Even with modern engineering and flood control measures, the region’s waterways periodically overrun their banks, rendering roads impassable and flooding homes and businesses.

Economic Profile & Labor Force

Central Connecticut is endowed with many economic assets and competitive advantages and is home to the headquarters and branches of many large national enterprises that bring stability and recognition to the region. The Region is known for its strong manufacturing sector, an industry that remains an important cornerstone in the local economy. The 2012 Quarterly Census of Employment and Wages shows that, although manufacturing only accounts for 10% of local enterprises, it accounts for 15% of local jobs and over 19% of aggregated local wages. Other important industries to the region include health care and social services and retail trade. The information industry continues to play a growing role in the economy of Bristol where ESPN is headquartered. For more details on wages within the region see page 26.

The region also faces a number of economic challenges. In 2012, the regional labor force numbered 129,278. Of these workers over 12,500 are unable to find employment. The rate of unemployment for 2012 was 9.69% which is above the state rate, 8.50%, and the national rate, 8.20%, for the same period. In New Britain the unemployment rate was 12.83% signaling even greater localized economic difficulty.

<table>
<thead>
<tr>
<th></th>
<th>Population</th>
<th>Labor Force</th>
<th>Employed</th>
<th>Unemployed</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berlin</td>
<td>20,463</td>
<td>11,225</td>
<td>10,340</td>
<td>885</td>
<td>7.88%</td>
</tr>
<tr>
<td>Bristol</td>
<td>60,603</td>
<td>34,037</td>
<td>30,892</td>
<td>3,145</td>
<td>9.24%</td>
</tr>
<tr>
<td>Burlington</td>
<td>9,434</td>
<td>5,439</td>
<td>5,067</td>
<td>372</td>
<td>6.84%</td>
</tr>
<tr>
<td>New Britain</td>
<td>73,153</td>
<td>36,626</td>
<td>31,927</td>
<td>4,699</td>
<td>12.83%</td>
</tr>
<tr>
<td>Plainville</td>
<td>17,819</td>
<td>10,366</td>
<td>9,460</td>
<td>906</td>
<td>8.74%</td>
</tr>
<tr>
<td>Plymouth</td>
<td>12,089</td>
<td>6,979</td>
<td>6,252</td>
<td>727</td>
<td>10.42%</td>
</tr>
<tr>
<td>Southington</td>
<td>43,434</td>
<td>24,606</td>
<td>22,815</td>
<td>1,791</td>
<td>7.28%</td>
</tr>
<tr>
<td>Region</td>
<td>236,995</td>
<td>129,278</td>
<td>116,753</td>
<td>12,525</td>
<td>9.69%</td>
</tr>
</tbody>
</table>

Table X. Employment and labor force statistics.

Economic Base

Based on 2009 data, in Central Connecticut, the economic base is made up of the following industries: Construction, Manufacturing, Retail Trade, Information, Health Care and Social Assistance, and Other Services. (Central Connecticut Comprehensive Economic Development Strategy, 2011) As these sectors represent the exporting industries for the Region it is important to identify those enterprises that are located in areas of high risk.

For employment, Central Connecticut’s population has historically been and is currently highly dependent on manufacturing. More than 15% of jobs in the region are currently in manufacturing. Manufacturing has always been a welcome part of the local economy for several reasons. First, salaries for workers in this industry are among the highest for the region. Second, across the US, manufacturing is responsible for the majority of all R&D spending, which makes it an important cornerstone to
maintaining local technological advantages. Third, manufacturing disproportionally rewards higher education relative to other industries.

**Person and Household Income**

Low-income households and individuals may be at greater risk to natural hazards than more affluent neighbors. These populations are more likely to rely on transit for transportation (which can be problematic when a disaster hits), have fewer resources to devote to disaster preparation, and have fewer resources to draw on to aid in recovery. While Connecticut is generally wealthier than the nation, the same is not true of every municipality in Central Connecticut. In 2012, the per capita income for the United States was $28,051. In Connecticut it was $37,807, but in New Britain it was just $20,601. New Britain also has a median household income that is much less than the state and national averages.

Poverty is increasingly a problem in the region, the state, and the country. In 2000, the poverty rate in the U.S. was 12.4%, and increased to 14.9% in 2012. Statewide, the rate nearly doubled from 7.9% to 14.9%. In every municipality in the region, the rate increased by at least 2%. In New Britain, the city with the highest poverty rate in the region, the rate increased from 16.4% to 22.9%. Region-wide, 27,530 people live below the poverty line, a rate of 11.7%. In fact, from 2000 to 2010, the number of new residents in the region was roughly equal to the number of people falling below the poverty line. Put another way, for every new resident the region gained, one person became impoverished.

<table>
<thead>
<tr>
<th>Region</th>
<th>Median household income</th>
<th>Per capita income</th>
<th>Percent of people under the poverty level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berlin</td>
<td>$85,735</td>
<td>$38,426</td>
<td>6.4%</td>
</tr>
<tr>
<td>Bristol</td>
<td>$58,814</td>
<td>$30,555</td>
<td>9.0%</td>
</tr>
<tr>
<td>Burlington</td>
<td>$106,756</td>
<td>$43,245</td>
<td>3.6%</td>
</tr>
<tr>
<td>New Britain</td>
<td>$39,898</td>
<td>$20,601</td>
<td>22.9%</td>
</tr>
<tr>
<td>Plainville</td>
<td>$61,766</td>
<td>$31,392</td>
<td>7.6%</td>
</tr>
<tr>
<td>Plymouth</td>
<td>$73,603</td>
<td>$31,407</td>
<td>6.7%</td>
</tr>
<tr>
<td>Southington</td>
<td>$78,668</td>
<td>$37,876</td>
<td>3.6%</td>
</tr>
<tr>
<td>Connecticut</td>
<td>$69,519</td>
<td>$37,807</td>
<td>10.0%</td>
</tr>
<tr>
<td>United States</td>
<td>$53,046</td>
<td>$28,051</td>
<td>14.9%</td>
</tr>
</tbody>
</table>

*Table X. Selected economic data.*

**Economic Risk**

Central Connecticut owes much of its early economic development to the region’s rivers and streams. The energy these waterways provided and the cargo they carried facilitated the region’s transition from an agricultural economy to an industrial economy. While the remnants of canals, mills and factories, many of which are still active, tell the story of this industrial past, the potential for a flood surge to breach their banks is emblematic of the risk weather presents local economic activity. The same structures that were designed to make the economy productive can threaten the very forces that keep it functioning. Just as highways and electric power, the life blood of modern production, can be shut down from an extreme weather event, halting economic activity.

If a business is forced to close because of weather, physical damages or any other emergency event the forfeited production and forgone wages often represent a permanent economic loss. Anecdotal
evidence from local chambers of commerce and business leaders indicates that for a small or medium sized business even a couple days of lost production can be enough to lead to closure. The proportion of local enterprises and jobs that are located in flood zones represent an easily identifiable economic risk. **Table 5** above catalogues these at-risk companies and at-risk jobs.

<table>
<thead>
<tr>
<th></th>
<th>Businesses within Floodway</th>
<th>% of Businesses within Floodway</th>
<th>Employees within Floodway</th>
<th>% of Employees within Floodway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berlin</td>
<td>231</td>
<td>17.55%</td>
<td>2350</td>
<td>16.99%</td>
</tr>
<tr>
<td>Bristol</td>
<td>353</td>
<td>14.11%</td>
<td>3485</td>
<td>12.06%</td>
</tr>
<tr>
<td>Burlington</td>
<td>3</td>
<td>1.04%</td>
<td>25</td>
<td>1.52%</td>
</tr>
<tr>
<td>New Britain</td>
<td>26</td>
<td>0.94%</td>
<td>489</td>
<td>1.65%</td>
</tr>
<tr>
<td>Plainville</td>
<td>104</td>
<td>9.19%</td>
<td>1214</td>
<td>25.27%</td>
</tr>
<tr>
<td>Plymouth</td>
<td>29</td>
<td>7.30%</td>
<td>189</td>
<td>4.59%</td>
</tr>
<tr>
<td>Southington</td>
<td>200</td>
<td>8.75%</td>
<td>2121</td>
<td>9.82%</td>
</tr>
<tr>
<td>Region</td>
<td>946</td>
<td>8.85%</td>
<td>9873</td>
<td>9.44%</td>
</tr>
</tbody>
</table>

**Table X. Businesses at risk of flooding.**

In most of the Central Connecticut towns, only a small proportion of businesses are at risk. The obvious exceptions being Berlin and Bristol which both have more than 1 in 10 Businesses exposed to some level of flood risk. Not surprisingly a large proportion of jobs in Berlin and Bristol are also exposed to flood risk. With regard to employment risk, Plainville stands out as being at particular risk with over 1 in 4 employees working within the 1% flood zone. Continued support for moving high risk or repeat loss facilities to safer grounds would reduce economic vulnerability.

**Hazard Risks to the Region**

The Federal Emergency Management Agency defines disasters in their State and Local Mitigation Planning Guide (2003) as “events that can cause loss of life and property, environmental damage, and disruption of governmental, social, and economic activities. They occur when hazards impact human settlements and the built environment.” The Central Connecticut Region has experienced a range of disasters in recent years. The following provides an examination of these disasters.

**Hazards impacting the region**

Natural disasters affect thousands of people every year. It is important that communities and businesses understand the risks posed by natural disasters and ensure that adequate preparedness and recovery procedures are in place before disaster strikes. The following provides an overview of natural disasters that are likely to impact the Central Connecticut Region. The section includes a description of the disaster, provides an historic look at recent disasters in the region, analyzes the probability the disaster will strike again, and assesses the impact of each. Particular emphasis is given to floods, severe winter storms, and tropical cyclones (hurricanes and tropical storms), which are most common in the region.
Other natural disasters examined, which can impact the region but are less likely to occur, include tornadoes, wildfires, drought, earthquakes, and dam failure.

Throughout the following section all estimates of costs and damages given in dollars are not inflation adjusted.

Floods

Flooding is the most common natural disaster encountered in the Central Connecticut Region. Triggered by a variety of events, floods can occur at any time in the region. Heavy precipitation is common throughout the year, and each season brings its own source of floods: from mid-summer through fall, hurricanes bring wind and torrential rain; winter Nor’Easters pound the region with snow and rain; in spring snowmelt inundates local hydrologic systems; and summer thunderstorms can bring flash floods in minutes. Historical development patterns encouraged dense construction of town centers near water bodies; consequently many areas with chronic flooding problems are in population centers.

Historic Flood Events

Historically, the region has seen a great deal of flooding. The National Climatic Data Center’s (NCDC) Storm Events Database lists many flood events for Hartford and Litchfield Counties, 208 events between 1996-2011 and 9 flood events for the Central Connecticut region since 2006( beginning of NOAA’s NWS records). The storms listed in NCDC’s database only present notable storm events tied to flooding but unlisted storms also have a significant impact on the region. In 1992, for example, New Britain experienced extensive flooding from a rainstorm that, according to a report by Maguire Group, exceeded a 100-year storm. The flooding that resulted from this unlisted storm inundated local playing fields and caused $654,000 worth of damage to bridges, culverts, and roads.

The following details recent floods in the region:

**April 16-18, 1996:** Two to three inches of rain fell on April 16th in northern Connecticut, with totals of 3 to 5 inches in the south portion of Hartford and Tolland Counties. All of the rain fell in about a 12 hour period. The ground had remained saturated from heavy snowmelt during the previous week and this combined with the heavy rain to produce urban flooding, flooding of small streams, and minor to moderate flooding of the major rivers. A flash flood occurred in Berlin, where boats were needed to rescue people stuck in two cars on Route 71.

**September 16, 1999:** Tropical Storm Floyd brought torrential rainfall and strong winds to northern Connecticut, as it tracked up the Connecticut River valley into central Massachusetts. Although many areas received torrential rainfall, with totals between 4 and 8 inches, the heaviest rain fell in western Hartford County where as much as 10.80 inches was reported in Bristol. Smaller rivers such as the Quinnipiac, North Branch Park, and Burlington Brook rose rapidly out of their banks. Crests of 2 to 3 feet above flood stage occurred by daybreak on the 17th.

**June 30-July 1, 1998:** An area of heavy showers and thunderstorms associated with a slow moving warm front brought 2 to 4 inches of rainfall, resulting in street, basement, small stream, and river flooding in Hartford County. The Quinnipiac River in Southington reached flood stage at 6:10 PM on June 30th, crested at 4.24 feet at 8:39 PM and continued flooding through midnight before falling below flood stage on July 1st.
**September 28, 2003:** Significant urban flooding affected central Hartford County, after nearly 4 inches of rain fell in a few hours. Several cars were stranded in Berlin and West Hartford, and Willow Brook rose out of its banks in New Britain, flooding a nearby park. This event included flash flooding in Berlin that caused $25,000 worth of property damage.

**December 12, 2008:** While a major ice storm affected Massachusetts and Southern New Hampshire, three to four inches of rain fell in Connecticut resulting in small stream and some street flooding. Roack Road in Burlington was closed due to flooding.

**August 28, 2011:** Hurricane Irene made landfall in Connecticut as a tropical storm, producing significant amounts of rain, storm surge, inland and coastal flooding, and wind damage across southern New England and much of the east coast of the United States. Four to ten inches of heavy rain from the storm caused the Pequabuck River to overflow its banks, flooding homes and businesses throughout Bristol. At least 50 people were evacuated from areas around the river and took shelter at Chippens Hill Middle School. Roads were also flooded, becoming impassable with water approximately three and a half feet deep. Flood waters also washed out a portion of Route 72. Forty high water rescues took place in Bristol. A 46 year old man drowned while canoeing in floodwaters when his canoe capsized. Tropical Storm Irene also flooded parts of Burlington, with Bunnell Brook having its third worst flood on record. Inland flooding resulted in 1 fatality and $8 million in property damages.

**September 8, 2011:** A slow moving cold front moved across Southern New England and stalled just south of the area. This front was instrumental in bringing tropical moisture from the remnants of Tropical Storm Lee into New England. Rainfall totals throughout the region over the four days totaled anywhere from two to eight inches. The majority of flooding in urban areas occurred on September 8 as a band of very heavy rain dumped up to two inches of rain in an hour in some locations. Scoville Street, West Chippens Hill Road, and the George Washington Turnpike in Burlington were flooded with one foot of water. In addition, Bunnell Brook at Burlington experienced minor flooding.

**Risk**

The floods are often described in terms of the annual percentage chance of occurrence. Flood plains have been delineated by FEMA to reflect 1% and 0.2% annual flood events previously known as 100-year and 500-year floods respectively. However, because a n% flood plain reflects the percentage chance that area will be inundated in any given year, it is possible to observe a 1% flood more than once every 100 years. Furthermore, an n% flood plain is based on empirical evidence. If more or less floods of a certain magnitude are observed, FEMA redesignates the flood plains and corresponding insurance maps. This means that there can be a lag between the official risk and the empirical risk. A table of the two terms, n% flood and their corresponding n year floods is found in table X.

<table>
<thead>
<tr>
<th>Previous terminology</th>
<th>Current Annual percent chance terminology</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 -Year</td>
<td>4%</td>
</tr>
<tr>
<td>100 Year</td>
<td>1%</td>
</tr>
<tr>
<td>500-Year</td>
<td>0.20%</td>
</tr>
</tbody>
</table>

*Table X. Current and antiquated terms for various intensities of flooding.*
The Connecticut Department of Transportation (ConnDOT) also keeps indexes linking return periods with expected precipitation. A chart including events by expected return period, the expected volume of precipitation recorded in one day for each hypothetical event, the observed number of events that have crossed the volume threshold and the observed probability for the return of any such event in any given year is given in Table X. This table highlights the uncertainty of the predictions. According to the official numbers, 2% annual events have occurred 5 times in the last roughly 50 years. This implies that there is actually a 10% annual observed chance of an event of this magnitude within the region; this is five times more likely than official probability. Municipalities can improve their resiliency by looking at local observed severe weather and by exceeding, where necessary, state requirements to meet local needs.

<table>
<thead>
<tr>
<th>Return Period</th>
<th>Expected Probability</th>
<th>Expected Rain Fall/Day</th>
<th>Observed Occurrences</th>
<th>Observed Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>1%</td>
<td>7</td>
<td>4</td>
<td>8.2%</td>
</tr>
<tr>
<td>50</td>
<td>2%</td>
<td>6.35</td>
<td>5</td>
<td>10.2%</td>
</tr>
<tr>
<td>25</td>
<td>4%</td>
<td>5.75</td>
<td>8</td>
<td>16.4%</td>
</tr>
<tr>
<td>10</td>
<td>10%</td>
<td>4.95</td>
<td>10</td>
<td>20.5%</td>
</tr>
<tr>
<td>5</td>
<td>20%</td>
<td>4.2</td>
<td>17</td>
<td>34.8%</td>
</tr>
<tr>
<td>2</td>
<td>50%</td>
<td>3.25</td>
<td>41</td>
<td>84.0%</td>
</tr>
</tbody>
</table>

The National Climate Assessment estimates 5-20% more precipitation during winter and spring months for the northeast by the turn of the next century. The assessment also predicts an increase in severe weather events for the region which may increase the chance of experiencing floods. Intense precipitation, combined with an increase in impervious surfaces and thus increase in surface runoff, means the region has to be particularly aware of flooding risks.

**Impacts**

As recorded in the above descriptions of past flooding events, the impacts go beyond lost or damaged property and include reducing access to transportation and limiting the movement of economic goods and services. All seven towns in the region are impacted by floods on a regular basis. The Pequabuck, Quinnipiac, and Mattabesset Rivers flow through the region, and all have flood-prone areas. Impacts from flooding vary according to the severity of each flood event, but can range from minor damage of personal property to dam failure, septic and sewer system failure, and even the destruction of homes and businesses and loss of lives. Flood damage is predictable in its location, however, and every town in the region has one or more specific properties that are damaged by flooding on a regular basis. These properties are defined by the National Flood Insurance Program (NFIP) as repetitive flood loss properties or severe repetitive flood loss properties (SRLP). Maps showing the general locations of these properties are contained in the individual municipal sections.
<table>
<thead>
<tr>
<th>Community</th>
<th>Building Payments</th>
<th>Contents Payments</th>
<th>Total Payments</th>
<th>Average Payments</th>
<th>Number of Losses</th>
<th>Number of Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berlin</td>
<td>$157,809.72</td>
<td>$93,730.50</td>
<td>$251,540.07</td>
<td>$13,238.95</td>
<td>19</td>
<td>6</td>
</tr>
<tr>
<td>Bristol</td>
<td>$1,467,468.57</td>
<td>$127,486.38</td>
<td>$1,594,954.95</td>
<td>$16,789.00</td>
<td>95</td>
<td>32</td>
</tr>
<tr>
<td>Burlington</td>
<td>$15,080.58</td>
<td>$0.00</td>
<td>$15,080.58</td>
<td>$7,540.29</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>New Britain</td>
<td>$202,248.60</td>
<td>$12,796.68</td>
<td>$215,045.28</td>
<td>$6,516.52</td>
<td>33</td>
<td>13</td>
</tr>
<tr>
<td>Plainville</td>
<td>$290,963.41</td>
<td>$28,111.82</td>
<td>$319,075.23</td>
<td>$13,872.84</td>
<td>23</td>
<td>7</td>
</tr>
<tr>
<td>Southington</td>
<td>$213,996.26</td>
<td>$327,029.65</td>
<td>$541,025.91</td>
<td>$18,034.20</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>Plymouth</td>
<td>$124,290.60</td>
<td>$14,518.13</td>
<td>$138,808.73</td>
<td>$19,829.82</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Totals</td>
<td>$2,471,857.74</td>
<td>$603,673.16</td>
<td>$3,075,530.75</td>
<td>$95,821.62</td>
<td>209</td>
<td>72</td>
</tr>
</tbody>
</table>

*Table X. Payments made under the National Flood Insurance Program.*
HAZUS

Potential impacts from flooding events were evaluated using HAZUS-MH loss estimation program. HAZUS-MH can be performed at three levels of analysis each with an increasing level of detail but at the cost of user effort and data sophistication. The scope of this analysis is a level 1 analysis which uses the default HAZUS-MH data. In future updates to this plan, it may be possible to use a higher level of analysis if digital parcel data and building footprints are available.

This section of the plan focuses on a flood event with a 1% annual chance of occurring. The percentage represents the likeliness of a flood occurring in a given year. HAZUS-MH was used to simulate such an event. Simulations of other events (4% and 0.2% annual events) were also performed, but the 1% event was chosen to be the focus of this analysis. This event was chosen because recent climate data suggests that 1% events are becoming increasingly common, and because the difference between the 1% and the 0.2% simulations was not large enough to make the comparison meaningful to readers of this plan.

Within the Central Connecticut region essential facilities in most towns are safe from the impacts of any flooding. All hospitals in the region would be expected to remain at full capacity in the event of base flood elevation flooding. However the town of Plainville is expected to lose use of its one police station and Plymouth is expected to lose use of its one fire station. The floodplains for both Plymouth and Plainville are in the process of being remapped. Preliminary data suggest that the Police Station in Plainville will no longer be in the 1% annual chance floodplain.

The replacement value of all buildings (as reported by HAZUS) in the region is $19 billion. Of that, $10.5 billion is potentially in the path of a 1% annual chance flood event. That is roughly 55% of the total replacement value. Exposure varies throughout the region, however, from a low of 38% in New Britain to a high of 74% in Berlin. Overall, the greatest dollar amount of exposure is in Bristol.

<table>
<thead>
<tr>
<th>Geography</th>
<th>Replacement value</th>
<th>1% Flood Event Exposure</th>
<th>% of Value Exposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berlin</td>
<td>$1,842,227,000</td>
<td>$1,359,169,000</td>
<td>74%</td>
</tr>
<tr>
<td>Bristol</td>
<td>$5,036,403,000</td>
<td>$2,793,969,000</td>
<td>55%</td>
</tr>
<tr>
<td>Burlington</td>
<td>$745,462,000</td>
<td>$543,883,000</td>
<td>73%</td>
</tr>
<tr>
<td>New Britain</td>
<td>$5,331,489,000</td>
<td>$2,022,586,000</td>
<td>38%</td>
</tr>
<tr>
<td>Plainville</td>
<td>$1,606,235,000</td>
<td>$872,604,000</td>
<td>54%</td>
</tr>
<tr>
<td>Southington</td>
<td>$3,576,365,000</td>
<td>$2,271,638,000</td>
<td>64%</td>
</tr>
<tr>
<td>Plymouth</td>
<td>$954,189,000</td>
<td>$636,735,000</td>
<td>67%</td>
</tr>
<tr>
<td>Region</td>
<td>$19,092,370,000</td>
<td>$10,500,584,000</td>
<td>55%</td>
</tr>
</tbody>
</table>

Table X. Replacement values of buildings and exposure under a 1% annual chance event.

A 1% annual chance flood event would cause damage of some kind to an estimated 590 buildings throughout the region. Of that total, 124 are estimated to be total losses (greater than 50% of the building’s value is destroyed) and 466 will have moderate damage. The greatest number of total losses is expected to occur in Plainville (48), while the greatest number of damaged buildings is expected to occur in Southington).
Damage to building contents accounts for the majority of all damage that is expected to be suffered as a result of base flood elevation flooding. Damage to contents is expected to account for roughly two thirds of all damage while damage to the building stock is only expected to account for a little less than a third of all damage. The Remaining damage is credited to lost inventory. The greatest dollar amount of economic losses is expected in Bristol ($189.7 million).

When the population of each municipality is taken into consideration, a different picture of the distribution of damage materializes. For example, while Bristol is expected to experience greater economic losses than Berlin, the per capita share in Berlin is actually double that of Bristol. Plymouth is expected to have the lowest overall losses, but the third highest per capita losses.
### Table X. Per capita losses under a simulated 1% annual chance flood event.

Of all economic damage suffered to the region almost 100% can be attributed to buildings, contents and inventory. Across the region, business related damage accounts for less than half a percent of all economic damage, this includes lost income, relocation costs, rental income, and lost wages. Although, these losses account for only a small portion of total economic impacts they can cause ripple effects throughout the economy, putting many small businesses at risk of closure.

### Table X. Losses due to business interruptions under a 1% annual chance flood event.

In addition to the expenses associated with damage to buildings and contents, there would also be extensive debris left in the wake of a flood. If waters reached base flood elevation across the region, there would be over 23,000 tons of debris to be cleared. At $60 per ton, this would cost up to $1.3 million.
<table>
<thead>
<tr>
<th>Geography</th>
<th>Total Tons Of Debris</th>
<th>Cost Of Clean-Up ($60 Per Ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berlin</td>
<td>2,632</td>
<td>$157,911.60</td>
</tr>
<tr>
<td>Bristol</td>
<td>5,500</td>
<td>$329,996.40</td>
</tr>
<tr>
<td>Burlington</td>
<td>832</td>
<td>$49,945.20</td>
</tr>
<tr>
<td>New Britain</td>
<td>3,188</td>
<td>$191,290.80</td>
</tr>
<tr>
<td>Plainville</td>
<td>5,000</td>
<td>$300,001.20</td>
</tr>
<tr>
<td>Southington</td>
<td>4,343</td>
<td>$260,575.20</td>
</tr>
<tr>
<td>Plymouth</td>
<td>1,754</td>
<td>$105,258.60</td>
</tr>
<tr>
<td>Region</td>
<td>23,250</td>
<td>$1,394,979.00</td>
</tr>
</tbody>
</table>

Table X. Estimated debris generation and clean-up costs.

Fortunately Hazus doesn’t predict there would be life lost due to flooding in the region. Residents must remain cautious and avoid unnecessary risk. A Bristol man lost his life in the flooding that accompanied Hurricane Irene in 2011.

While no loss of life is expected, severe flooding could be expected to displace a large portion of residents. While not all residents who must evacuate their homes will seek public shelter, Berlin should ensure they have ample room in local shelters to absorb the estimated 12,000 residents that might seek temporary shelter.

<table>
<thead>
<tr>
<th>Geography</th>
<th>Displaced Population</th>
<th>Displaced Households</th>
<th>Temporary Shelter Needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berlin</td>
<td>2,000</td>
<td>667</td>
<td>1,297</td>
</tr>
<tr>
<td>Bristol</td>
<td>4,513</td>
<td>1,504</td>
<td>3,487</td>
</tr>
<tr>
<td>Burlington</td>
<td>420</td>
<td>140</td>
<td>95</td>
</tr>
<tr>
<td>New Britain</td>
<td>3,080</td>
<td>1,027</td>
<td>2,419</td>
</tr>
<tr>
<td>Plainville</td>
<td>1,915</td>
<td>638</td>
<td>1,621</td>
</tr>
<tr>
<td>Southington</td>
<td>3,456</td>
<td>1,152</td>
<td>2,574</td>
</tr>
<tr>
<td>Plymouth</td>
<td>798</td>
<td>266</td>
<td>418</td>
</tr>
<tr>
<td>Region</td>
<td>16,182</td>
<td>5,394</td>
<td>11,911</td>
</tr>
</tbody>
</table>

Table X. Estimated displaced households and shelter needs.

Detailed results for each municipality can be found in their individual municipal sections. Summary reports generated by HAZUS are also included in the appendix.

**Winter Storms**

Winter storms, consisting of snow, ice, wind, and other cold weather precipitation, are a regular occurrence in Connecticut. Some winter storms are mild and of little consequence. However others, including blizzards, ice storms, and Nor’Easters cause large scale and regular disruptions by restricted transportation, lost electricity, and incurred physical damages.
Historic Winter Weather

According to FEMA’s disaster history, 5 of the 19 major disaster declarations in Connecticut since 1954 have been prompted by snowfall. The following provides an overview of winter storms in recent history:

January 7, 1996: The “Blizzard of ’96” was one of the most significant winter storms to hit southern New England in the past 20 years. However, by the National Weather Service definition, no actual blizzard conditions occurred in the state. Snowfall across the north and northeast portions of the state ranged from 15 to 23 inches, with New Britain reporting 18 inches. This storm disrupted transportation systems and closed schools and businesses.

December 7, 1996: This storm brought heavy, wet snow and resulted in widespread power outages. A total of 225,000 electric customers lost power statewide, including 100,000 in central Connecticut. Power remained out for several days, despite the efforts of dozens of electric company repair crews, many from out-of-state. Many roads remained unplowed until the utility companies could repair fallen wires. Up to 22 shelters were opened across the region and many residents left their unheated and darkened homes. Many vehicles and homes were damaged by falling tree limbs and damage was estimated in the millions of dollars.

November 16, 2002: A major ice storm caused significant damage in north central Connecticut. There were numerous reports of downed trees, limbs, and power lines as a result of one-half to three quarters of an inch of ice. An estimated 100,000 customers in Hartford and Tolland Counties were left without power because of the storm. The damage from the ice storm was compounded by high winds one day later. Gusts as high as 50 mph hampered the cleanup effort, downing more trees and branches which were weighted down by ice. Total damage from the storm in Hartford County was estimated at two million dollars.

February 2, 2011: A series of significant heavy snow events occurred between December 26, 2010 and February 2, 2011. From February 1st through the 2nd, a total of 6-11 inches of snow fell across Hartford County, with upwards of a quarter inch of ice accumulation for isolated locations. Across Connecticut, numerous roof collapses due to heavy snow load occurred, including 75 structures in Hartford County. Snow for the winter season totaled 86.4 inches.

February 8, 2013: An historic blizzard deposited tremendous amounts of snow over southern New England. Most locations received 2 to 2.5 feet of snow. Isolated thunderstorms were common across the region during the height of the storm. During the night, rates of accumulation reaching 2 to 3 inch per hour were common throughout the region. The Connecticut Department of Agriculture reported that more than 140 agricultural structures were damaged or destroyed throughout the state because of the weight of the snow.

January 25, 2015: An historic blizzard deposited tremendous amounts of snow over southern New England. Most locations received at least a foot of snow; some received up to three feet. During the night, rates of accumulation reaching 2 to 3 inch per hour were common throughout the region. Snow removal in parts of Connecticut took two to three days.

Risk

Winter storms of varying levels of severity are fairly common in the region. Data from the weather station in Burlington reveals that in an average year there are 85 days when it snows .1 inches or more.
Most of those days (54) are during December through February. During this same time period, there are 32 days where snow totals at least 1 inch and 3 days on average have a snowfall total of 10 inches or higher. These data demonstrate that the Central Connecticut Region should expect several heavy snows per year and therefore should be adequately prepared for these storms.

While the probability of a winter storm occurring is roughly the same in all parts of the region, the risk of damage will vary depending on infrastructure and population density. To a large extent, the areas with the greatest risk of experiencing damage due to winter storms, are those with the greatest amount of development and the most extensive networks of roads. Bristol, a relatively large and densely populated city, has the greatest number of miles of town-owned roads at 223.24 miles. Burlington, a similarly large town but with much lower population density, only has 86.15 miles of town-owned roads. The potential snow-removal burden is, therefore, much lower in Burlington. The magnitude of travel-related impacts is also lower in Burlington due to the lower road capacity. Conversely, the travelers who must go through Burlington face a potentially greater risk due to the lower density of roads which provides fewer alternate routes.

<table>
<thead>
<tr>
<th>Municipality</th>
<th>Total miles of road</th>
<th>Total town-owned miles of road</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berlin</td>
<td>131.66</td>
<td>103.72</td>
</tr>
<tr>
<td>Bristol</td>
<td>243.59</td>
<td>223.24</td>
</tr>
<tr>
<td>Burlington</td>
<td>98.76</td>
<td>86.15</td>
</tr>
<tr>
<td>New Britain</td>
<td>183.89</td>
<td>164.33</td>
</tr>
<tr>
<td>Plainville</td>
<td>84.36</td>
<td>66.84</td>
</tr>
<tr>
<td>Plymouth</td>
<td>94.80</td>
<td>82.38</td>
</tr>
<tr>
<td>Southington</td>
<td>226.61</td>
<td>195.26</td>
</tr>
</tbody>
</table>

Table X. Miles of roads and town-owned roads per municipality.

Areas with greater levels of development are also at greater risk of business disruptions, loss of life, and damage to structure. As shown in the figure below, New Britain has the greatest level of development (with the exception of a few parks, the entire city is developed) and the greatest potential risk. For example, with more roofs comes more potential for roof collapse. There are also simply more sidewalks to clear, more homes to heat, and more people to protect.
Central Connecticut 2010 Land Cover

Land Cover Classes
- Agricultural Field
- Other
- Forest
- Developed
- Wetland
- Water

GIS Mapping by Central CT
Regional Planning Agency
May, 2014
Impacts

While picturesque, snow and ice can create impassable roads, interrupt utility service, knock down trees and power lines, and isolate people in their homes or workplaces, sometimes without electricity or heat. Melting snow and ice can also cause flooding, as can winter rainstorms that hit when the ground is already frozen. The following examines the impact of snow storms on the region.

Municipal Budgets

Snow and ice removal has a tremendous impact on municipal budgets. The impact varies by town; some towns use their own staff to clear roads, which may represent savings but also be inefficient. Other towns hire contractors to remove 100% of the snow and ice. The remainder of towns use a combination of town staff and contractors. Regardless of staffing, every town is faced with spending between $100,000 and $1 million per year on snow and ice management.

In recent years, towns have budgeted and spent widely varying amounts on their snow removal budgets depending on severity. The winter of 2013-14 saw the state and many towns exceeding their budgets and running out of salt, sand, and other resources before the winter ended.

For example, Plainville regularly had to extend their snow removal budget in order to adequately clear multiple feet of snow of the past several winters. See Table X below for recent snow removal budgets in Plainville.

<table>
<thead>
<tr>
<th>Year</th>
<th>Budgeted</th>
<th>Total Cost</th>
<th>Sand/Salt Cost</th>
<th>Snow (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>$99,000</td>
<td>$150,746</td>
<td>$59,725</td>
<td>86</td>
</tr>
<tr>
<td>2005</td>
<td>$99,240</td>
<td>$237,011</td>
<td>$65,000</td>
<td>77</td>
</tr>
<tr>
<td>2006</td>
<td>$97,000</td>
<td>$192,113</td>
<td>$60,000</td>
<td>67</td>
</tr>
<tr>
<td>2007</td>
<td>$96,800</td>
<td>$129,594</td>
<td>$60,400</td>
<td>26.5</td>
</tr>
<tr>
<td>2008</td>
<td>$96,800</td>
<td>$241,229</td>
<td>$83,600</td>
<td>42</td>
</tr>
<tr>
<td>2009</td>
<td>$127,692</td>
<td>$239,317</td>
<td>$170,025</td>
<td>46.7</td>
</tr>
<tr>
<td>2010</td>
<td>$127,692</td>
<td>$189,015</td>
<td>$104,050</td>
<td>34</td>
</tr>
<tr>
<td>2011</td>
<td>$132,240</td>
<td>$104,478</td>
<td>$54,778</td>
<td>22</td>
</tr>
<tr>
<td>2012</td>
<td>$132,240</td>
<td>$241,715</td>
<td>$98,443</td>
<td>64</td>
</tr>
</tbody>
</table>

Table X. Snow removal budgets and observed snowfall in Plainville, 2004-2012.

Roof Collapse

Heavy snow and ice accumulation brings with it the threat of roof collapse and catastrophic damage to the building’s occupants. As seen in Table X, snow alone can put a large burden on roofs, however when coupled with rain and sleet, this load per square foot increases.

<table>
<thead>
<tr>
<th>Type</th>
<th>Equivalent to 1&quot; of water</th>
<th>Load per Square Foot</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Snow</td>
<td>10-12&quot;</td>
<td>5 lbs</td>
<td>4 ft.</td>
</tr>
<tr>
<td>Packed Snow</td>
<td>3-5&quot;</td>
<td>5 lbs</td>
<td>2 ft.</td>
</tr>
</tbody>
</table>

Table X: The burden of snow on a roof.

Two feet of old snow and two feet of new snow could weigh as much as 60 pounds per square foot of roof space, which is beyond the typical snow load capacity of most roofs. One inch of ice is equivalent to one foot of fresh snow. A house should be able to support 20 to 25 pounds of snow per square foot. (IIBHS, 2012)

The winter of 2011 saw many buildings condemned by snow accumulation, collapsing their roofs. In Southington several businesses experienced roof collapse including the Home Depot and Country Dog Training. Yarde Metals also had to be evacuated after the roof was damaged (Vallee, 2011). In Plainville, the roof of Classic Auto Body of Plainville collapsed. The building was condemned and the owners estimated the damages to exceed $100,000 (Sopchak, 2011).

Road Closures

Like many other types of disasters, winter weather and heavy snowfall can cause localized and widespread road closures. Closures can result from a variety of causes such as poor driving conditions, heavy snow and drifts, as well detritus like fallen trees and power lines. When a blizzard struck on February 8th, 2013, Governor Malloy called for a traffic ban on all vehicles except for those emergency response and recovery vehicles with the capacity to maneuver in heavy snow for the following day. Events with large impacts on transit also have major economic impacts, like preventing employees from reaching work and halting or delaying shipments and deliveries.

Burst Pipes

Cold and winter weather not only wrecks havoc outside a building, but inside as well. Frozen pipes can cause severe damage. A complete ice blockage in a pipe causes freezing and expansion which in turn causes water pressure to increase to the faucet. The increase in water pressure leads to pipe failure. In 2013, frozen and broken water pipes ranked second to hurricanes in terms of both the number of homes damaged and the total amount of damages claimed in the U.S. (IINC, 2014) While there are few records of burst pipes in the region, in nearby Farmington at the UConn Health Center, a frozen sprinkler pipe burst. This caused extensive damage, with water leaking into the main floor, the ground floor and a storage room, some labor and delivery rooms, as well as the newborn nursery. (Lank, 2014).

Power Outages

Heavy snow and ice can cause tree limbs to fall, bringing power lines down with them. Winter weather frequently causes significant power outages throughout the state, especially in more rural areas. Urban areas, where a greater percentage of power lines are underground, are impacted to a lesser degree. Not
only is this an inconvenience, but it can cause damage to property, disrupt business, and threaten lives if heaving systems are impacted.

The snow storm of October 2011 was particularly impactful. During that storm, 76% of the region was without power, often for five days or more. The table below has a summary of the number of customers who were without power. In each of the town sections, more detail is provided about how many days customers in those towns were without power.

<table>
<thead>
<tr>
<th>Municipality</th>
<th>Customers Served</th>
<th>Max outage</th>
<th>% without power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berlin</td>
<td>9,622</td>
<td>6,868</td>
<td>71%</td>
</tr>
<tr>
<td>Bristol</td>
<td>29,472</td>
<td>26,098</td>
<td>89%</td>
</tr>
<tr>
<td>Burlington</td>
<td>3,680</td>
<td>3,667</td>
<td>100%</td>
</tr>
<tr>
<td>New Britain</td>
<td>34,175</td>
<td>20,509</td>
<td>60%</td>
</tr>
<tr>
<td>Plainville</td>
<td>9,305</td>
<td>9,278</td>
<td>100%</td>
</tr>
<tr>
<td>Plymouth</td>
<td>5,771</td>
<td>5,732</td>
<td>99%</td>
</tr>
<tr>
<td>Southington</td>
<td>19,363</td>
<td>13,457</td>
<td>69%</td>
</tr>
<tr>
<td>Region</td>
<td>111,388</td>
<td>84,303</td>
<td>76%</td>
</tr>
</tbody>
</table>

**Tropical Cyclones: Hurricanes and Tropical Storms**

A tropical cyclone is defined by the National Weather Service as a “rotating, organized system of clouds and thunderstorms that originates over tropical or subtropical waters and has a closed low-level circulation.” A tropical cyclone is further classified as a tropical depression, tropical storm, hurricane, or major hurricane, and is most likely to form from June 1 through November 30. Please refer to preceding description.
The Saffir-Simpson Hurricane Wind Scale is a 1 to 5 rating based on a hurricane's sustained wind speed. This scale estimates potential property damage. Hurricanes reaching Category 3 and higher are considered major hurricanes because of their potential for significant loss of life and damage. Category 1 and 2 storms are still dangerous, however, and require preventative measures.

<table>
<thead>
<tr>
<th>Category</th>
<th>Sustained Winds</th>
<th>Types of Damage Due to Hurricane Winds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>74-95 mph</td>
<td><strong>Very dangerous winds will produce some damage:</strong> Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days. Hurricanes Gloria of 1985 was a Category One hurricane at landfall.</td>
</tr>
<tr>
<td></td>
<td>64-82 kt</td>
<td></td>
</tr>
<tr>
<td></td>
<td>119-153 km/h</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>96-110 mph</td>
<td><strong>Extremely dangerous winds will cause extensive damage:</strong> Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks. Hurricane Bob was a category 2 hurricane when it made landfall in Rhode Island.</td>
</tr>
<tr>
<td></td>
<td>83-95 kt</td>
<td></td>
</tr>
<tr>
<td></td>
<td>154-177 km/h</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>111-129 mph (major)</td>
<td><strong>Devastating damage will occur:</strong> Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes. The New England Hurricane of 1938 was a category 3 hurricane when it made landfall.</td>
</tr>
<tr>
<td></td>
<td>96-112 kt</td>
<td></td>
</tr>
<tr>
<td></td>
<td>178-208 km/h</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>130-156 mph (major)</td>
<td><strong>Catastrophic damage will occur:</strong> Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.</td>
</tr>
<tr>
<td></td>
<td>113-136 kt</td>
<td></td>
</tr>
<tr>
<td></td>
<td>209-251 km/h</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>157 mph or higher (major)</td>
<td><strong>Catastrophic damage will occur:</strong> A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.</td>
</tr>
<tr>
<td></td>
<td>137 kt or higher</td>
<td></td>
</tr>
<tr>
<td></td>
<td>252 km/h or higher</td>
<td></td>
</tr>
</tbody>
</table>

**Historic Tropical Cyclones**

Tropical cyclones are the most destructive natural disasters that threaten the state of Connecticut due principally to their accompanying storm surge. Of the 19 major disaster declarations in the state since 1954, seven have been for hurricane related damage. As a land locked region, Central Connecticut is principally insulated from the most severe risks associated with these violent storms. However, despite...
its location, as illustrated by Figure X, many of these storms have tracked through the region in the last 100 years. The wind and rain they brought with them caused flooding, property damage, power outages, and left extensive debris and detritus in their wake.

The most destructive and powerful recorded hurricane to hit Connecticut struck on September 21, 1938. Named the Great New England Hurricane of 1938, the strongest winds ever recorded in Southern New England occurred during this storm at the Blue Hill Observatory with sustained winds of 121 mph and a peak gust of 186 mph. The worst damage was concentrated on the coast due to massive storm surges of 14 to 18 feet. However, inland communities were not spared. Rainfall of 10 to 17 inches from the hurricane resulted in severe river flooding across Connecticut, washing away road and sections of the New York, New Haven, and Hartford Railroad lines. The Connecticut River, in Hartford reached a level of 35.4 feet, which was 19.4 feet above flood stage. A total of 8,900 homes, cottages and buildings were destroyed, and over 15,000 were damaged by the hurricane. Across Southern New England 564 people died and over 1,700 were injured (National Weather Service Forecast Office, 2005). Due to its destruction, the hurricane of 1938 is often used as a benchmark when assessing the worst case scenario for future hurricanes to strike the region.

While no other hurricane has caused the level of destruction in Connecticut as the 1938 hurricane, other storms of significance have hit the region. The following provides an overview of these recent storms:
**August 19, 1991:** Hurricane Bob developed in the Bahamas, strengthening as it moved up the East Coast. Coastal communities in New England sustained winds between 75 and 100 mph, with peak wind gusts of 125 mph recorded on Cape Cod and in Wethersfield, Connecticut. Hurricane Bob caused approximately $680 million dollars of damage in Southern New England and was responsible for six deaths in Connecticut.

**September 16-21, 1999:** Tropical Storm Floyd dropped an average of four to eight inches of rain across the State, flooding 25 to 30 homes in Southington, which received rainfall on the order of a 250-year event. Plainville and Bristol also saw many homes flood as a result of this storm. Sixteen buildings in the state were utterly destroyed by the storm. The storm caused $2.2 million in damage.

**August 28, 2011:** Irene first made landfall in North Carolina as a Category 1 hurricane before moving north. By the time it reached the New York area, it was downgraded to a tropical storm. Dropping torrential rain on Connecticut, the storm caused widespread flooding, knocked power out to thousands of homes and businesses, and left many roads impassable. Tropical Storm Irene washed away a portion of Route 72 in Bristol and resulted in one death in the region.

**October 29, 2012:** Tropical Storm Sandy formed in the Caribbean on October 22. Moving up the coast, hitting New Jersey and New York on October 29, 2012, Tropical Storm Sandy caused extensive flooding and damage on Connecticut’s coast. The National Hurricane Center Tropical Cyclone Report estimated the death count from Sandy at 147 deaths, including 5 in Connecticut. Sandy was the deadliest hurricane to hit the United States since Hurricane Katrina in 2005.

**Probability**

According to NOAA, a Category 1 hurricane can be expected to make landfall in/near Connecticut once every ten to fifteen years. A Category 2 hurricane could be expected to make landfall in/near Connecticut once every twenty-three to thirty years, and a Category 3 hurricane has a calculated return period of forty-six to seventy-four years. Based on this, the occurrence of another hurricane to impact the state can be expected within the foreseeable future.

These return periods are for the state as a whole. The return period for a storm of equal or greater strength to the 1938 storm which tracked directly through the region would understandably be longer for Central Connecticut than for the state as a whole. As discussed in the Impacts section below, a storm of this intensity would be expected to have a return period to the Region closer to 500 years. Return periods can be a helpful tool to put risk in perspective. Resident and business leaders should ask themselves, “How many times, over the course of a 30 year mortgage will a category 1 hurricane hit Connecticut?” This exercise may help frame these storms as an eventuality to be prepared for rather than a risk that can be magically avoided.

**Impacts**

Hurricane simulations were performed for the region for probabilistic 1% annual hurricane events as well as the historic 1938 Hurricane, the latter representing a worst case scenario storm and the impacts it would have if a similar hurricane occurred today. The 1938 hurricane has roughly a 0.2% chance to occur in any given year in this region. Historic storms provide an opportunity to compare simulated impacts to historical reports on the actual storm. In order to provide a damage comparison to the
models estimates of the historic hurricane, a 2nd probabilistic scenario for a 1% hurricane scenario was ran for the region.

1938 Hurricane Simulation: Economic Impacts and Displaced Residents

The economic impacts for the hurricane simulations reflect population values for each town. The most populated and developed towns, Bristol, New Britain, and Southington, are affected the most. In the 1938 Hurricane scenario, with predicted sustained winds of approximately 85 mph and a max wind gust of 105 miles per hour, the model estimates $810 million dollars of damage. The 1938 Hurricane scenario also estimates a loss of economic output of approximately $21.3 million and a total employment loss of 85,500 days (Figures 18 & 19).

<table>
<thead>
<tr>
<th>Geography</th>
<th>Damage (thousands of dollars)</th>
<th>Loss of Economic Output (thousands of dollars)</th>
<th>Employment Loss (thousands of days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berlin</td>
<td>$11,349.85</td>
<td>$342.94</td>
<td>1.12</td>
</tr>
<tr>
<td>Bristol</td>
<td>$186,899.33</td>
<td>$5,282.76</td>
<td>22.35</td>
</tr>
<tr>
<td>Burlington</td>
<td>$98,894.91</td>
<td>$2,389.66</td>
<td>9.90</td>
</tr>
<tr>
<td>New Britain</td>
<td>$281,251.85</td>
<td>$6,175.72</td>
<td>23.22</td>
</tr>
<tr>
<td>Plainville</td>
<td>$72,073.93</td>
<td>$2,320.94</td>
<td>8.82</td>
</tr>
<tr>
<td>Southington</td>
<td>$20,095.88</td>
<td>$625.35</td>
<td>2.81</td>
</tr>
<tr>
<td>Plymouth</td>
<td>$140,101.84</td>
<td>$4,201.56</td>
<td>17.55</td>
</tr>
<tr>
<td>Region</td>
<td>$810,667.60</td>
<td>$21,338.93</td>
<td>85.77</td>
</tr>
</tbody>
</table>

*Table X. Economic loss estimates from a hurricane similar to the 1938 hurricane.*

HAZUS estimates significant damage to buildings, with 26,373 buildings suffering at least minor damage (Figures 20 & 21). Of those damaged buildings, 259 are expected to be completely destroyed. Fallen trees and damaged buildings attribute to 237,992 tons of debris, 142,474 tons of which are from trees alone. It is also estimated that 1,657 households would be displaced with 438 people requiring short term shelter needs.

<table>
<thead>
<tr>
<th>Geography</th>
<th>Total Debris (tons)</th>
<th>Tree Debris (tons)</th>
<th>Damaged Buildings</th>
<th>Buildings Destroyed</th>
<th>Displaced Households</th>
<th>Short-term Shelter Needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berlin</td>
<td>22,579</td>
<td>21,383</td>
<td>681</td>
<td>2</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Bristol</td>
<td>45,534</td>
<td>22,661</td>
<td>6,677</td>
<td>58</td>
<td>395</td>
<td>95</td>
</tr>
<tr>
<td>Burlington</td>
<td>37,180</td>
<td>28,625</td>
<td>2,956</td>
<td>47</td>
<td>85</td>
<td>17</td>
</tr>
<tr>
<td>New Britain</td>
<td>53,203</td>
<td>14,950</td>
<td>7,259</td>
<td>61</td>
<td>881</td>
<td>261</td>
</tr>
<tr>
<td>Plainville</td>
<td>17,223</td>
<td>9,374</td>
<td>2,495</td>
<td>27</td>
<td>110</td>
<td>25</td>
</tr>
<tr>
<td>Southington</td>
<td>16,752</td>
<td>14,225</td>
<td>1,187</td>
<td>6</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>Plymouth</td>
<td>45,521</td>
<td>31,256</td>
<td>5,091</td>
<td>59</td>
<td>160</td>
<td>34</td>
</tr>
<tr>
<td>Region</td>
<td>237,992</td>
<td>142,474</td>
<td><strong>26,346</strong></td>
<td><strong>260</strong></td>
<td>1,657</td>
<td>438</td>
</tr>
</tbody>
</table>

*Table X. Estimated damage to buildings, debris generated, and population displaced, from a hurricane of similar magnitude to the 1938 hurricane.*
In the 1% annual hurricane simulation, the region observed around one tenth of the damage estimated in the 1938 hurricane simulation. Predicted maximum wind gusts were at 85 mph, and the model estimates $123.4 million of damage. A 1% hurricane scenario also estimates a loss of economic output of approximately $2.3 million and total employment loss of 9,200 days.

<table>
<thead>
<tr>
<th>Geography</th>
<th>Damage (thousands of dollars)</th>
<th>Loss of Economic Output (thousands of dollars)</th>
<th>Employment Loss (thousands of days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berlin</td>
<td>$1,708.00</td>
<td>$-</td>
<td>0</td>
</tr>
<tr>
<td>Bristol</td>
<td>$24,229.00</td>
<td>$142.00</td>
<td>0.59</td>
</tr>
<tr>
<td>Burlington</td>
<td>$15,443.00</td>
<td>$533.00</td>
<td>2.23</td>
</tr>
<tr>
<td>New Britain</td>
<td>$49,181.00</td>
<td>$1,009.00</td>
<td>3.88</td>
</tr>
<tr>
<td>Plainville</td>
<td>$9,883.00</td>
<td>$289.00</td>
<td>1.11</td>
</tr>
<tr>
<td>Southington</td>
<td>$2,600.00</td>
<td>$-</td>
<td>0</td>
</tr>
<tr>
<td>Plymouth</td>
<td>$20,356.00</td>
<td>$371.00</td>
<td>1.39</td>
</tr>
<tr>
<td>Region</td>
<td>$123,400.00</td>
<td>$2,344.00</td>
<td>9.2</td>
</tr>
</tbody>
</table>

Table X. Estimated economic loss from a 1% annual occurrence hurricane.

The model estimates that 4,535 buildings will suffer at least minor damage. Of those damaged buildings none are expected to be completely destroyed. In this simulation, fallen trees and damaged buildings attribute to 64,515 tons of debris, 46,829 tons of which from trees alone. It is also estimated that 157 households would be displaced with 43 people requiring short term shelter needs.

<table>
<thead>
<tr>
<th>Geography</th>
<th>Total Debris (tons)</th>
<th>Tree Debris (tons)</th>
<th>Damaged Buildings</th>
<th>Buildings Destroyed</th>
<th>Displaced Households</th>
<th>Short-term Shelter Needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berlin</td>
<td>7,908</td>
<td>7,776</td>
<td>64</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bristol</td>
<td>9,831</td>
<td>6,377</td>
<td>898</td>
<td>0</td>
<td>27</td>
<td>6</td>
</tr>
<tr>
<td>Burlington</td>
<td>11,637</td>
<td>10,150</td>
<td>669</td>
<td>0</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>New Britain</td>
<td>13,297</td>
<td>4,529</td>
<td>1,509</td>
<td>0</td>
<td>111</td>
<td>33</td>
</tr>
<tr>
<td>Plainville</td>
<td>3,964</td>
<td>2,694</td>
<td>396</td>
<td>0</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Southington</td>
<td>5,582</td>
<td>5,274</td>
<td>120</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Plymouth</td>
<td>12,296</td>
<td>10,029</td>
<td>868</td>
<td>0</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Region</td>
<td>64,515</td>
<td>46,829</td>
<td>4,525</td>
<td>0</td>
<td>157</td>
<td>43</td>
</tr>
</tbody>
</table>

Table X. Estimated debris generated, buildings damaged, and population displaced by a 1% annual occurrence hurricane.

Tornados

A tornado is a violent, destructive whirling wind storm accompanied by a funnel-shape cloud that progresses in a narrow path over the land. While tornados that strike the region are often localized, they can have large impacts on the area affected. According to the state Hazard Mitigation Plan,
“The pattern of occurrence and potential locations for tornadoes to occur in Connecticut is expected to remain relatively unchanged in the 21st Century. The highest risk for tornadoes is expected in New Haven and Hartford counties. The second area of moderate to high risk is in Fairfield and New Haven Counties. The Counties of Middlesex, Tolland, and Windham have a moderate risk and the County of New London can expect a low risk.”

Tornados are measured on the Enhanced Fujita scale (EF). Wind speeds are estimated based on the damage they cause. Table X links EF classifications to estimated three-second wind speed gusts.

<table>
<thead>
<tr>
<th>F Number</th>
<th>3 second gust (mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>65-85</td>
</tr>
<tr>
<td>1</td>
<td>86-109</td>
</tr>
<tr>
<td>2</td>
<td>110-137</td>
</tr>
<tr>
<td>3</td>
<td>138-167</td>
</tr>
<tr>
<td>4</td>
<td>168-199</td>
</tr>
<tr>
<td>5</td>
<td>200-234</td>
</tr>
</tbody>
</table>

Table X. The enhanced fujita scale.

Historic Tornadoes

It is rare for Connecticut, and the region, to experience a tornado. Three tornadoes have touched down within the region in the past seventy years. A map of tornadoes in Connecticut can be found in Figure X. The following details these tornadoes:

**September 24, 1942:** A tornado touched down in Plainville, destroying a church.

**May 21, 1962:** An F3 tornado killed one person, injured 45 more, and razed or heavily damaged over 200 buildings of all types in Southington and Waterbury. (Messier, 1962; NCDC; NWS, 1962)

**July 21, 2010:** An EF1 tornado briefly touched down in Bristol and Plymouth. In Bristol, the Imagine Nation Museum, which was very near the damage path, recorded a wind gust of 67 mph on their anemometer. As the tornado moved through Bristol, it uprooted trees and twisted the tops off others, and left many residents without power. The tornado caused more than $550,000 in damages in Bristol alone. In Plymouth, the tornado left approximately 880 locations without power, and resulted in multiple road and business closures. Neighboring towns also experienced high winds, trees knocked down, power outages, and hail up to one inch in diameter.

Probability

Although these violent storms remain a concern for the state and region, Table X shows that only a small percentage of the storms recorded since 1950 have been classified as F3 or higher.
Table X. Classification of Tornadoes touching down in CT.

<table>
<thead>
<tr>
<th>EF/F - Scale</th>
<th># Classified</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>17</td>
<td>17.30%</td>
</tr>
<tr>
<td>1</td>
<td>53</td>
<td>54.10%</td>
</tr>
<tr>
<td>2</td>
<td>22</td>
<td>22.40%</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>4.10%</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>2.00%</td>
</tr>
</tbody>
</table>

While Connecticut clearly faces some risk from tornadoes, the nature of the storms makes them unpredictable. All towns in the region share equal vulnerability to these storms, and although property destruction may be unavoidable, loss of life can be minimized through efficient, coordinated response.

**Impacts**

Although few tornadoes have hit Connecticut and the region, those that have struck the region have had devastating impacts. According to the National Climatic Data Center Database, three people have died as a result of tornadoes since 1951 in Harford County and 541 people have been injured in both Harford and Litchfield Counties. The total property damage from the events since 1951 have cost both Counties a total of $312.83 million over the same time period.

**Wildfires**

NOAA defines a wildfire as any free burning uncontainable wildland fire not prescribed for the area which consumes natural fuel and spreads in response to its environment. Wildfires can burn and destroy large tracts of land, infrastructure, and personal property. Connecticut experiences three distinct fire seasons: from mid-March to mid-May, prior to leaf-out, when fuels such as grasses, dead leaves, branches and twigs on the forest floor are dried out by the sun; from mid-May to mid-September, depending in precipitation; and from October until the first snowfall, when dead leaves collect on the forest floor. Differences in available fuel and conditions lend different characteristics to CT Tornadoes, Intensity & Tracks.
to fires in different seasons: spring and fall fires tend to spread quickly, burning through readily-available fuels on the surface of the forest floor and causing little long-term damage; summer fires burn deeper into the ground and tend to spread less quickly and be more difficult to suppress, they are the most destructive to vegetation.

Historic Wildfires

In the last 20 years, a handful of fires have occurred in the Central Connecticut Region. Statewide droughts in 1999 and 1995 resulted in fires in the region and in other locations in the state. Several fires from the Central Connecticut region were reported on in the Hartford Courant:

September, 1995: During a drought, a blaze started in Southington that burned over 25 acres of land for 3 days before being contained. No homes or businesses were affected.

August, 1999: A forest fire burned over 18 acres of woodland along the Berlin/Meriden border for 7 days before being extinguished. The Berlin Fire Chief suspected that the blaze originated from a campfire. No homes or businesses were affected.

November, 1999: A blaze on water company land in Burlington and Harwinton burned for 2 days and ranged over 110 acres, 80% of which were in Burlington. The blaze did not threaten any homes or businesses.

Probability

According to the Natural Hazard Mitigation Plan for the Central Connecticut Region, fire risk in the region is roughly the same as in the rest of the state. Within the region, some towns experience a greater risk of wildfire than others, as a result of differing amounts of forest from town to town. Many of the region’s towns are home to tracts of forested land owned by water utility companies; Burlington has by far the most acreage so owned, and is also home to the Nassahegan State Forest. As a result, Burlington’s fire risk is somewhat higher than the other towns’.

Impacts

The impacts from wildfires on the region have been minimal. According to statistics reported to the National Climatic Data Center, there have been no deaths or injuries, nor damage to property or crops from wildfires in the region from 1996 to 2013. However some events and statistics may not have been reported.

Drought

There is not a universal definition of a drought. What is considered a drought varies by many factors such as region and season. There are two types of droughts that are a concern in Connecticut: hydrological and agricultural droughts. Hydrological droughts are characterized by low streamflow, groundwater, and reservoir levels resulting from a lack of precipitation over the course of months. Agricultural droughts occur during the growing season due to a lack of adequate precipitation and soil moisture to sustain crops. Both types of droughts can and often do occur simultaneously.

Historic Droughts

Probability
In the northeast, short seasonal droughts lasting one to three months usually occur every two or three years. Longer droughts, with durations exceeding three months, are less frequent and occur every twenty to thirty years. The future frequency of droughts in the region may depend upon the changes in climate and resource use.

Impacts
Drought impacts are typically felt through economic and environmental consequences rather than as a direct risk to life and property. For example, droughts in Connecticut may destroy crops, affecting farmers and businesses that depend on farming. Droughts may also lead to losses or destruction of fish and wildlife habitat, loss of wetlands, and lower water levels in reservoirs, lakes, and ponds.

In addition, droughts can increase the severity of flooding as land that has been dry for extended periods of time does not allow water to infiltrate as quickly, which may lead to flash flooding.

Earthquakes
Earthquakes occur when two blocks of earth slip past one another; the location directly above it on the earth’s surface is called the epicenter. Earthquakes felt in Connecticut and the region often originate and have their epicenter elsewhere; soft soils and filled wetlands conduct energy better than bedrock, and create instances where earthquakes with their centers in upstate New York, New Hampshire, and Massachusetts make themselves felt in Connecticut.

Historic Earthquakes
Connecticut has experienced 136 earthquakes between 1938 and 2009 (see Figure 23), all of which had a Richter Scale magnitude of less than 5, the most recent of which occurred in 2011. The following provides information about two notable earthquakes:

May 16, 1791: The strongest earthquake in Connecticut history occurred in East Haddam in 1791, and is recorded with intensity 7. According to USGS, the earthquake, which was felt in Boston and New York City, caused stone walls and chimney tops to fall, and latched doors to open.

October 16, 2012: A magnitude 4.6 earthquake that struck in Maine was felt in Connecticut, including the Central Connecticut Region. However no damage was reported.

Probability
According to the U.S. Geological Survey (USGS), Connecticut is in an area of moderate to low risk for earthquakes. When earthquakes are reported in Connecticut, they have most frequently occurred in the southern and eastern parts of the state (Figure 24) Central Connecticut has a 2% chance of seeing an earthquake with peak ground acceleration exceeding 8-10% of gravity in 50 years (corresponding to a return period for an earthquake of this intensity of over 2,000 years). An earthquake in exceedance of 10% of gravity is generally considered one that would damage older dwellings and those not resistant to earthquakes.

Impacts
Of the towns in the region, New Britain would have the highest risk from earthquakes, simply because its buildings and infrastructure are tightly packed and many structures may have been erected before
seismic impacts were incorporated into the state building code in 1992. However, due to a variety of factors including distance from fault lines, building types, and settlement patterns, risk to the region in general from earthquake damage is quite small.

A magnitude 5 Earthquake simulation was performed using HAZUS disaster simulation software for the region with East Haddam as the epicenter. Historic earthquakes have clustered around East Haddam and the area also hosts Connecticut’s strongest earthquakes, a magnitude 4.4 and 7. The magnitude 5 simulation was performed because Hazus does not recognize earthquakes less than magnitude 5. Earthquakes less than magnitude 5 generally do not cause enough damage to warrant a simulation.

The simulation provide a glimpse into what damage might occur if a substantial earthquake were to occur again within the region again. The total building-related losses were estimated at $36.77 million; 19% of the estimated losses were related to the business interruption of the region. The magnitude 5 simulation estimates damage to 1,991 buildings out of approximately 77,000 buildings within the region; of the damaged buildings, 17.6% of them observed moderate or worse damage. In addition to buildings, an estimated 26 homes would be damaged with 19 people requiring shelter services. No power outages are expected. Total economic losses for the region are estimated at $578 million.

**Dam Failure**

Dam failure is generally caused by other natural hazards: floods arising from thunderstorms, spring thaw, and hurricanes; wind damage from hurricanes and tornadoes; and forces from earthquakes. Failure due to material fatigue is also possible, but regular maintenance and dam inspections can detect leaks and other signs of material fatigue before the problem escalates.

<table>
<thead>
<tr>
<th>Class</th>
<th>Hazard potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class C:</td>
<td><strong>High</strong> hazard potential dam which, if it were to fail, would result in the probable loss of life; major damage to habitable structures, residences, hospitals, convalescent homes, schools, etc.; damage to main highways; or great economic loss.</td>
</tr>
<tr>
<td>Class B:</td>
<td><strong>Significant</strong> hazard potential dam which, if it were to fail, would result in possible loss of life; minor damage to habitable structures, residences, hospitals, convalescent homes, schools, etc.; damage to or interruption of the use or service of utilities; damage to primary roadways and rail-roads; or significant economic loss.</td>
</tr>
<tr>
<td>Class BB:</td>
<td><strong>Moderate</strong> hazard potential dam which, if it were to fail, would result in damage to normally unoccupied storage structures, damage to low volume roadways, or moderate economic loss.</td>
</tr>
<tr>
<td>Class A:</td>
<td><strong>Low</strong> hazard potential dam which, if it were to fail, would result in damage to agricultural land, damage to unimproved roadways, or minimal economic loss.</td>
</tr>
<tr>
<td>Class AA:</td>
<td><strong>Negligible</strong> hazard potential dam which, if it were to fail, would result in no measurable damage to roadways, land and structures, and negligible economic loss.</td>
</tr>
</tbody>
</table>

*Table X. Dam classifications. (Guidelines for Inspection and Maintenance of Dams, Connecticut Department of Environmental Protection, September 2001)*

**Historic Dam Failure**

There has been one dam failure in Central Connecticut:
March 31, 1987: The Kenmere Reservoir Dam (Class C Dam) in Berlin collapsed on March 31, 1987, during a reconstruction effort. According to the Hartford Courant, torrential rains overwhelmed the dam and sent roughly 80 million gallons of water into surrounding Berlin, where it destroyed a bridge, inundated homes and businesses, and did extensive damage to a municipal golf course. No serious injuries resulted from the dam failure, and the property damage incurred was estimated to be approximately $187,000 (1987 dollars).

Probability

As mentioned earlier dam failures are most likely triggered by the occurrence of another natural disaster and are not likely to occur due to regular maintenance and inspections. Dam failures are less likely to occur than the natural disasters that trigger them. For example, a 1% annual chance flood will not always cause a dam failure.

Impacts

Not all dams pose a serious threat; the vast majority of dams in the state regulate water bodies that, either because of their size or location, would not cause major destruction in the event of a dam failure. The Connecticut Department of Energy and Environmental Protection (DEEP) has created five dam classifications based on hazard potential.

DEEP’s list of dams currently has 83% of all dams in the state classified as AA, A, or BB (dam classification can change as a result of downstream development). All dams are subject to inspection by DEEP. Owners of Class B and C dams are further required to prepare Operation and Maintenance Manuals for their dams. All dam owners are obligated to periodically inspect their dams, maintain the structures and their adjacent areas, keep written records of inspection and maintenance activities, and notify DEEP of major damage.

<table>
<thead>
<tr>
<th>Hazard Class</th>
<th>Inspection Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA</td>
<td>At least once</td>
</tr>
<tr>
<td>A</td>
<td>Every 10 years</td>
</tr>
<tr>
<td>BB</td>
<td>Every 7 years</td>
</tr>
<tr>
<td>B</td>
<td>Every 5 years</td>
</tr>
<tr>
<td>C</td>
<td>Every 2 years</td>
</tr>
</tbody>
</table>

*Table X. Dam inspection standards by class.*

Of the 142 dams in Central Connecticut, only 19 are Class C. Another 23 are Class B, and the remaining 100 are dams with relatively little potential impact on life or property. The 19 class C dams are distributed throughout the region. Every town has at least one Class C dam, with the exception of Plainville. The below map shows the location and class of each dam in Central Connecticut.
The three dams in the region with the largest potential for destruction are the Hancock Brook Dam in Plymouth, the Shuttle Meadow Reservoir Dam in Southington, and the Phelps Dam in Burlington. The Phelps Dam, the largest in the region, is an earth and stone structure 1,125 feet in length, which creates the Nepaug Reservoir, an 850-acre water body with a storage capacity of up to 9.8 billion gallons of water (according to the Metropolitan District Commission, which manages the reservoir). Hancock Brook Dam...
Brook Dam, the second largest dam in the region, is an earthen structure 630 feet long and 57 feet high which is maintained by the Army Corps of Engineers. It creates a 260-acre lake with a 1.3 billion gallon storage capacity. Shuttle Meadow Reservoir Dam, an earthen dam 600 feet long and 30 feet high, creates a 250-acre reservoir with storage capacity of approximately 1.5 billion gallons. The Nepaug and Shuttle Meadow Reservoirs are parts of the public water supply systems for greater Hartford and New Britain, respectively; consequently their dams impound water on a full-time basis. The Hancock Brook Dam, by contrast, is a flood control dam built and maintained by the Army Corps of Engineers. Hancock Brook Lake, which it creates, is filled only during flood events. The lake detains flood waters and gradually releases them when floodwaters have receded.

Once a dam collapses, the damage it does is largely dependent upon the sorts of land uses surrounding it. While the Kenmere dam inflicted damage primarily upon a golf course, other dams in the region (notably the Shuttle Meadow Reservoir Dam, which overlooks densely developed New Britain) could do far more damage in a collapse. Not only can buildings downstream be inundated by resulting flooding, but they can be damaged by the violent torrent of water as well, which impacts like a battering ram. Utility connections can be severed, in turn causing fires and power outages; people can be injured or even killed by rushing waters and the debris carried therein. Refer to the severity section for Floods for more information.

Existing strategies

Regional Strategies
While most activities to mitigate hazard risk take place at the local level, the region also has an important role to play in reducing vulnerability and floodplain management. Projects listed in this Natural Hazard Mitigation Plan become eligible for federal hazard mitigation funding. In addition the region has addressed flooding in several other documents.


In the Regional Disaster Response Strategy, CCRPA approached the question of flooding with a multi-subject approach. The report outlines the risk posed to the region by the same hazards identified in this report and examines the impact they have had on the economy, the property damage they have caused, and the risks they present to businesses.

As part of the outreach process for this report CCRPA held a day-long disaster preparedness workshop with state and local emergency responders for regional business leaders. The workshop focused on long and short-term business planning for natural and manmade disasters.

UPWP

Plow Optimization Study

The 2015 UPWP includes a Plow Optimization Study. While this project is not directly related to flooding it does address a very prominent and regularly reoccurring problem, snow removal. Blocked roads can be the primary hindrance for employees trying to reach their place of work.
Quinnipiac Runoff Study

While this study is primarily oriented toward addressing water quality problems along the Quinnipiac in Southington, important hydrologic data expected to come from it that will help address the greater flooding vulnerability of the region.

RPOCD

The RPOCD encourages development patterns that avoid exacerbating runoff and flooding. The plan acknowledges that capital projects can hold back flood waters but also reminds the reader that such projects carry with them additional maintenance costs that are a burden on tax payers.

The Plan identifies where development must not occur. This list includes floodplains, perennial or intermittent bodies of water and watercourses, and wetlands. In addition the Plan states that the extent of impermeable surface should not exceed 10% of any river basin.

The Forestville Project master plan

This document, completed April 2014, was conceived to aid in the revitalization of the Forestville neighborhood of Bristol. It identifies specific properties that could be converted to forestland to reduce impervious surfaces up river from this vulnerable location, and it also identifies obstacles along the river corridor that may exacerbate flood risk and that could be removed.

Existing Municipal Strategies

<table>
<thead>
<tr>
<th>Community ID</th>
<th>Municipality</th>
<th>County</th>
<th>Initial FHBM Identified</th>
<th>Initial FIRM</th>
<th>Current Effective</th>
</tr>
</thead>
<tbody>
<tr>
<td>090022#</td>
<td>Berlin</td>
<td>Hartford</td>
<td>08/16/74</td>
<td>07/16/80</td>
<td>09/26/08</td>
</tr>
<tr>
<td>090023#</td>
<td>Bristol</td>
<td>Hartford</td>
<td>05/17/74</td>
<td>11/18/1981</td>
<td>09/26/08</td>
</tr>
<tr>
<td>090145#</td>
<td>Burlington</td>
<td>Hartford</td>
<td>07/19/74</td>
<td>06/01/81</td>
<td>09/26/08</td>
</tr>
<tr>
<td>090032#</td>
<td>New Britain</td>
<td>Hartford</td>
<td>05/24/74</td>
<td>07/16/81</td>
<td>09/26/08</td>
</tr>
<tr>
<td>090034#</td>
<td>Plainville</td>
<td>Hartford</td>
<td>05/31/74</td>
<td>11/19/1980</td>
<td>09/26/08</td>
</tr>
<tr>
<td>090037#</td>
<td>Southington</td>
<td>Hartford</td>
<td>05/10/74</td>
<td>07/16/81</td>
<td>09/26/08</td>
</tr>
</tbody>
</table>
TOWN OF BERLIN

Introduction
The Central Connecticut Region, which includes Berlin, is updating its Natural Hazards Mitigation Plan. This plan lays out a series of goals, objectives, and projects that will be pursued by the region and its seven member municipalities over the next five years. The plan contains two parts. The first is a regional section that looks at risks from various natural hazards, and lays out a series of broad goals and objectives. The second is a collection of municipal plans. These municipal plans serve three functions. The first is to gather, in one place, information from various municipal departments about how the town currently prepares for, and responds to, natural disasters. The second is to gather the projects and priorities that the town will pursue to improve its disaster preparedness and strengthen its disaster response efforts. The last purpose is to make the town eligible for funding from the Federal Emergency Management Agency (FEMA). To be eligible for many of FEMA’s grant and assistance programs, a municipality must have a current FEMA-approved Natural Hazards Mitigation Plan.

What is presented below is Berlin’s updated municipal section of the plan. It presents a brief overview of the town, its challenges, its vulnerabilities, and its goals and objectives for the next five years.

Background

The Town of Berlin is located in the southeastern corner of the CCRPA region, with Southington situated on its Western border, and New Britain to its North. Berlin is primarily a suburban community, mixed with portions of the town considered rural areas. The town features mainly decentralized development, with a large retail strip located along the State Route 5/15 corridor and three distinct town village centers. In addition to the State Route 5/15 corridor, other major transportation routes through Berlin include State Routes 9 and 72. An Amtrak commuter rail line passes through Berlin and makes stops in the Kensington Village area in the west of town.

The Town of Berlin encompasses 26 square miles and is home to 19,974 residents (2008-2012 ACS 5-year estimate). Berlin had a population density of 768 persons per square mile, which is above the state average (644 persons per square mile), but below the county average (1,190 persons per square mile). The median age (as of 2012) was 44.6 years of age and 82.8% of households in the Town of Berlin are single-family residences.

Berlin’s major businesses and industries include construction, manufacturing, retail trade, and health care and social assistance. The town is also home to Northeast Utilities, the largest utility provider in the State of Connecticut.

The Town of Berlin’s 2013 Plan of Conservation and Development has reemphasized the town’s commitment to preserving the natural and cultural character of the community through preservation of ridgelines, open meadows and fields, inland wetlands and watercourses, woodlands and forests, and rehabilitation of flood hazard areas. The plan also emphasizes strategic and smart growth principles that revisit established service and zoning boundaries of the town, beyond which water, sewer, and other municipal services are not extended.

Vulnerability and Risk
Flooding and wintry weather are the most frequently occurring events in the Town of Berlin. During the past decade, Berlin has experienced recurrent flooding throughout the town, with regular, localized...
flooding at known locations 4-5 times per year. Core capitalized areas, such as the downtown, various business parks, and shopping centers are in proximity to streams and the Mattabesset River. In particular, the town has identified flooding issues along Farmington Avenue and portions of Park Drive have been washed away in the past as a result of heavy rains causing the dam in Meriden to overflow. During larger events, floodwaters divided the town into sections, separating population centers (such as Kensington and East Berlin) from the remainder of Berlin.

Furthermore, twenty-three dams affect the Town of Berlin, and six category C dams lie within the town's boundaries. The rupture of the Kensington Dam in 1987 alerted Berlin to the potential risks it faces from the dams in town. The 1987 Kensington Dam failure forced 80 million gallons of water into the town. Because of the dam's location, most of this water inundated a golf course. Had the dam been situated differently, however, the outcome could have been far worse.

Recently, concern has arisen in the town about the municipal storm water policy. Current policy requires flood-proofing and on-site water storage for properties within flood zones, but does not address the problem comprehensively, from a hydrological systems perspective. In interviews, several individuals from the town questioned whether a more systematic approach would go further in lessening the severity and frequency of floods. One alternative to address this matter has been Berlin’s effort to create a Dam Breakage Emergency Response Plan.

CCRPA used FEMA’s Hazus-MH model to analyze potential risks that the Town of Berlin might face from a major flooding event. The model estimates not only economic losses in the town including residential and commercial damage, but also business interruptions due to a flood having a 1% chance of occurring in any given year (the 100-year flood) would be $108,350,000. Key impact areas of such a flooding event are summarized in the table immediately below:

<table>
<thead>
<tr>
<th>Estimated Damages from 100-Year Flood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Households Displaced</td>
</tr>
<tr>
<td>People Needing Shelter</td>
</tr>
<tr>
<td>Buildings at Least Moderately Damaged</td>
</tr>
<tr>
<td>Total Estimated Economic Losses</td>
</tr>
<tr>
<td>Total Residential Building &amp; Content Losses</td>
</tr>
<tr>
<td>Total Commercial, Industrial, &amp; Other Building &amp; Content Losses</td>
</tr>
<tr>
<td>Total Business Interruption Losses</td>
</tr>
</tbody>
</table>

Berlin also faces the usual challenges during winter storms; ice and snow make roads impassable, knock down tree limbs which in turn disrupt utility service. The combined effect leaves people stranded in their homes, potentially without heat or power. Removal of the ice and snow for Berlin's town-owned roads is handled by a combination of town workers and contractors; the town also handles debris removal. The table below considers the impact of Severe Winter Storms on the Town of Berlin:

<table>
<thead>
<tr>
<th>Estimated Losses from a Severe Winter Storm comparable to October 2011 Snow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Customers Served (2013)</td>
</tr>
<tr>
<td>Maximum Outages During Severe Winter Storm (2011)</td>
</tr>
<tr>
<td>Maximum Outages Percentage of Customers (2011)</td>
</tr>
<tr>
<td>Number of Businesses Experiencing Outages</td>
</tr>
<tr>
<td>Total Lost Wages (Daily)</td>
</tr>
<tr>
<td>Average Lost Wages (Weekly)</td>
</tr>
<tr>
<td>Miles of Local Roads Plowed by Town of Berlin</td>
</tr>
<tr>
<td>Municipal Cost (Plowing, Road Treatment)</td>
</tr>
<tr>
<td>Tons of Debris Removal</td>
</tr>
</tbody>
</table>
CRCOG also used FEMA’s Hazus-MH model to analyze the risks that the Town of Berlin might face from a hurricane as powerful as the 1938 Hurricane. The model estimates the economic losses to the town including residential and commercial damage and business interruptions due to such a Category 3 hurricane would be approximately $11.7 million. The impacts of such a storm are summarized below:

<table>
<thead>
<tr>
<th>Estimated Damages from a 1938 Strength Hurricane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Households Displaced</td>
</tr>
<tr>
<td>People Needing Short-Term Shelter</td>
</tr>
<tr>
<td>Buildings at Least Moderately Damaged</td>
</tr>
<tr>
<td>Building Completely Damaged</td>
</tr>
<tr>
<td>Total Estimated Economic Losses</td>
</tr>
<tr>
<td>Total Residential Building Losses</td>
</tr>
<tr>
<td>Total Commercial, Industrial, &amp; Other Building Losses</td>
</tr>
<tr>
<td>Total Business Interruption Losses</td>
</tr>
<tr>
<td>Total Debris Generated (in tons)</td>
</tr>
<tr>
<td>Truckloads (at 25 tons/truck) of building debris</td>
</tr>
</tbody>
</table>

According to information from the town and the FEMA Public Assistance Funded Projects Summary (Open Government Initiative), there were 5 federally declared disasters between 2011 and 2013 that resulted in total expenses to the town and other local public and non-profit agencies of over $1.4 million. These expenses included debris and snow removal, emergency protective measures, and repairs to damaged infrastructure and buildings experienced by private citizens and businesses.

<table>
<thead>
<tr>
<th>Applicant Municipality &amp; Other Agencies</th>
<th>DR-1958-CT 2011 Snow</th>
<th>DR-4023-CT 2011 Tropical Storm Irene</th>
<th>DR-4046-CT 2011 Severe Storm Alfred</th>
<th>DR-4087-CT 2012 Hurricane Sandy</th>
<th>DR-4106-CT 2013 Severe Winter Storm</th>
<th>Total Damages Eligible for Public Assistance Due to 2011 - 2013 Disasters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Town of Berlin</td>
<td>$47,045.00</td>
<td>$572,546.48</td>
<td>$604,829.16</td>
<td>$</td>
<td>$6,645.00</td>
<td>$1,405,841.42</td>
</tr>
<tr>
<td>Other Agencies</td>
<td>$ -</td>
<td>$ -</td>
<td>$ -</td>
<td>$</td>
<td>$6,645.00</td>
<td>$6,645.00</td>
</tr>
<tr>
<td>Berlin Total</td>
<td>$47,045.00</td>
<td>$572,546.48</td>
<td>$604,829.16</td>
<td>$</td>
<td>$6,645.00</td>
<td>$1,412,486.42</td>
</tr>
</tbody>
</table>

*Other Agencies = Fire Districts, Schools, Housing Authorities, Private and Non-Profit Agencies

Table X. 2011 - 2013 Disasters Damage Amounts Eligible for 75% Reimbursement Under FEMA Public Assistance Program

Existing Strategies

The Town of Berlin has in place codes and ordinances to reduce the risks to public health and property posed by flooding. These regulations primarily limit any activities on floodplains that would increase flood heights and velocities, or reduce or alter naturally occurring floodplains and water catchment areas. The town defines floodplains, hereafter special flood hazard areas, off of the Federal Flood Insurance Rate Maps identified in FEMA’s Flood Insurance Study. The following includes a brief description of how the Town of Berlin is addressing flood risk in its most important planning documents.
<table>
<thead>
<tr>
<th>Planning Documentation</th>
<th>Year Established or Updated</th>
<th>Lead Department(s)</th>
<th>Recommendation for Natural Hazard Mitigation</th>
</tr>
</thead>
</table>
| Plan of Conservation & Development (POCD) | 2013 | Planning and Zoning Commission | • The Plan identifies preserving “lands...intrinsic to public health and safety” among its open space policies.  
• The Plan also directly identifies areas that see regular flooding and potential infrastructural changes that could help alleviate flooding.  
• Finally the plan recognizes a need to ensure zoning and subdivision regulations are written to promote limited impact development and to discourage new development that would exacerbate flood risk. |
| An Ordinance Establishing Floodplain Management Regulations for Special Flood Hazard Areas in the Town of Berlin, Connecticut | 2008 | Inland Wetlands and Water Courses Commission | • These regulations fulfill the requirement for participation in the National Flood Insurance Program (NFIP).  
• The regulations apply to all special flood hazard areas identified by the Federal Emergency Management Agency (FEMA) in its Flood Insurance Study (FIS).  
• The Flood Insurance Rate Maps (FIRM), which identifies the special flood hazard areas, is considered to provide the “degree of flood protection required... [and] is considered reasonable for regulatory purposes and is based on scientific and engineering considerations.” |
| Subdivision Ordinance | 2003 | Planning and Zoning Commission | • This ordinance stipulates that subdivisions address the need to avoid damage related to flooding by ensuring: all utilities and facilities are located to minimize impact, adequate drainage is provided all subdivisions greater than 50 lots or 5 acres include elevations in their application.  
• Under the Storm Sewer Design section of the ordinance, the municipality mandates that drainage estimates should be based upon “anticipated runoff for a 25-year storm and ultimate land use”. Additionally the section addresses flood risk by stipulating that “cross culverts and basins shall be sized to accommodate runoff from a 100-year (1%) design storm.” |
| Inland Wetlands and Watercourses Commission Regulations | 2012 | Inland Wetlands and Water Courses Commission | • Under Connecticut General Statutes all municipalities shall regulate activities on those wetlands and watercourses that lie within municipal borders. While these regulations are primarily for the protection of environmental and ecological assets, they do address impacts to safety and public health.  
• Additionally, the Inland Wetlands and Water Courses Commission reviews all development applications for projects within the special flood hazard areas, giving it a central role in mitigating flood hazard risk. |
<table>
<thead>
<tr>
<th><strong>Table X. Town of Berlin Planning Documents</strong></th>
</tr>
</thead>
</table>
| **Stormwater Annual Report** | 2014 | Public Works | • Report identifies Best Management Practices (BMP’s) and development of future BMPs for implementation with regard to Stormwater Management.  
• Report includes efforts toward stakeholder education, public involvement and participation, and enforcement of regulations to reduce impact of development on stormwater storage and drainage. |
| **Capital Improvement Plan (CIP)** | 2015 | All Departments | • Identifies the municipal plans associated with equipment and infrastructure improvement.  
• Specifically, Berlin will seek funding to develop a Disaster Recovery Plan, POCD Implementation Studies, Public Safety Equipment, and Public Works Projects to fund Bridge Rehabilitation and Town-wide Drainage Improvements and Flood Control. |
| **Municipal Building Code** | 2012 | Engineering Department, Town Building Inspector | • Establishes the authority of the Town Building Inspector, with the assistance of the Town Engineer to review all building permit applications to determine whether proposed building sites will be reasonably safe from flooding, and the proper materials and building methods are used in construction or substantial infrastructure improvements if placed in identified floodplains. |
| **Community Emergency Response Team (CERT)** | 2015 | Fire Marshall/ Emergency Management | • Berlin is in the process of establishing a CERT. CERT is composed of volunteers who received training in disaster preparedness and response. Using the training, CERT members would be able to assist town personnel and support emergency response functions.  
• CERT members would engage with the community to educate fellow residents about disaster preparedness. They would also have a library of resources online that provides information about emergency situations. |
| **National Flood Insurance Program (NFIP)** | 1980 | Town Manager | • Town of Berlin is a participating community in FEMA’s National Flood Insurance Program since 1980.  
• The National Flood Insurance Program has paid 48 property damage claims in Berlin totaling $365,993.40 to date.  
• The National Flood Insurance Program has paid 19 repetitive loss property damage claims in Berlin on 6 properties. These claims have totaled $251,540.07. |
| **Local Emergency Operations Plan** | 2014-2015 | Fire Marshall/ Emergency Management | • These plans are meant to be applied during an emergency to maximize survival, give direction, integrate departments and expertise, define roles to departments and community leaders, and provide a basis for continued preparation.  
• Specifically the plans identify town personnel and assign responsibilities to each department and its personnel during disasters and emergencies. As part of the plan, instructions are also outlined for activation of the emergency operations center. |
Current Mitigation and Response Activities

- Berlin has flood control regulations in place that limit the type of development that may occur in the flood zone. Regulations also stipulate use of flood-resistant materials, flood proofing, required elevation for buildings' lowest floors, and on-site water storage.

- The town is preparing a Dam Breakage Emergency Response Plan.

- During floods, the town uses sandbags to control flood waters, and evacuates people with homes in known flooding locations, including: sections of Farmington Avenue, residences on Lower Lane, properties on Norton Road between the two schools, Massirio Drive, and the east side of New Britain Road.

- The town has an open space acquisition program, although it does not specifically target wetlands or flood-prone properties. It also encourages low-impact development.

- Berlin uses a reverse 911 system for emergency notifications, in combination with TV and radio announcements.

- Berlin does annual inspection and cleaning of its culverts.

- The town participates in the National Flood Insurance Program, and has begun mitigating its Repetitive Loss Properties: a single-family house at 79 Massirio Drive has been removed and the parcel is now vacant.

- The town participates in DEMHS Region 3 and follows its Regional Emergency Support Plan.

Goals, Objectives, and Strategies

The following section includes updates on objectives and mitigation strategies that were proposed during the 2011-2016 Natural Hazard Mitigation Plan.

**Goal:** reduce losses of life and property, and minimize economic consequences of natural hazards

**Objective 1: Update town policies and plans to encourage sound practices**

**Strategic Action:**

1.1 Target wetland or floodplain properties for open space acquisition

   - Activity Description
     - Lead: Planning and Conservation Commissions
     - Priority: High
     - Status:
     - Estimated Cost:
     - Potential Funding Source(s): Municipal
     - Timeframe: 2016

1.2 Complete the Dam Breakage Emergency Plan

   - Activity Description
     - Lead: Planning
1.3 Revise subdivision/zoning code to offer incentives for low-impact

iii. Activity Description
- Lead: Planning
- Priority: Medium
- Status:
- Estimated Cost:
- Potential Funding Source(s): Municipal
- Timeframe: 2015

1.4 Conduct a comprehensive study of storm-water issues across town; examine benefits (if any) of developing a strategic (rather than piecemeal) storm-water management plan

iv. Activity Description
- Lead: Planning; Public Works
- Priority: Medium
- Status:
- Estimated Cost:
- Potential Funding Source(s): Municipal
- Timeframe:

Objective 2: Ensure access to critical facilities

Strategy Action:

2.1 Relocate physical services building complex to higher ground

i. Activity Description
- Lead: Public Works
- Priority: Medium
- Status:
- Estimated Cost:
- Potential Funding Source(s): Municipal
- Timeframe: 2016

Objective 3: Improve capacity to deal with hazards by investing in necessary equipment & training

Strategic Action:

3.1 Acquire generators and shelter supplies to equip multiple shelters

i. Activity Description
- Lead: Emergency Management
- Priority: High
- Status:
- Estimated Cost:
- Potential Funding Source(s): Municipal
- Timeframe:
3.2 Improve coordination and efficiency by periodically exercising and evaluating response plans

ii. Activity Description
   - Lead: Emergency Management
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s): Municipal
   - Timeframe:

3.3 Take advantage of regional WebEOC training as necessary

iii. Activity Description
   - Lead: Emergency Management
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

3.4 Invest in sandbag loader, sandbags, and sand to help manage recurrent flooding

iv. Activity Description
   - Lead: Public Works
   - Priority: Medium
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s): Municipal
   - Timeframe: 2016

3.5 Purchase chainsaws and a wood chipper(s) to expedite removal of downed trees and other debris

ii. Activity Description
   - Lead: Public Works
   - Priority: Medium
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s): Municipal
   - Timeframe: 2016

Objective 4: Enable residents to better help themselves through preparedness education

Strategic Action:

4.1 Develop and distribute a pamphlet about household preparedness for natural hazards; post .pdf of pamphlet on town website

i. Activity Description
   - Lead: Emergency Management, Staff
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s): Municipal
4.2 Publish evacuation plan on town website
   ii. Activity Description
       - Lead: Emergency Management
       - Priority: High
       - Status:
       - Estimated Cost:
       - Potential Funding Source(s): Municipal
       - Timeframe: 2016

4.3 Encourage preparedness workshops in schools
   iii. Activity Description
        - Lead: Emergency Management
        - Priority: High
        - Status:
        - Estimated Cost:
        - Potential Funding Source(s): Municipal
        - Timeframe:

Objective 5: Continue participation in National Flood Insurance Program

Strategic Action:

5.1 Continue enforcement of floodplain management ordinances by regulating all new and substantially improved construction in flood zones.
   i. Activity Description
      - Lead: Planning
      - Priority: High
      - Status:
      - Estimated Cost:
      - Potential Funding Source(s):
      - Timeframe: 2016

5.2 Work with FEMA to update floodplain maps as necessary
   ii. Activity Description
       - Lead: Planning, Public Works
       - Priority: High
       - Status:
       - Estimated Cost:
       - Potential Funding Source(s): Municipal
       - Timeframe: 2016

5.3 Continue to distribute information about the NFIP to homeowners
   iii. Activity Description
        - Lead: Planning
        - Priority: High
        - Status:
5.4 Continue to assist homeowners with amendments to NFIP maps as necessary

iv. Activity Description
- Lead: Planning
- Priority: High
- Status: 
- Estimated Cost: 
- Potential Funding Source(s): 
- Timeframe: 

THE FOLLOWING ADDITIONAL OBJECTIVES AND MITIGATION STRATEGIES ARE PROPOSED TO BE INCLUDED IN THE 2016 – 2021 PLAN UPDATE:

Contributors
Jim Horbal (Deputy Director of Public Works, Wetlands Agent)
Hellyn Riggins (Town Planner)
Morgan Seeley (former Town Engineer)
Nick Chirico (Building Official)
Matt Odishoo (EMD & Deputy Fire Marshal)
Barton Bovee (Town resident and Professional Engineer)
Dennis Kern (Berlin Land Trust)
Art Simonian (Director of Public Works).

The map below shows the locations of “critical facilities” in Berlin, as well as the relationship between them, flood zones, and the most populated areas of town. As shown in the map, a large portion of Berlin is located within the 1% annual flood zone; fortunately, most of the critical facilities in town are outside the flood zone. The sole exception is a school and an ambulance facility. Most of the most densely populated areas of town are close to a flood zone, but not in one. The central business district is in the flood zone.
While the above assets are necessary to keep the town up and running, emergency planners also pay close attention to their most vulnerable citizens. Populations that may be particularly vulnerable include: people living under the poverty line, people with limited or no English proficiency, minorities, and people who are dependent on transit. The maps below illustrate where these populations are located.

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2 Vulnerability address the inability to withstand the impacts of a hazard.
3 In the final document, these maps will be moved to the regional analysis section. Data is not available on a small enough scale to make town-level analysis useful.
CITY OF BRISTOL

Introduction
The Central Connecticut Region, which includes Bristol, is updating its Natural Hazards Mitigation Plan. This plan lays out a series of goals, objectives, and projects that will be pursued by the region and its member municipalities over the next five years. The plan contains two parts. The first is a regional section that looks at risks from various natural hazards, and lays out a series of broad goals and objectives. The second is a collection of municipal plans. These municipal plans serve three functions. The first is to gather, in one place, information from various municipal departments about how the town currently prepares for, and responds to, natural disasters. The second is to gather the projects and priorities that the town will pursue to improve its disaster preparedness and strengthen its disaster response efforts. The last purpose is to make the town eligible for funding from the Federal Emergency Management Agency (FEMA). To be eligible for many of FEMA’s grant and assistance programs, a municipality must have a current FEMA-approved Natural Hazards Mitigation Plan.

What is presented below is Bristol’s updated municipal section of the plan. It presents a brief overview of the town, its challenges, its vulnerabilities, and its goals and objectives for the next five years.

Background

The City of Bristol is the first of two cities in the region. Bristol is situated in the west central section of the CCRPA region, with Burlington to the North, Plainville to the East, Southington to the South, and Plymouth to the West. Bristol serves as a transportation nexus for outlying towns in the region—Plymouth and Burlington—connecting State Route 72, State Route 6, and State Route 69 with Interstate Highway 84. While the community traditionally is home to manufacturing and industry, the City of Bristol has made continued efforts to diversify its economic activities by preserving and repurposing its richly historic building stock to attract new local businesses.

In 2012, 60,502 residents lived in the City of Bristol (ACS 5-year estimate). The city is 26.8 square miles in size and had a population density of 2,257 persons per square mile. This indicator is far above the county average (1,190 persons per square mile) and the state average (644 persons per square mile). Moreover, housing in the City of Bristol is varied with only 59.9% of residences classified as single-family households. The median age in Bristol is 40.6 years old, which remains in-line with state and county averages. While the city is aging, it is not doing so as quickly as suburban towns in the region. Only 15.2% of City of Bristol residents were age 65 or older in 2012 and the number is expected to grow with state averages.

In its most recent iteration of the Plan of Conservation and Development (pending adoption in 2015), the city projects to have an older, but fairly stable population by 2030. In order to support the needs of its residents in the future, Bristol has indicated a desire to develop land to diversify its business and affordable housing offerings. Resident surveys conducted in 2014 found a preference for “greener” development policies that align with the preservation of natural, geological, and cultural resources and continue to manage activities in environmentally sensitive areas, in particular, wetlands and ridgelines.

Vulnerability and Risk

Winter storms are the biggest natural hazard concerns for the City of Bristol. Snow and ice removal can become quite expensive, exceeding municipal budgets. The City handles plowing on its own roads and, when required, assists in keeping traffic moving on State Route 6, a road which is vital to the region but
of relatively low priority for the Department of Transportation. When the State cannot clear Route 6 in a reasonable amount of time and the police department requests assistance, City forces will handle snow and ice removal along the state road. Higher elevations in the City have more trouble with snow and ice; generally, major thoroughfares and routes to the hospital are tended to first, followed by higher elevation areas.

The City also has the usual trouble with tree limbs downed by snow and ice; these take out power lines, block roads, and can leave people without electricity, heat, or communication lines when they are already isolated. Burying power lines would alleviate these problems, but is prohibitively expensive on a citywide basis. The city's subdivision regulations state that utility lines will be buried wherever feasible, but there are no plans to bury older infrastructure.

Removal of the ice and snow for Bristol's town-owned roads is handled by a combination of town workers and contractors; the town also handles debris removal. The table below considers the impact of Severe Winter Storms on the City of Bristol:

| Estimated Losses Resulting from a Severe Winter Storm like the October 2011 Snow Storm |
|---------------------------------------------------------------|---------------------------------|
| Number of Customers Served (2013)                            | 29,489                         |
| Maximum Outages During Severe Winter Storm (2011)             | 26,098                         |
| Maximum Outages Percentage of Customers (2011)                | 88.50%                         |
| Number of Businesses Experiencing Outages                     | 152                            |
| Total Lost Wages (Daily)                                     | $35,763.69                     |
| Average Lost Wages (Weekly)                                  | $61,343.00                     |
| Miles of Local Roads Plowed by Town of Berlin                 | 223.24                         |
| Municipal Cost (Plowing, Road Treatment)                      |                                 |
| Tons of Debris Removed                                       | tons                            |

Flooding is also a concern in the City. The Pequabuck River snakes directly through the downtown, with a number of old buildings built straddling the watercourse. Copper Mine Brook, on the east side of Bristol, floods frequently as well. At the confluence of the water bodies, where Copper Mine Brook empties into the Pequabuck, an existing railroad bridge causes flooding problems—the 3’ high girders of the bridge act as a restricting dam, impounding water until the flow is sufficient to overtop the girders. This is a known problem, but high replacement costs and railroad ownership of the bridge prevent the City from taking action and replacing it. There are also issues with culvert capacity, although the City has worked to improve a number of culverts. Flooding can back up the sewer system; the City is currently working on a $13.5 million Sanitary Sewer Overflow Elimination project to address the problem, in addition to a phased Infiltration and Inflow Reduction project.

The city has several flood control projects in the works that were identified in the Copper Mine Brook Drainage Evaluation document that may assist in mitigating the impacts of flooding on many of its repetitive loss properties. The projects require work on private property; the City has provided funding for these projects which are currently undergoing permitting and final design work. Additionally, the City of Bristol working with the Towns of Plymouth and Plainville and a grant from the State of Connecticut, initiated a study of the Pequabuck River to identify flood prone areas and develop projects solutions that can be applies at a regional basis.

CCRPA used FEMA’s Hazus-MH model to analyze potential risks that the City of Bristol might face from a major flooding event. The model estimates not only economic losses in the town including residential and commercial damage, but also business interruptions due to a flood having a 1% chance of occurring.
in any given year (the 100-year flood) would be $165,580,000. Key impact areas of such a flooding event are summarized in the table immediately below:

<table>
<thead>
<tr>
<th>Estimated Damages from 100-Year Flood</th>
<th>Estimated Damages from a 1938 Strength Hurricane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Households Displaced</td>
<td>Households Displaced</td>
</tr>
<tr>
<td>People Needing Shelter</td>
<td>People Needing Shelter</td>
</tr>
<tr>
<td>Buildings at Least Moderately Damaged</td>
<td>Buildings at Least Moderately Damaged</td>
</tr>
<tr>
<td>Building Completely Damaged</td>
<td>Building Completely Damaged</td>
</tr>
<tr>
<td>Total Estimated Economic Losses</td>
<td>Total Estimated Economic Losses</td>
</tr>
<tr>
<td>Total Residential Building &amp; Content Losses</td>
<td>Total Residential Building &amp; Content Losses</td>
</tr>
<tr>
<td>Total Commercial, Industrial, &amp; Other Building &amp; Content Losses</td>
<td>Total Commercial, Industrial, &amp; Other Building &amp; Content Losses</td>
</tr>
<tr>
<td>Total Business Interruption Losses</td>
<td>Total Business Interruption Losses</td>
</tr>
<tr>
<td></td>
<td>Total Debris Generated (in tons)</td>
</tr>
<tr>
<td></td>
<td>Truckloads (at 25 tons/truck) of building debris</td>
</tr>
</tbody>
</table>

CRCOG also used FEMA’s Hazus-MH model to analyze the risks that the City of Bristol might face from a hurricane as powerful as the 1938 Hurricane. The model estimates the economic losses to the town including residential and commercial damage and business interruptions due to such a Category 3 hurricane would be approximately $192.2 million. The impacts of such a storm are summarized below:

<table>
<thead>
<tr>
<th>Estimated Damages from a 1938 Strength Hurricane</th>
<th>Estimated Damages from a 1938 Strength Hurricane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Households Displaced</td>
<td>Households Displaced</td>
</tr>
<tr>
<td>People Needing Short-Term Shelter</td>
<td>People Needing Short-Term Shelter</td>
</tr>
<tr>
<td>Buildings at Least Moderately Damaged</td>
<td>Buildings at Least Moderately Damaged</td>
</tr>
<tr>
<td>Building Completely Damaged</td>
<td>Building Completely Damaged</td>
</tr>
<tr>
<td>Total Estimated Economic Losses</td>
<td>Total Estimated Economic Losses</td>
</tr>
<tr>
<td>Total Residential Building Losses</td>
<td>Total Residential Building Losses</td>
</tr>
<tr>
<td>Total Commercial, Industrial, &amp; Other Building &amp; Content Losses</td>
<td>Total Commercial, Industrial, &amp; Other Building &amp; Content Losses</td>
</tr>
<tr>
<td>Total Business Interruption Losses</td>
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</tr>
<tr>
<td>Total Debris Generated (in tons)</td>
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</tr>
<tr>
<td>Truckloads (at 25 tons/truck) of building debris</td>
<td>Truckloads (at 25 tons/truck) of building debris</td>
</tr>
</tbody>
</table>

According to information from the city and the FEMA Public Assistance Funded Projects Summary (Open Government Initiative), there were 5 federally declared disasters between 2011 and 2013 that resulted in total expenses to the city and other local public and non-profit agencies of nearly $3.8 million. These expenses included debris and snow removal, emergency protective measures, and repairs to damaged infrastructure and buildings experienced by private citizens and businesses.

<table>
<thead>
<tr>
<th>Applicant Municipality &amp; Other Agencies</th>
<th>DR-1958-CT 2011 Snow Hurricane Charlotte</th>
<th>DR-4023-CT 2011 Tropical Storm Irene</th>
<th>DR-4046-CT 2011 Severe Storm Alfred</th>
<th>DR-4087-CT 2012 Hurricane Sandy</th>
<th>DR-4106-CT 2013 Severe Winter Storm</th>
<th>Total Damages Eligible for Public Assistance Due to 2011 - 2013 Disasters</th>
</tr>
</thead>
<tbody>
<tr>
<td>City of Bristol Other Agencies</td>
<td>$20,809.11</td>
<td>$392,529.41</td>
<td>$2,834,682.1</td>
<td>$-</td>
<td>$287,038.28</td>
<td>$3,635,058.96</td>
</tr>
<tr>
<td>Bristol Total</td>
<td>$7,367.75</td>
<td>$-</td>
<td>$45,732.20</td>
<td>$-</td>
<td>$103,522.47</td>
<td>$156,622.42</td>
</tr>
<tr>
<td></td>
<td>$128,176.8</td>
<td>$392,529.41</td>
<td>$2,880,414.3</td>
<td>$-</td>
<td>$390,560.75</td>
<td>$3,791,681.38</td>
</tr>
</tbody>
</table>

*Other Agencies = Fire Districts, Schools, Housing Authorities, Private and Non-Profit Agencies

While the City of Bristol is vulnerable to the same hazards as the other towns of the region, its risks are unique. This is due to the unique stock of assets the city possesses, including local, state and interstate routes and highways, rail lines, medical facilities, historical sites, business and employment centers, schools, elderly populations, building and building content value, police, and fire departments. Each hazard will impact these assets to a different extent. The impacts of flooding are local and can be
anticipated with some measurement of certainty, snow storms impact the entire region and are considered annual events, and a tornado can have severe impacts on a very local level and are basically unpredictable. The breadth of these impacts make it necessary to inventory all community assets and, where possible, identify if they lie in a high risk area.

As would be expected of a more urban municipality, Bristol has the second highest concentration of vulnerable populations in the region. Citywide, 6.7% of the population has no access to an automobile. Most other towns in the region have concentrations that are less than 4% of the population. Similarly, Bristol has higher concentrations of limited-English proficiency residents. The highest concentration is in the Spanish speaking community, of which 2.5% do not speak English well. Bristol also has the second highest poverty rate in the region, at 9%. This is, however, lower than the state and national averages.

Finally, the City's shelters are undersupplied and have been used only a few times in the past 25 years. The majority of people in Bristol—as in other towns—shelter at home for winter storms, preferring to stay in place than travel. In flood situations, the City finds that it is rarely confronted with need sufficient to merit opening shelters (even if they were fully equipped), noting that it is more cost-effective to put individuals up in local motels than to open the shelter for a handful of people.

**Existing Strategies**

The City of Bristol has in place codes and ordinances to reduce the risks to public health and property posed by flooding. These regulations primarily limit any activities on floodplains that would increase flood heights and velocities, or reduce or alter naturally occurring floodplains and water catchment areas. The town defines floodplains, hereafter special flood hazard areas, from of the Federal Flood Insurance Rate Maps identified in FEMA’s Flood Insurance Study. The following includes a brief description of how the City of Bristol is addressing flood risk in its most important planning documents.

<table>
<thead>
<tr>
<th>Planning Documentation</th>
<th>Year Established or Updated</th>
<th>Lead Department(s)</th>
<th>Recommendation for Natural Hazard Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan of Conservation &amp; Development (POCD)</td>
<td>Last Adopted: 2000</td>
<td>Planning and Zoning Commission</td>
<td>• In the draft 2015 Plan of Conservation and Development, the City of Bristol emphasizes new strategies to mark a change in thinking about how to prevent flooding and address storm water runoff.</td>
</tr>
<tr>
<td></td>
<td>Amended: 2011</td>
<td></td>
<td>• Bristol has identified policies that promote sustainability and resiliency to preserve and enhance the preparedness of the community to meet future emergencies and challenges. The new approach is to institute policies that favor low impact development (LID), where properties and public land have the capacity to absorb the rainwater and vegetation removes pollutants from runoff.</td>
</tr>
<tr>
<td></td>
<td>Draft Plan: 2015</td>
<td></td>
<td>• The POCD stresses a need to discourage development that negatively affects wetlands and watercourses, particularly along the Pequabuck River.</td>
</tr>
<tr>
<td>Regulation Type</td>
<td>Year</td>
<td>Commission/Ordinance</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>------</td>
<td>---------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Flood Damage Prevention Ordinance | 2008 | Flood and Erosion Commission                                                         | - These regulations fulfill the requirement for participation in the National Flood Insurance Program (NFIP).  
- The regulations apply to all special flood hazard areas identified by the Federal Emergency Management Agency (FEMA) in its Flood Insurance Study (FIS).  
- The municipal Ordinance acknowledges that special flood hazard areas are afflicted by repetitive periodic inundation, “which may result in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety and general welfare.” |
| Zoning Regulations              | 2013 | Planning and Zoning Commission                                                        | - The Zoning Regulations include securing safety from flood and other dangers in their statement of intent. They also include an open space development zone.  
- This zone accommodates alternative forms of residential development that cluster development on smaller lots in order to preserve larger tracts of open land.  
- Among the expressed purposes of the open space development zone is the protection of “natural drainage ways and flood water detention and retention areas.” |
| Subdivision Regulations         | 2013 | Planning and Zoning Commission                                                        | - Subdivisions shall be reviewed to ensure proposals will be reasonably safe from flooding. This ordinance stipulates that subdivisions address the need to avoid damage related to flooding by ensuring that all utilities and facilities are located to minimize impact, that adequate drainage is provided, and that all subdivisions greater than 50 lots or 5 acres include elevations in their proposals.  
- The Flood and Erosion Commission, as established by the City Council, shall hear and decide appeals and requests for variances from the requirements of the Flood Damage Prevention Ordinance. |
| Inland Wetlands and Watercourses Regulations | 2009 | Conservation Commission                                                               | - Adopted Inland Wetlands and Watercourses Regulations of the City of Bristol 1973, amended 2009. Under Connecticut General Statutes all municipalities shall regulate activities on those wetlands and watercourses that lie within municipal borders. While these regulations are primarily for the protection of environmental and ecological assets, they do address impacts to safety and public health.  
- The City of Bristol also publishes a Designated Inland Wetlands and Watercourses Map identifying all ponds, rivers, streams brooks and wetlands within the boundaries of the town. |
| Capital Improvement Plan (CIP) | 2015 | All Departments | Identifies the long-term municipal plans associated with funding equipment and infrastructure improvement.  
Specifically, Bristol will seek funding to initiate the Coppermine Brook Flood Control Project (Maltby Street Water Storage Area), Replacing Louisiana Bridge, and Replacement of Storm Drainage and Culverts in seven (7) locations. |
|---|---|---|---|
| Bristol-Plainville-Plymouth Pequabuck River Flooding Study | Expected completion: 2015 | Conservation Commission | The Bristol-Plainville-Plymouth Pequabuck River Flooding Study was made possible by a $200,000 grant from the Economic Development Administration.  
This Study will address flooding and the accompanying economic risks that have restrained development and recovery for the communities along the river following extensive flooding caused by rainfall during Hurricane Irene in 2011. |
| Community Emergency Response Team (CERT) | 2015 | Emergency Management | Bristol has a Community Emergency Response Team (CERT).  
CERT is composed of volunteers who received training in disaster preparedness and response. Using the training, CERT members are able to assist town personnel and support emergency response functions. For example, in Bristol CERT members are responsible for staffing the emergency shelter when it is activated.  
CERT members engage with the community to educate fellow residents about disaster preparedness. They also have a library of resources online that provides information about emergency situations. CERT has been an important resource to residents in the preparedness stage. |
| National Flood Insurance Program (NFIP) | 1988 | Town Manager | The City of Bristol is a participating community in FEMA’s National Flood Insurance Program since 1988.  
The National Flood Insurance Program has paid 178 property damage claims in Bristol totaling $3,713,058.85 to date.  
The National Flood Insurance Program has paid 107 repetitive loss property damage claims in Bristol on 34 properties. These claims have totaled $1,714,198.14. |
| Local Emergency Operations Plan | 2014-2015 | Emergency Management | These plans are meant to be applied during an emergency to maximize survival, give direction, integrate departments and expertise, define roles to departments and community leaders, and provide a basis for continued preparation.  
Specifically the plans identify town personnel and assign responsibilities to each department and its personnel during disasters and emergencies. As part of the plan, instructions are also outlined for activation of the emergency operations center. |

Table X. City of Bristol Planning Documents
Current Mitigation and Response Activities

- Flood Control Regulations limit the type of development that may occur in the flood plain, and require flood-proofing and on-site water storage.

- Bristol uses NIMS to establish the lead agency in a disaster.

- The city's subdivision regulations authorize the Planning Commission to require that up to 15% of the land in a proposed subdivision be set aside for open space. The city's zoning regulations include provisions for an Open Space Development Zone, which requires, in return for reducing minimum lot sizes or clustering dwelling units, the preservation of at least 25% of the land as open space.

- The City’s subdivision regulations state that, wherever feasible, utility lines shall be placed underground. Nearly every new subdivision since the mid-1990s has had underground utility lines.

- The City has an evacuation plan which is documented within its shelter plan; evacuation routes are not signed.

- The City is engaged in a $13.5 million Sanitary Sewer Overflow Elimination project as well as a phased Infiltration and Inflow Reduction project. The fire department notifies residents of flood-prone areas when water levels begin to rise.

- Procedures outlined in the Emergency Operations Plan are tested periodically.

- The City participates in the statewide reverse-911 system.

- The City uses WebEOC to stay abreast of developments across the state.

- The City participates in the National Flood Insurance Program.

- Bristol Hospital (a private hospital) has backup generators and is self-sufficient; hospital access roads are plowed first during winter storm events.

- The City provides extensive preparedness education information on its website.

- The City participates in DEMHS Region 3 and follows their Regional Emergency Support Plan.

Goals, Objectives, and Strategies

The following section includes updates on objectives and mitigation strategies that were proposed during the 2011-2016 Natural Hazard Mitigation Plan.

Goal: reduce losses of life and property, and minimize economic consequences of natural hazards

Objective 1: Improve city’s capacity to deal with hazards by investing in necessary equipment & training

Strategic Action:

1.1 Invest in public supplies sufficient to stock existing shelter for a major mass care event
   i. Activity Description
Objective 2: Improve infrastructure to minimize flooding impacts

Strategy Action:

2.1 Increase capacity of culverts where necessary; encourage private property owners to improve capacity of culverts on private land where necessary

   i. Activity Description
      - Lead: Public Works
      - Priority: High
      - Status:
      - Estimated Cost:
      - Potential Funding Source(s): Municipal
      - Timeframe: 2015

2.2 Improve city sewer system to prevent sewer backups during flood events

   ii. Activity Description
      - Lead: Public Works
      - Priority: Medium
      - Status:
      - Estimated Cost:
      - Potential Funding Source(s):
      - Timeframe: 2015

2.3 Replace railroad bridge where Copper Mine Creek empties into the Pequabuck river (requires railroad cooperation)

   iii. Activity Description
      - Lead: Public Works
      - Priority: Medium
      - Status:
      - Estimated Cost:
      - Potential Funding Source(s):
      - Timeframe: 2015

Objective 3: Build upon existing preparedness education efforts

Strategy Action:

3.1 Encourage preparedness workshops in schools

   i. Activity Description
      - Lead: Emergency Management
      - Priority: High
      - Status:
      - Estimated Cost:
      - Potential Funding Source(s): Municipal
3.2 Consider posting signs along evacuation routes to raise public awareness

   ii. Activity Description
      - Lead: Emergency Management
      - Priority: High
      - Status:
      - Estimated Cost:
      - Potential Funding Source(s): Municipal
      - Timeframe: 2016

**Objective 4: Continue participation in National Flood Insurance Program (NFIP)**

**Strategic Action:**

4.1 Continue enforcement of floodplain management ordinances by regulating all new and substantially improved construction in flood zones

   i. Activity Description:
      - Lead: Inland Wetlands & Watercourses Commission
      - Priority: High
      - Status:
      - Estimated Cost:
      - Potential Funding Source(s): Municipal
      - Timeframe: 2016

4.2 Work with FEMA to update FIRMs as necessary

   ii. Activity Description:
      - Lead: Public Works, Inland Wetlands & Watercourses Commission
      - Priority: High
      - Status:
      - Estimated Cost:
      - Potential Funding Source(s): Municipal
      - Timeframe: 2016

4.3 Continue to distribute information about the NFIP to homeowners

   iii. Activity Description:
      - Lead: Inland Wetlands & Watercourses Commission
      - Priority: High
      - Status:
      - Estimated Cost:
      - Potential Funding Source(s): Municipal
      - Timeframe:

4.4 Continue to assist homeowners with amendments to NFIP maps as necessary

   iv. Activity Description:
      - Lead: Inland Wetlands & Watercourses Commission
      - Priority: High
THE FOLLOWING ADDITIONAL OBJECTIVES AND MITIGATION STRATEGIES ARE PROPOSED TO BE INCLUDED IN THE 2016 – 2021 PLAN UPDATE:

Contributors

Richard Ladisky (Emergency Management Director)
Vince D’Andrea (former Chief Building Official)
Paul Strawderman (City Engineer)
Alan Weiner (City Planner)
Walter Veselka (Public Works Director)

The map below shows the locations of “critical facilities” in Bristol, as well as the relationship between them, flood zones, and the most populated areas of town. As shown in the map, the majority of Bristol is located outside the 1% annual flood zone; unfortunately, a number of critical facilities in town are inside the flood zone, such as two fire houses, and three schools. The areas of the city that are in or adjacent to flood zones tend to be heavily populated. For example, Bristol’s downtown is adjacent to the Pequabuck River, which frequently floods.
While the above assets are necessary to keep the town up and running, emergency planners also pay close attention to their most vulnerable\textsuperscript{4} citizens. Populations that may be particularly vulnerable include: people living under the poverty line, people with limited or no English proficiency, minorities, and people who are dependent on transit. The maps below\textsuperscript{5} illustrate where these populations are located.

\textsuperscript{4} Vulnerability address the inability to withstand the impacts of a hazard.
\textsuperscript{5} In the final document, these maps will be moved to the regional analysis section. Data is not available on a small enough scale to make town-level analysis useful.
TOWN OF BURLINGTON

Introduction

The Central Connecticut Region, which includes Burlington, is updating its Natural Hazards Mitigation Plan. This plan lays out a series of goals, objectives, and projects that will be pursued by the region and its member municipalities over the next five years. The plan contains two parts. The first is a regional section that looks at risks from various natural hazards, and lays out a series of broad goals and objectives. The second is a collection of municipal plans. These municipal plans serve three functions. The first is to gather, in one place, information from various municipal departments about how the town currently prepares for, and responds, to natural disasters. The second is to gather the projects and priorities that the town will pursue to improve its disaster preparedness and strengthen its disaster response efforts. The last purpose is to make the town eligible for funding from the Federal Emergency Management Agency (FEMA). To be eligible for many of FEMA’s grant and assistance programs, a municipality must have a current FEMA-approved Natural Hazards Mitigation Plan.

What is presented below is Burlington’s updated municipal section of the plan. It presents a brief overview of the town, its challenges, its vulnerabilities, and its goals and objectives for the next five years.

Background

The Town of Burlington is the most rural town in the region. It is located geographically in the northwest of the CCRPA region, and holds a southern border with Bristol. The Town of Burlington contains hundreds of acres of protected State Forest (approximately 40%), while significant acreage (approximately 31%) belongs to three water supply companies. Miles of recreational trail systems cross its woods, while reservoirs in the Town of Burlington serve the water supply for the nearby regional City of New Britain. As of 2012, the Town of Burlington’s population was 9,293 residents living within 30.4 square miles.

At about 305 person per square mile, the population density sits far below the county and state averages. However, Burlington’s population is projected to grow by 80% in 2020 which could place greater demands on town services and land use. Of those residents, the median age is 42 and only 10.7% of residents are age 65 or older, while 28.3% of its residents are age 19 or younger.

According to its most recent Plan of Conservation and Development in 2009, the Town of Burlington has noted that the residents of the town value open space and natural resources. Conservation themes identify “best practices” for the protection and efficient management of land, water, and natural resources, as well as defining open space in the Town of Burlington. Meanwhile, development themes focused on the development of housing, business development in existing nodes of activity, and promotion of environmentally friendly business practices, which align strategic economic growth with conservation.

Vulnerability and Risk

Flooding and winter storms both present challenges for Burlington, although those challenges are not uniform across the town. Situated at the edge of the Western Highlands, Burlington experiences large changes in elevation that result in different weather patterns in different areas of town. When the northwest corner of town, elevation of roughly 1100' above sea level, gets a foot of snow, the southeast corner (at 600') might only see an inch or two. The Farmington River makes a loop through the
northeast corner of the town, where elevations are low, before heading into Farmington to the east. Flooding problems in Burlington arise in two main areas: along the brooks that feed into the Farmington River from the northwest, and in the Whigville area, in the southeast.

Flooding in both areas impacts residences as well as town infrastructure. Many of the flooding problems involve infrastructural damage arising from a storm in October 2005 which inundated the town with 16" of rain over the course of 5 days. The storm washed out a number of roads and bridges, and overwhelmed culverts throughout the town. Damage from the storm is still widespread; notable locations include:

Upson Road: the road was washed out during the 2005 storm. Culverts need to be enlarged.

Foote Road: Bunnell Brook needs a berm or a larger channel in this area; every time it rains, it floods the recreation facility next to it. 2 FEMA claims were submitted regarding brook modifications in 2005/2006.

Corey & Hotchkiss Roads: a bridge over Bunnell Brook washed out during the 2005 storm.

Main Street (in Whigville): a bridge over the Whigville Brook washed out in 2005. The town made temporary repairs in order to reopen the bridge, but permanent repairs need to be made.

Prospect Street (in Whigville): a bridge over Whigville Brook washed out in 2005 and remained closed for a year. The town made temporary repairs to reopen the bridge, but permanent repairs are still needed.

Other flooding problems in the town arise from persistent conflicts with beavers, which build dams inside culverts and obstruct the flow. The dams can result in surprising problems including landslides, undermined bridges, and road collapses. The culvert at Scoville Road needs to be replaced, partially due to damage from beavers; in heavy rains the road floods and must be closed. The town works to install beaver-proof grates in as many culverts as it can, and clears out debris from the beavers before large storms in order to prevent flooding.

CCRPA used FEMA’s Hazus-MH model to analyze potential risks that the Town of Burlington might face from a major flooding event. The model estimates not only economic losses in the town including residential and commercial damage, but also business interruptions due to a flood having a 1% chance of occurring in any given year (the 100-year flood) would be $94,640,000. Key impact areas of such a flooding event are summarized in the table immediately below:

<table>
<thead>
<tr>
<th>Estimated Damages from 100-Year Flood</th>
<th>Households Displaced</th>
<th>People Needing Shelter</th>
<th>Buildings at Least Moderately Damaged</th>
<th>Total Estimated Economic Losses</th>
<th>Total Residential Building &amp; Content Losses</th>
<th>Total Commercial, Industrial, &amp; Other Building &amp; Content Losses</th>
<th>Total Business Interruption Losses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>140</td>
<td>95</td>
<td>2</td>
<td>$11,490,000.00</td>
<td>8,650,000.00</td>
<td>$2,840,000.00</td>
<td>$-</td>
</tr>
</tbody>
</table>

Winter storms also pose challenges for Burlington. The town handles all of its own snow and ice removal without relying on contractors. The topography of the town means that some areas may be inundated with snow and ice while others are barely affected by the same storm. Although zoning regulations
require all new construction (since 2005) to bury utility lines, older homes still have aboveground wires, and power is disrupted by fallen tree limbs in Burlington as in the other towns in the Region. The table below considers the impact of Severe Winter Storms on the Town of Burlington:

<table>
<thead>
<tr>
<th>Estimated Losses from a Severe Winter Storm like the October 2011 Snow Storm</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Customers Served (2013)</td>
<td>3,701</td>
</tr>
<tr>
<td>Maximum Outages During Severe Winter Storm (2011)</td>
<td>3,667</td>
</tr>
<tr>
<td>Maximum Outages Percentage of Customers (2011)</td>
<td>99.08%</td>
</tr>
<tr>
<td>Number of Businesses Experiencing Outages</td>
<td>7</td>
</tr>
<tr>
<td>Total Lost Wages (Daily)</td>
<td>$1,126.38</td>
</tr>
<tr>
<td>Average Lost Wages (Weekly)</td>
<td>$43,738.00</td>
</tr>
<tr>
<td>Miles of Local Roads Plowed by Town of Berlin</td>
<td>98.76</td>
</tr>
<tr>
<td>Municipal Cost (Plowing, Road Treatment)</td>
<td></td>
</tr>
<tr>
<td>Tons of Debris Removed</td>
<td>tons</td>
</tr>
</tbody>
</table>

Because of its extensive wooded areas, Burlington experiences a slightly greater risk of wildfires than do the other towns in the Region.

CRCOG also used FEMA’s Hazus-MH model to analyze the risks that the Town of Burlington might face from a hurricane as powerful as the 1938 hurricane. The model estimates the economic losses to the town including residential and commercial damage and business interruptions due to such a Category 3 hurricane would be approximately $101.3 million. The impacts of such a storm are summarized below:

<table>
<thead>
<tr>
<th>Estimated Damages from a 1938 Strength Hurricane</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Households Displaced</td>
<td>85</td>
</tr>
<tr>
<td>People Needing Short-Term Shelter</td>
<td>17</td>
</tr>
<tr>
<td>Buildings at Least Moderately Damaged</td>
<td>2,958</td>
</tr>
<tr>
<td>Building Completely Damaged</td>
<td>47</td>
</tr>
<tr>
<td>Total Estimated Economic Losses</td>
<td>$101,281,880.00</td>
</tr>
<tr>
<td>Total Residential Building Losses</td>
<td>$72,312,950.00</td>
</tr>
<tr>
<td>Total Commercial, Industrial, &amp; Other Building Losses</td>
<td>$26,581,960.00</td>
</tr>
<tr>
<td>Total Business Interruption Losses</td>
<td>$2,386,970.00</td>
</tr>
<tr>
<td>Total Debris Generated (in tons)</td>
<td>425,794</td>
</tr>
<tr>
<td>Truckloads (at 25 tons/truck) of building debris</td>
<td>17,032</td>
</tr>
</tbody>
</table>

According to information from the town and the FEMA Public Assistance Funded Projects Summary (Open Government Initiative), there were 5 federally declared disasters between 2011 and 2013 that resulted in total expenses to the town and other local public and non-profit agencies of more than $473 thousand. These expenses included debris and snow removal, emergency protective measures, and repairs to damaged infrastructure and buildings experienced by private citizens and businesses.
### Table X. 2011 - 2013 Disasters Damage Amounts Eligible for 75% Reimbursement Under FEMA Public Assistance Program

<table>
<thead>
<tr>
<th>Applicant Municipality &amp; Other Agencies</th>
<th>DR-1958-CT 2011 Snow WS Charlotte</th>
<th>DR-4023-CT 2011 Tropical Storm Irene</th>
<th>DR-4046-CT 2011 Severe Storm Alfred</th>
<th>DR-4087-CT 2012 Hurricane Sandy</th>
<th>DR-4106-CT 2013 Severe Winter Storm</th>
<th>Total Damages Eligible for Public Assistance Due to 2011 - 2013 Disasters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Town of Burlington</td>
<td>$30,808.31</td>
<td>$45,381.83</td>
<td>$269,647.32</td>
<td>$-</td>
<td>$127,790.87</td>
<td>$473,628.33</td>
</tr>
<tr>
<td>Other Agencies</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td>Burlington Total</td>
<td>$30,808.31</td>
<td>$45,381.83</td>
<td>$269,647.32</td>
<td>$-</td>
<td>$127,790.87</td>
<td>$473,628.33</td>
</tr>
</tbody>
</table>

*Other Agencies = Fire Districts, Schools, Housing Authorities, Private and Non-Profit Agencies

### Existing Strategies

The Town of Burlington has in place codes and ordinances to reduce the risks to public health and property posed by flooding. These regulations primarily limit any activities on floodplains that would increase flood heights and velocities, or reduce or alter naturally occurring floodplains and water catchment areas. The town defines floodplains, hereafter special flood hazard areas, off of the Federal Flood Insurance Rate Maps identified in FEMA’s Flood Insurance Study. The following includes a brief description of how the Town of Burlington is addressing flood risk in its most important planning documents.

<table>
<thead>
<tr>
<th>Planning Documentation</th>
<th>Year Established or Updated</th>
<th>Lead Department(s)</th>
<th>Recommendation for Natural Hazard Mitigation</th>
</tr>
</thead>
</table>
| Plan of Conservation & Development (POCD) | 2009 | Planning and Zoning Commission | - Town of Burlington adopted low impact development (LID) strategies to encourage developers to make sustainable on-site storm water drainage and strategies. Moreover, the POCD also recommends that the zoning and subdivision regulations to promote effective management of open space and land use.  
- The town continues to apply buildable land provisions to inventory the land available for development and exclude areas located in floodplains and floodways, along streams and wetlands, and steep slopes. Instead, land in these exempt categories are severely limited to development other than for temporary or passive recreational usage.
- The Plan encourages the Planning and Zoning Commission to ensure current zoning codes limit “additional development” in these vulnerable areas.
- Finally the Plan lists “strengthening and coordinating municipal regulation of flood hazard areas to protect life, property and the continued functioning of the natural flood management system” as an ongoing priority for the Conservation Commission and the Planning and Zoning Commission. |

- The Town of Burlington addresses building standards for floodplains. The Regulations define floodplains as: areas of special flood hazard, including all territories that fall below the 1% annual flood hazard elevation as determined by the Federal Emergency Management Agency in their Flood Insurance Study.
- This includes land adjacent to the Farmington River and other watercourses. The stated purpose of these regulations is to “regulate land uses and activities in the floodplain in order to minimize loss of life and injury to persons and property, and to preserve the floodplains as a valuable natural resource that can accommodate flooding with minimal adverse effects.”
- These regulations identify several agricultural uses as permitted in the floodplains so long as there is no regrading or filling.
- All other uses are allowed by permit only.

- In broad terms the Town of Burlington Subdivision Regulations address flood risk in this manner: “Land of such character that in its natural state, is unsuitable for occupancy or building purposes because of danger to the public health, safety and welfare by reason of ... flooding conditions, erosion hazards ... or other similar conditions, shall not be subdivided for residential use or for any other uses that may increase the danger to health, life or property or otherwise aggravate the hazard, unless and until appropriate corrective measures have been taken by the subdivider to eliminate such hazards.”
- Regulations are written to reduce future risk associated with flooding by protecting natural drainage systems. Streams, watercourses and bodies of water, whether year round or intermittent, are protected from relocation, dredging, diversion.
- Areas contiguous to special flood hazard areas, such as the 1% annual flood hazard areas, are protected from filling or confinement to a conduit without specific authorization from the Burlington Inland Wetlands and Watercourses Commission.
- Additionally all natural contours will be preserved within 50 feet of all waterbodies and watercourses. Authorization for any activity that will modify the above stipulated protected areas will be authorized by the Inland Wetlands and Watercourses Commission under only “highly unusual circumstances.”
- Drainage infrastructure related to subdivision for roads shall be designed for not less than the 4% annual flood hazard event.
<table>
<thead>
<tr>
<th>Document Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inland Wetlands and Watercourses Regulations</td>
<td>Adopted Inland Wetlands and Watercourses Regulations of 1974, amended 2011. Under Connecticut General Statutes all municipalities shall regulate activities on those wetlands and watercourses that lie within municipal borders. While these regulations are primarily for the protection of environmental and ecological assets, they do address impacts to safety and public health. The Town of Burlington also publishes a Designated Inland Wetlands and Watercourses Map identifying all ponds, rivers, streams brooks and wetlands within the boundaries of the town.</td>
</tr>
<tr>
<td>Community Emergency Response Team (CERT)</td>
<td>Burlington has Community Emergency Response Teams (CERT). CERT is composed of volunteers who received training in disaster preparedness and response. Using the training, CERT members are able to assist town personnel and support emergency response functions. For example, in Burlington CERT members are responsible for staffing the emergency shelter when it is activated. CERT members engage with the community to educate fellow residents about disaster preparedness. They also have a library of resources online that provides information about emergency situations. CERT has been an important resource to residents in the preparedness stage.</td>
</tr>
<tr>
<td>National Flood Insurance Program (NFIP)</td>
<td>The Town of Burlington is a participating community in FEMA’s National Flood Insurance Program since 1981. The town strives to maintain flood hazard controls that ensure compliance with NFIP and the Community Rating System (CRS). The National Flood Insurance Program has paid 5 property damage claims in Burlington totaling $23,601.94 to date. The National Flood Insurance Program has paid 2 repetitive loss property damage claims in Burlington on 1 property. These claims have totaled $15,080.58.</td>
</tr>
<tr>
<td>Local Emergency Operations Plan</td>
<td>These plans are meant to be applied during an emergency to maximize survival, give direction, integrate departments and expertise, define roles to departments and community leaders, and provide a basis for continued preparation. Specifically the plans identify town personnel and assign responsibilities to each department and its personnel during disasters and emergencies. As part of the plan, instructions are also outlined for activation of the emergency operations center.</td>
</tr>
</tbody>
</table>

*Table X. Town of Burlington Planning Documents*
Current Mitigation and Response Activities

- All new construction (since 2005) must have underground wires for electricity per the zoning regulations; older infrastructure has not been buried.
- DEP monitors dams.
- Wetlands areas protected since 1970s.
- Flood plain regulations limit development within the flood plain.
- All schools in town are Red Cross approved shelters and are equipped with generators.
- Town Hall is an emergency warming / cooling center, also has a generator.
- Town uses a reverse-911 notification system for emergencies. Emergency Management also has permission to use the school system notification service and to post emergency messages on the variable-message sign at the High School; this will be possible when the correct software is obtained and installed. The Town received a $40,000 grant to purchase a second sign to be installed on Route 4 by Town Hall, but cannot install the sign until they receive a zoning variance.
- Key individuals are trained in WebEOC; EMD is hoping to train more in the future.
- The Town participates in the National Flood Insurance Program.

Goals, Objectives, and Strategies

The following section includes updates on objectives and mitigation strategies that were proposed during the 2011-2016 Natural Hazard Mitigation Plan.

**Goal:** reduce losses of life and property, and minimize economic consequences of natural hazards

**Objective 1:** Improve citizen awareness, preparedness, and response time through education

**Strategic Action:**

1.1 Develop and distribute a pamphlet about household preparedness and town emergency response services

i. Activity Description
   - Lead: Emergency Management
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

1.2 Encourage preparedness workshops in schools

ii. Activity Description
   - Lead: Emergency Management
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
1.3 Publish preparedness pamphlet and evacuation plan on town website

iii. Activity Description
   - Lead: Emergency Management
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

1.4 Offer low-cost or no-cost town-wide CPR training

iv. Activity Description
   - Lead: Emergency Management
   - Priority: Medium
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

Objective 2: Improve town infrastructure to better handle hazards

Strategic Action:

2.1 Upgrade culverts on Upson and Scoville Roads

i. Activity Description
   - Lead: Highway Department
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

2.2 Replace culvert on Alto Road at the intersection of Brookside Drive

ii. Activity Description
   - Lead: Highway Department
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

2.3 Repair/replace bridges as necessary at Prospect Street, Main Street, and the intersection of Covey and Hotchkiss Roads.

iii. Activity Description
   - Lead: Highway Department
   - Priority: High
   - Status:
   - Estimated Cost:
2.4 Beaver-proof culverts where possible

iv. Activity Description
- Lead: Highway Department
- Priority: High
- Status:
- Estimated Cost:
- Potential Funding Source(s):
- Timeframe:

2.5 Look at widening channel of Bunnell Brook near Foote Road

v. Activity Description
- Lead: Highway Department
- Priority: High
- Status:
- Estimated Cost:
- Potential Funding Source(s):
- Timeframe:

2.6 Examine possibility of burying older electrical infrastructure in order to curtail disruptions in service.

vi. Activity Description
- Lead: Highway Department
- Priority: Medium
- Status:
- Estimated Cost:
- Potential Funding Source(s):
- Timeframe:

Objective 3: Improve town communications capacities

Strategic Action:

3.1 Upgrade town radio equipment to 700 MHz to ensure interoperability with the state

i. Activity Description
- Lead: Emergency Management
- Priority: High
- Status:
- Estimated Cost:
- Potential Funding Source(s):
- Timeframe:

3.2 Replace ITAC/ICALL mobile base unit by 2013; upgrade portable units and add one

ii. Activity Description
- Lead: Emergency Management
- Priority: High
- Status:
- Estimated Cost:
3.3 Revise zoning or grant a variance to allow installation of variable message notification sign on Route 4 by town hall

iii. Activity Description
- Lead: Emergency Management, Planning & Zoning
- Priority: High
- Status:
- Estimated Cost:
- Potential Funding Source(s):
- Timeframe:

3.4 Install a radio transmission tower between Lake Garda and Whigville to extend reception to all parts of town and eliminate gaps

iv. Activity Description
- Lead: Highway Department
- Priority: Medium
- Status:
- Estimated Cost:
- Potential Funding Source(s):
- Timeframe:

3.5 Implement a one-touch alert notification system to allow Emergency Management and other first responders to contact each other instantaneously in the event of an emergency

v. Activity Description
- Lead: Emergency Management
- Priority: Medium
- Status:
- Estimated Cost:
- Potential Funding Source(s):
- Timeframe:

Objective 4: Improve sheltering capacity for vulnerable populations

Strategic Action:

4.1 Acquire a generator for the senior center

i. Activity Description
- Lead: Emergency Management
- Priority: High
- Status:
- Estimated Cost:
- Potential Funding Source(s):
- Timeframe:

Objective 5: Increase town capacity to plan for, simulate, and respond to hazards

Strategic Action:
5.1 Equip Fire and Emergency Management vehicles with portable notebook computers and GPS units

- **Activity Description**
  - **Lead:** Emergency Management
  - **Priority:** High
  - **Status:**
  - **Estimated Cost:**
  - **Potential Funding Source(s):**
  - **Timeframe:**

5.2 Develop GIS capacity to assist in emergency planning and response

- **Activity Description**
  - **Lead:** Planning
  - **Priority:** Medium
  - **Status:**
  - **Estimated Cost:**
  - **Potential Funding Source(s):**
  - **Timeframe:**

**Objective 6: Continue participation in National Flood Insurance Program**

**Strategic Action:**

6.1 Continue enforcement of floodplain management ordinances by regulating all new and substantially improved construction in flood zones

- **Activity Description**
  - **Lead:** Engineering
  - **Priority:** High
  - **Status:**
  - **Estimated Cost:**
  - **Potential Funding Source(s):**
  - **Timeframe:**

6.2 Work with FEMA to update FIRMs as necessary

- **Activity Description**
  - **Lead:** Planning, Technical Services
  - **Priority:** High
  - **Status:**
  - **Estimated Cost:**
  - **Potential Funding Source(s):**
  - **Timeframe:**

6.3 Continue to distribute information about the NFIP to homeowners

- **Activity Description**
  - **Lead:** Technical Services
  - **Priority:** High
  - **Status:**
  - **Estimated Cost:**
  - **Potential Funding Source(s):**
  - **Timeframe:**
6.4 Continue to assist homeowners with amendments to NFIP maps as necessary

iv. Activity Description
   - Lead: Technical Services
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

THE FOLLOWING ADDITIONAL OBJECTIVES AND MITIGATION STRATEGIES ARE PROPOSED TO BE INCLUDED IN THE 2016 – 2021 PLAN UPDATE:

Contributors

The map below shows the locations of “critical facilities” in Burlington, as well as the relationship between them, flood zones, and the most populated areas of town. As shown in the map, a large portion of Berlin is located within the 1% annual flood zone; fortunately, most of the critical facilities in town are outside the flood zone. The sole exception is a school and an ambulance facility. Most of the most densely populated areas of town are close to a flood zone, but not in one. The central business district is in the flood zone.
While the above assets are necessary to keep the town up and running, emergency planners also pay close attention to their most vulnerable citizens. Populations that may be particularly vulnerable include: people living under the poverty line, people with limited or no English proficiency, minorities, and people who are dependent on transit. The maps below illustrate where these populations are located.

6 Vulnerability address the inability to withstand the impacts of a hazard.
7 In the final document, these maps will be moved to the regional analysis section. Data is not available on a small enough scale to make town-level analysis useful.
CITY OF NEW BRITAIN

Introduction

The Central Connecticut Region, which includes New Britain, is updating its Natural Hazards Mitigation Plan. This plan lays out a series of goals, objectives, and projects that will be pursued by the region and its member municipalities over the next five years. The plan contains two parts. The first is a regional section that looks at risks from various natural hazards, and lays out a series of broad goals and objectives. The second is a collection of municipal plans. These municipal plans serve three functions. The first is to gather, in one place, information from various municipal departments about how the town currently prepares for, and responds to, natural disasters. The second is to gather the projects and priorities that the town will pursue to improve its disaster preparedness and strengthen its disaster response efforts. The last purpose is to make the town eligible for funding from the Federal Emergency Management Agency (FEMA). To be eligible for many of FEMA’s grant and assistance programs, a municipality must have a current FEMA-approved Natural Hazards Mitigation Plan.

What is presented below is New Britain’s updated municipal section of the plan. It presents a brief overview of the town, its challenges, its vulnerabilities, and its goals and objectives for the next five years.

Background

The City of New Britain is the second, and most populous city in the CCRPA region. New Britain is positioned geographically in the East of the region, with Berlin bordering to the South, Plainville to the West, and Southington to the Southwest. New Britain is connected to the region via State Route 9 and State Route 72, and a small stretch of Interstate Highway 84 runs through the western edge of the city. New Britain is distinctly characterized—compared to other regional partners—as a densely populated, younger, and culturally diverse city. As of 2012, the City of New Britain’s population was 73,122 residents living within 13 square miles, making it the most densely populated city in the CCEDA region, at 5,625 people per square mile.

New Britain’s population, with a median age of 33, falls below the county and state averages of 40 years old. This is partly due to a declining population of residents above the age of 65 and of individuals between age 25 and 44 years old. Future population projections are varied for New Britain. One model used by the City of New Britain expects a sharp decline to fewer than 64,000 residents by 2030, while other projections used by state and regional agencies predict modest population increases. Each of these projections place potential challenges on the city’s revenue base, demand for services, and land use. In addition, the City of New Britain has maintained itself as a center of cultural diversity, where past and present immigrant communities continue to locate and concentrate to work in the city’s industrial districts. This factor has had implications on community and neighborhood planning activities, and attracting and retaining residents remains a key component of New Britain’s development goals.

In its most recent Plan of Conservation and Development from 2010, the City of New Britain categorizes itself as a mature city, where little vacant land exists to build outward. Instead, New Britain addresses strategic planning and development as it relates to the conserving limited available vacant land and designating certain areas available for development. New Britain, with only about 3% vacant land use available, has focused on preservation of designated open spaces and infrastructure development that conserves land use, water, and energy efficiency. Development focuses on encouraging low impact
development housing, business development adjacent transportation corridors, and revitalizing neighborhoods, which promote redevelopment and conservation of limited open space and landscapes.

**Vulnerability and Risk**

As in other towns, flooding and winter storms present the biggest challenges in New Britain. Several water bodies in the city flood on occasion: Webster Brook, Bass Brook, and the Quinnipiac River all give rise to minor flooding issues at times, while Willow Brook and West Canal create more frequent and severe flooding problems. Willow Brook is a well-known source of flooding in the City. Overflow from the brook floods a southwest neighborhood where 60-80 properties are affected, as well as the New Britain stadium. A strong storm in June of 1992 caused extensive flooding from Willow Brook, which was the subject of a study by the Maguire Group, who catalogued the damage wrought by the flooding (see appendix). According to their report, the 1992 flooding resulted in over $650,000 of damages.

West Canal is another source of frequent flooding in the city, although it is undocumented on FEMA’s FIRMs due to its high elevation. The 1992 storm caused the canal, built in 1908, to breach; flooding washed out nearby streets and inundated homes. The City paid out $30,000 in damages to homeowners, who were not eligible for reimbursements under the NFIP. Development in the area impacted by flooding from West Canal is not limited by the City’s flood control regulations, which apply only to areas documented in FIRMs.

Drainage infrastructure and water and sewer lines throughout the City are in need of major upgrades. The majority of the infrastructure was constructed in or around 1872 and was not designed to support the level of development the city has seen. Undersized pipes result in flooding, sewer backups, system leaks, and other problems.

CCRPA used FEMA’s Hazus-MH model to analyze potential risks that the City of New Britain might face from a major flooding event. The model estimates not only economic losses in the town including residential and commercial damage, but also business interruptions due to a flood having a 1% chance of occurring in any given year (the 100-year flood) would be $94,640,000. Key impact areas of such a flooding event are summarized in the table immediately below:

<table>
<thead>
<tr>
<th>Estimated Damages from 100-Year Flood</th>
<th>Households Displaced</th>
<th>1,027</th>
</tr>
</thead>
<tbody>
<tr>
<td>People Needing Shelter</td>
<td></td>
<td>2,419</td>
</tr>
<tr>
<td>Buildings at Least Moderately Damaged</td>
<td></td>
<td>73</td>
</tr>
<tr>
<td>Total Estimated Economic Losses</td>
<td></td>
<td>$94,700,000.00</td>
</tr>
<tr>
<td>Total Residential Building &amp; Content Losses</td>
<td></td>
<td>$29,830,000.00</td>
</tr>
<tr>
<td>Total Commercial, Industrial, &amp; Other Building &amp; Content Losses</td>
<td></td>
<td>$64,440,000.00</td>
</tr>
<tr>
<td>Total Business Interruption Losses</td>
<td></td>
<td>$440,000.00</td>
</tr>
</tbody>
</table>

New Britain also faces the usual challenges during winter storms; ice and snow make roads impassable, knock down tree limbs which in turn disrupt utility service. The combined effect leaves people stranded in their homes, potentially without heat or power. New Britain’s hills pose a particular problem; to mitigate the problem, the city will pre-treat hilly streets with salt before a big storm. Removal of the ice and snow for New Britain’s town-owned roads is handled by a combination of town workers and contractors; the town also handles debris removal. The table below considers the impact of Severe Winter Storms on the City of New Britain:
Estimated Losses from a Severe Winter Storm like the October 2011 Snow Storm

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Customers Served (2013)</td>
<td>34,207</td>
<td></td>
</tr>
<tr>
<td>Maximum Outages During Severe Winter Storm (2011)</td>
<td>20,509</td>
<td></td>
</tr>
<tr>
<td>Maximum Outages Percentage of Customers (2011)</td>
<td>59.96%</td>
<td></td>
</tr>
<tr>
<td>Number of Businesses Experiencing Outages</td>
<td>131</td>
<td></td>
</tr>
<tr>
<td>Total Lost Wages (Daily)</td>
<td>$26,102.53</td>
<td></td>
</tr>
<tr>
<td>Average Lost Wages (Weekly)</td>
<td>$52,004.00</td>
<td></td>
</tr>
<tr>
<td>Miles of Local Roads Plowed by Town of Berlin</td>
<td>183.89</td>
<td></td>
</tr>
<tr>
<td>Municipal Cost (Plowing, Road Treatment)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tons of Debris Removed</td>
<td>tons</td>
<td></td>
</tr>
</tbody>
</table>

CRCOG also used FEMA’s Hazus-MH model to analyze the risks that the City of New Britain might face from a hurricane as powerful as the 1938 hurricane. The model estimates the economic losses to the town including residential and commercial damage and business interruptions due to such a Category 3 hurricane would be approximately $287.4 million. The impacts of such a storm are summarized below:

<table>
<thead>
<tr>
<th>Estimated Damages from a 1938 Strength Hurricane</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Households Displaced</td>
<td>881</td>
</tr>
<tr>
<td>People Needing Short-Term Shelter</td>
<td>261</td>
</tr>
<tr>
<td>Buildings at Least Moderately Damaged</td>
<td>7,271</td>
</tr>
<tr>
<td>Building Completely Damaged</td>
<td>61</td>
</tr>
<tr>
<td>Total Estimated Economic Losses</td>
<td>$287,426,170.00</td>
</tr>
<tr>
<td>Total Residential Building Losses</td>
<td>$229,324,530.00</td>
</tr>
<tr>
<td>Total Commercial, Industrial, &amp; Other Building Losses</td>
<td>$51,927,310.00</td>
</tr>
<tr>
<td>Total Business Interruption Losses</td>
<td>$6,174,330.00</td>
</tr>
<tr>
<td>Total Debris Generated (in tons)</td>
<td>333,729</td>
</tr>
<tr>
<td>Truckloads (at 25 tons/truck) of building debris</td>
<td>13,349</td>
</tr>
</tbody>
</table>

According to information from the city and the FEMA Public Assistance Funded Projects Summary (Open Government Initiative), there were 5 federally declared disasters between 2011 and 2013 that resulted in total expenses to the city and other local public and non-profit agencies of nearly $1.3 million. These expenses included debris and snow removal, emergency protective measures, and repairs to damaged infrastructure and buildings experienced by private citizens and businesses.

<table>
<thead>
<tr>
<th>Applicant Municipality &amp; Other Agencies</th>
<th>DR-1958-CT 2011 Snow WS Charlotte</th>
<th>DR-4023-CT 2011 Tropical Storm Irene</th>
<th>DR-4046-CT 2011 Severe Storm Alfred</th>
<th>DR-4087-CT 2012 Hurricane Sandy</th>
<th>DR-4106-CT 2013 Severe Winter Storm</th>
<th>Total Damages Eligible for Public Assistance Due to 2011 - 2013 Disasters</th>
</tr>
</thead>
<tbody>
<tr>
<td>City of New Britain Other Agencies</td>
<td>$120,905.96</td>
<td>$52,037.92</td>
<td>$536,985.07</td>
<td>$260,405.35</td>
<td>$972,974.30</td>
<td></td>
</tr>
<tr>
<td>New Britain Total</td>
<td>$4,132.00</td>
<td>$4,297.50</td>
<td>$269,118.95</td>
<td>$</td>
<td>$323,951.34</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$125,037.96</td>
<td>$56,335.42</td>
<td>$806,104.02</td>
<td>$260,405.35</td>
<td>$1,296,925.64</td>
<td></td>
</tr>
</tbody>
</table>

*Other Agencies = Fire Districts, Schools, Housing Authorities, Private and Non-Profit Agencies

Table X. 2011 - 2013 Disasters Damage Amounts Eligible for 75% Reimbursement Under FEMA Public Assistance Program

Page | 90
Finally, New Britain has more concern about earthquakes than other towns. Although earthquakes are rare in this area, New Britain is almost fully built-out with many older buildings that could sustain serious damage in the event of a quake. In response to concerns, the city’s building code was changed in 2005 to accommodate seismic requirements for new structures.

Existing Strategies

The City of New Britain has in place codes and ordinances to reduce the risks to public health and property posed by flooding. These regulations primarily limit any activities on floodplains that would increase flood heights and velocities, or reduce or alter naturally occurring floodplains and water catchment areas. The town defines floodplains, hereafter special flood hazard areas, from of the Federal Flood Insurance Rate Maps identified in FEMA’s Flood Insurance Study. The following includes a brief description of how the City of New Britain is addressing flood risk in its most important planning documents.

<table>
<thead>
<tr>
<th>Planning Documentation</th>
<th>Year Established or Updated</th>
<th>Lead Department(s)</th>
<th>Recommendation for Natural Hazard Mitigation</th>
</tr>
</thead>
</table>
| Plan of Conservation & Development (POCD) | 2010 | Planning and Zoning Commission | • Each town in Connecticut is required to write a Plan of Conservation and Development at least once every 10 years. State statute requires that these plans address “protection of environmental assets critical to public health and safety” (Sec.8-23 CGS). Municipalities that comply with the requirements will become eligible for discretionary state funding.  
• While the Plan does not outline any developmental goals for its floodplains, it does include them on a map of area excluded from the build out analysis. |
| City of New Britain Ordinances Chapter 9: Flood and Erosion Control | 2008 | Engineering Department | • The city adopted Flood and Erosion Ordinances that include floodplain management ordinances.  
• The ordinance applies to all special flood hazard areas identified by the Federal Emergency Management Agency (FEMA) in its Flood Insurance Study (FIS). The Ordinances acknowledges that there are areas of periodic inundation, “which may result in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety and general welfare.”  
• The ordinance includes the prohibition of certain uses and the restriction of others. It also requires permits for all activities that might alter the river channel or floodplain. Administration and permitting of these regulations is the authority of the town engineer.  
• New Britain prohibits all placement of manufactured homes and recreation vehicles (campers) within the special flood hazard area. |
<table>
<thead>
<tr>
<th>Regulations</th>
<th>Year</th>
<th>Responsible Agency</th>
<th>Details</th>
</tr>
</thead>
</table>
| Zoning Regulations                              |      | Planning and Zoning Commission                        | • The ordinance generally requires that all new construction locate its lowest floor at least two feet above Base Flood Elevation (BFE). For non-residential construction the lowest floor maybe located below BFE if it is adequately flood proofed.  
• Similarly all utilities and electrical appliances must be located above the BFE or be situated to ensure no water is able to enter their workings. |
| Subdivision Regulations                         | 2014 | Planning and Zoning Commission                        | • The City of New Britain does not address flooding in the Zoning Ordinance.  
• City Subdivision regulations stipulate that subdivisions must minimize the risk of flood damage. This includes locating utilities and other facilities away from danger. The application submitted by the subdivisions must also include the location of any watercourses.  
• The Flood and Erosion Control Ordinances echo these demands with a couple additions: (1) drainage be designed to reduce flood exposure, (2) elevations and floodway data be included in all subdivision applications located in the special flood hazard area.  
• Drainage infrastructure related to subdivision for roads shall be designed for not less than the 4% annual flood hazard event. |
| Inland Wetlands and Watercourses Regulations    | 2014 | Planning and Zoning Commission                        | • The Conservation Commission was established in 1964 and given the mandate of inland wetland agency in 1973 to implement the Inland Wetland and Watercourses Regulations (in accordance with Section 19-35 of Ordinances). Under Connecticut General Statutes all municipalities shall regulate activities on those wetlands and watercourses that lie within municipal borders. While these regulations are primarily for the protection of environmental and ecological assets, they also address impacts to safety and public health. As such, the Conservation Commission has a role to play in mitigating risk in flood hazard areas.  
• The Flood and Erosion Control Board has the authority to plan, layout, acquire, construct, reconstruct repair maintain, supervise and manage a flood or erosion control system. This board also has the authority to take and hold property or issue bonds for the construction of a flood or erosion control system. |
| Capital Improvement Plan (CIP)                  | 2015 | All Departments                                       | • Identifies the long-term municipal plans associated with funding equipment and infrastructure improvement.  
• Specifically, New Britain will seek funding to improve drainage and culverts along Allen Street, replace the Shuttle Meadow Avenue over Shuttle Meadow Pond Brook, and West Canal Flooding Abatement.  
• At this time, minor funds are dedicated to flood related projects, namely dam and canal repairs |
<table>
<thead>
<tr>
<th>Community Emergency Response Team (CERT)</th>
<th>2015</th>
<th>Emergency Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>- New Britain has a Community Emergency Response Team (CERT).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- CERT is composed of volunteers who received training in disaster preparedness and response. Using the training, CERT members are able to assist town personnel and support emergency response functions. For example, in New Britain CERT members are responsible for staffing the emergency shelter when it is activated.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- CERT members engage with the community to educate fellow residents about disaster preparedness. They also have a library of resources online that provides information about emergency situations. CERT has been an important resource to residents in the preparedness stage.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>National Flood Insurance Program (NFIP)</th>
<th>1981</th>
<th>Town Manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>- The City of New Britain is a participating community in FEMA’s National Flood Insurance Program since 1981.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- The National Flood Insurance Program has paid 79 property damage claims in New Britain totaling $424,247.91 to date.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- The National Flood Insurance Program has paid 35 repetitive loss property damage claims in New Britain on 14 properties. These claims have totaled $264,339.87.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- These plans are meant to be applied during an emergency to maximize survival, give direction, integrate departments and expertise, define roles to departments and community leaders, and provide a basis for continued preparation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Specifically the plans identify town personnel and assign responsibilities to each department and its personnel during disasters and emergencies. As part of the plan, instructions are also outlined for activation of the emergency operations center.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table X. City of New Britain Planning Documents**

### Current Mitigation and Response Activities

- Flood control regulations limit development in “special flood hazard areas”, which are defined as “the area within New Britain subject to one percent or greater chance of flooding in any given year, as identified by New Britain’s FIRM.” These regulations prohibit manufactured homes and recreational vehicles while imposing restrictions on residential and non-residential construction regarding base elevation, materials, construction methods, etc.

- Seismic standards were added to the building code in 2005.

- Town participates in National Flood Insurance Program

### Goals, Objectives, and Strategies
The following section includes updates on objectives and mitigation strategies that were proposed during the 2011-2016 Natural Hazard Mitigation Plan.

**Goal:** reduce losses of life and property, and minimize economic consequences of natural hazards

### Objective 1: Improve municipal response capabilities

#### Strategic Action:

1.1 Improve communication and coordination between response personnel in different departments (Police, Fire, Water, Public Works) by holding regularly scheduled, multi-agency exercises of the EOP.

   - **Activity Description**
     - **Lead:** Emergency Management
     - **Priority:** High
     - **Status:**
     - **Estimated Cost:**
     - **Potential Funding Source(s):**
     - **Timeframe:**

1.2 Create guidelines for releasing water from dams during storm events to avoid dam breakage

   - **Activity Description**
     - **Lead:** Planning, Public Works
     - **Priority:** High
     - **Status:**
     - **Estimated Cost:**
     - **Potential Funding Source(s):**
     - **Timeframe:**

### Objective 2: Enable residents to better help themselves through preparedness education

#### Strategic Action:

2.1 Develop and distribute pamphlet about preparedness for residents (English, Spanish, and Polish); post on city website

   - **Activity Description**
     - **Lead:** Emergency Management
     - **Priority:** High
     - **Status:**
     - **Estimated Cost:**
     - **Potential Funding Source(s):**
     - **Timeframe:**

2.2 Encourage preparedness workshops in schools

   - **Activity Description**
     - **Lead:** Emergency Management
     - **Priority:** High
     - **Status:**
     - **Estimated Cost:**
     - **Potential Funding Source(s):**
     - **Timeframe:**
Objective 3: Upgrade aging infrastructure to improve city’s capacity to deal with inundation

Strategic Action:

3.1 Create a plan for repairing/replacing aging infrastructure including water, sewer, and storm water drainage lines throughout the city

i. Activity Description
   - Lead: Planning, Public Works
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe

3.2 Coordinate improvement plans with utility companies re: putting utility lines underground

ii. Activity Description
   - Lead: Planning
   - Priority: Medium
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

3.3 Initiate and complete road reconstruction project for Allen Street (Phase 2)

iii. Activity Description
   - Lead: Engineering
   - Priority: High
   - Status:
   - Estimated Cost: $3,000,000
   - Potential Funding Source(s): Future LOTCIP allocations, Municipal Bonding
   - Timeframe: FY 2016 - FY 2017

3.4 Replace the Shuttle Meadow Avenue Bridge over Shuttle Meadow Pond Brook

iv. Activity Description
   - Lead: Engineering
   - Priority: High
   - Status:
   - Estimated Cost: $800,000
   - Potential Funding Source(s): Municipal Bridge Bond
   - Timeframe: FY 2019

3.5 Coordinate and complete West Canal flooding abatement project

v. Activity Description
   - Lead: Sewer and Water Division
   - Priority: High
   - Status:
   - Estimated Cost: $1,000,000
   - Potential Funding Source(s): Future DWSRF Loan, 15% grant
- Timeframe: FY 2017

**Objective 4: Align planning policies with affected areas**

**Strategic Action:**

4.1 Amend the city’s Flood Control Regulations to apply to the West Canal area despite that area not being included on FEMA’s FIRMs

  i. Activity Description
     - Lead: Planning
     - Priority: High
     - Status:
     - Estimated Cost:
     - Potential Funding Source(s):
     - Timeframe:

**Objective 5: Continue participation in National Flood Insurance Program**

**Strategic Action:**

5.1 Continue enforcement of floodplain management ordinances by regulating all new and substantially improved construction in flood zones.

  i. Activity Description
     - Lead: Planning
     - Priority: High
     - Status:
     - Estimated Cost:
     - Potential Funding Source(s):
     - Timeframe:

5.2 Work with FEMA to update FIRMs as necessary

  ii. Activity Description
     - Lead: Public Works
     - Priority: High
     - Status:
     - Estimated Cost:
     - Potential Funding Source(s):
     - Timeframe:

5.1 Continue to distribute information about the NFIP to homeowners

  iii. Activity Description
     - Lead: Planning
     - Priority: High
     - Status:
     - Estimated Cost:
     - Potential Funding Source(s):
     - Timeframe:
5.2 Continue to assist homeowners with amendments to NFIP maps as necessary

iv. Activity Description

- Lead: Planning
- Priority: High
- Status:
- Estimated Cost:
- Potential Funding Source(s):
- Timeframe:

THE FOLLOWING ADDITIONAL OBJECTIVES AND MITIGATION STRATEGIES ARE PROPOSED TO BE INCLUDED IN THE 2016 – 2021 PLAN UPDATE:

Contributors

The map below shows the locations of “critical facilities” in New Britain, as well as the relationship between them, flood zones, and the most populated areas of town. As shown in the map, a large portion of Berlin is located within the 1% annual flood zone; fortunately, most of the critical facilities in town are outside the flood zone. The sole exception is a school and an ambulance facility. Most of the most densely populated areas of town are close to a flood zone, but not in one. The central business district is in the flood zone.
While the above assets are necessary to keep the town up and running, emergency planners also pay close attention to their most vulnerable citizens. Populations that may be particularly vulnerable include: people living under the poverty line, people with limited or no English proficiency, minorities, and people who are dependent on transit. The maps below illustrate where these populations are located.

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8 Vulnerability address the inability to withstand the impacts of a hazard.
9 In the final document, these maps will be moved to the regional analysis section. Data is not available on a small enough scale to make town-level analysis useful.
TOWN OF PLAINVILLE

Introduction
The Central Connecticut Region, which includes Plainville, is updating its Natural Hazards Mitigation Plan. This plan lays out a series of goals, objectives, and projects that will be pursued by the region and its member municipalities over the next five years. The plan contains two parts. The first is a regional section that looks at risks from various natural hazards, and lays out a series of broad goals and objectives. The second is a collection of municipal plans. These municipal plans serve three functions. The first is to gather, in one place, information from various municipal departments about how the town currently prepares for, and responds to, natural disasters. The second is to gather the projects and priorities that the town will pursue to improve its disaster preparedness and strengthen its disaster response efforts. The last purpose is to make the town eligible for funding from the Federal Emergency Management Agency (FEMA). To be eligible for many of FEMA’s grant and assistance programs, a municipality must have a current FEMA-approved Natural Hazards Mitigation Plan.

What is presented below is Plainville’s updated municipal section of the plan. It presents a brief overview of the town, its challenges, its vulnerabilities, and its goals and objectives for the next five years.

Background

The Town of Plainville marks itself as the geographic center within the CCRPA region and the entire state of Connecticut. The City of Bristol flanks Plainville to the West, the City of New Britain borders to the East, and Southington neighbors Plainville to the South. The Town of Plainville encompasses approximately 9.6 square miles along a geo-physical plain and the city has urban, rural, and suburban development. The town is also hosts the interchange between State Route 72 and Interstate Highway 84. The town is home to 17,726 residents (ACS 5-year estimate), making the population density 1,846 persons per square mile, which is approximately 1.5 times above the county average and nearly 3 times the state average.

As of 2012, Plainville’s median age was 42.6 years of age, slightly above the county and state medians at that time. However, Plainville’s median age is projected to increase as the percentage of children under 19 will remain steady at 22%, and the percentage of individuals in the 65-plus population cohort increases from 15% to 23% by 2030. In 2012, the percentage of single-family households accounted for 67.6% of residences in Plainville. A smaller percentage of multi-family, apartments, and condominium developments constitute the remainder of housing options available.

According to its Plan of Conservation and Development (POCD), last published in 2009, the Town of Plainville had emphasized conservation of its limited open space and efforts to take a land use inventory. In addition, the Town of Plainville recommended a management plan to protect open space and land conservation beyond the 182 acres already designated, which only accounts for 2.9% of the Town of Plainville’s total land area. In recognition of this fact, the POCD stresses the importance of comprehensive open space planning, natural resource protection, and limitation of impervious surface cover.

Vulnerability and Risk

Flooding is the primary challenge in Plainville. The Pequabuck and Quinnipiac Rivers both pass through the town; of the two, the Pequabuck poses the greater flooding risk. At one time flooding from the
Pequabuck would divide the town, flooding a bridge on Washington Street and thus rendering the northwest section of town inaccessible. Now, access to the northwest is secured via Northwest Drive, which provides a connection between Routes 10 and 177. The river still floods several other areas, including a strip of homes on Robert Street Extension. In 2013, 11 homes on Robert Street Extension were purchased by the town (with a FEMA grant) and demolished. 12 homes remain on the street. Although the area floods regularly, and informal plans are known, there is no written evacuation plan for the street.

The town's wastewater treatment plant is also subject to flooding, although on a less regular basis. Although according to a 1980 FEMA flood study the plant is constructed above the 100 year flood elevation, the plant still floods during extreme conditions. The gravity-operated plant was built in the 1940s, and its location is non-negotiable.

Even slight flooding can cause backups in Plainville's sewer and storm water systems. This has been the case for some time, and was the subject of a Comprehensive Drainage Study completed in May of 1975. While the report's findings are still valid, the solutions proposed for alleviating the situation have always been prohibitively expensive, and have not been implemented.

While the Town of Plainville is vulnerable to the same hazards as the other towns of the region, its risks are unique. This is due to the particular stock of assets the town possesses, including local, state and interstate routes and highways, rail lines, medical facilities, historical sites, business and employment centers, schools, elderly populations, building and building content value, police, and fire departments. Each hazard will impact these assets to a different extent. The impacts of flooding are local and can be anticipated with some measurement of certainty, snow storms impact the entire region and are considered annual events, and a tornado can have severe impacts on a very local level and are basically unpredictable. The breadth of these impacts make it necessary to inventory all community assets and, where possible, identify if they lie in a high risk area.

CCRPA used FEMA’s Hazus-MH model to analyze potential risks that the Town of Plainville might face from a major flooding event. The model estimates not only economic losses in the town including residential and commercial damage, but also business interruptions due to a flood having a 1% chance of occurring in any given year (the 100-year flood) would be $94,640,000. Key impact areas of such a flooding event are summarized in the table immediately below:

<table>
<thead>
<tr>
<th>Estimated Damages from 100-Year Flood</th>
<th>Households Displaced</th>
<th>638</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>People Needing Shelter</td>
<td>1,621</td>
</tr>
<tr>
<td></td>
<td>Buildings at Least Moderately Damaged</td>
<td>138</td>
</tr>
<tr>
<td></td>
<td>Total Estimated Economic Losses</td>
<td>$94,640,000.00</td>
</tr>
<tr>
<td></td>
<td>Total Residential Building &amp; Content Losses</td>
<td>$34,290,000.00</td>
</tr>
<tr>
<td></td>
<td>Total Commercial, Industrial, &amp; Other Building &amp; Content Losses</td>
<td>$59,870,000.00</td>
</tr>
<tr>
<td></td>
<td>Total Business Interruption Losses</td>
<td>$480,000.00</td>
</tr>
</tbody>
</table>

The town faces the same challenges from winter storms as do the other towns in the region: cleanup and management of the storms can be expensive; residents can be isolated by snowy and icy roads; and downed trees can block roads and cause power outages, depriving residents of electricity, communications, and even heat. As in other towns, the vast majority of residents, accustomed to Connecticut's weather, choose to shelter in place, waiting out the storms from the comfort of their own
homes. In the event that shelters are required for winter storms or other events, the town has one approved Red Cross regional shelter at the high school.

Removal of the ice and snow for Plainville's town-owned roads is handled by a combination of town workers and contractors; the town also handles debris removal. The table below considers the impact of Severe Winter Storms on the Town of Plainville:

| Estimated Losses from a Severe Winter Storm like the October 2011 Snow Storm | Number of Customers Served (2013) | 9,328 |
| | Maximum Outages During Severe Winter Storm (2011) | 9,278 |
| | Maximum Outages Percentage of Customers (2011) | 99.46% |
| | Number of Businesses Experiencing Outages | 11 |
| | Total Lost Wages (Daily) | $2,012.09 |
| | Average Lost Wages (Weekly) | $48,775.00 |
| | Miles of Local Roads Plowed by Town of Berlin | 84.36 |
| | Municipal Cost (Plowing, Road Treatment) | |
| | Tons of Debris Removed | |

CRCOG also used FEMA’s Hazus-MH model to analyze the risks that the Town of Plainville might face from a hurricane as powerful as the 1938 hurricane. The model estimates the economic losses to the town including residential and commercial damage and business interruptions due to such a Category 3 hurricane would be approximately $74.4 million. The impacts of such a storm are summarized below:

| Estimated Damages from a 1938 Strength Hurricane | Households Displaced | 110 |
| | People Needing Short-Term Shelter | 25 |
| | Buildings at Least Moderately Damaged | 2,497 |
| | Building Completely Damaged | 27 |
| | Total Estimated Economic Losses | $74,394,870.00 |
| | Total Residential Building Losses | $54,967,720.00 |
| | Total Commercial, Industrial, & Other Building Losses | $17,106,210.00 |
| | Total Business Interruption Losses | $2,320,940.00 |
| | Total Debris Generated (in tons) | 171,080 |
| | Truckloads (at 25 tons/truck) of building debris | 6,843 |

According to information from the town and the FEMA Public Assistance Funded Projects Summary (Open Government Initiative), there were 5 federally declared disasters between 2011 and 2013 that resulted in total expenses to the town and other local public and non-profit agencies of nearly $577 thousand. These expenses included debris and snow removal, emergency protective measures, and repairs to damaged infrastructure and buildings experienced by private citizens and businesses.
<table>
<thead>
<tr>
<th>Applicant Municipality &amp; Other Agencies</th>
<th>DR-1958-CT 2011 Snow WS Charlotte</th>
<th>DR-4023-CT 2011 Tropical Storm Irene</th>
<th>DR-4046-CT 2011 Severe Storm Alfred</th>
<th>DR-4087-CT 2012 Hurricane Sandy</th>
<th>DR-4106-CT 2013 Severe Winter Storm</th>
<th>Total Damages Eligible for Public Assistance Due to 2011 - 2013 Disasters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Town of Plainville Other Agencies</td>
<td>$45,772.96</td>
<td>$33,555.93</td>
<td>$371,550.13</td>
<td>$-</td>
<td>$94,139.91</td>
<td>$545,018.93</td>
</tr>
<tr>
<td>Plainville Total</td>
<td>$9,119.69</td>
<td>$ -</td>
<td>$12,378.97</td>
<td>$-</td>
<td>$10,357.50</td>
<td>$31,856.16</td>
</tr>
<tr>
<td></td>
<td>$54,892.65</td>
<td>$33,555.93</td>
<td>$383,929.10</td>
<td>$-</td>
<td>$104,497.41</td>
<td>$576,875.09</td>
</tr>
</tbody>
</table>

Table X. 2011 - 2013 Disasters Damage Amounts Eligible for 75% Reimbursement Under FEMA Public Assistance Program

*Other Agencies = Fire Districts, Schools, Housing Authorities, Private and Non-Profit Agencies

Existing Strategies

The Town of Plainville has in place codes and ordinances to reduce the risks to public health and property posed by flooding. These regulations primarily limit any activities on floodplains that would increase flood heights and velocities, or reduce or alter naturally occurring floodplains and water catchment areas. The town defines floodplains, hereafter special flood hazard areas, off of the Federal Flood Insurance Rate Maps identified in FEMA’s Flood Insurance Study. The following includes a brief description of how the Town of Plainville is addressing flood risk in its most important planning documents.

<table>
<thead>
<tr>
<th>Planning Documentation</th>
<th>Year Established or Updated</th>
<th>Lead Department(s)</th>
<th>Recommendation for Natural Hazard Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan of Conservation &amp; Development (POCD)</td>
<td>2009</td>
<td>Planning and Zoning Commission</td>
<td>• The Plan promotes the protection of natural resources and open space, which provide flood storage capacity. As such, floodplains and floodways, streams, wetlands, and rights-of-way will be excluded from consideration of the buildable land area of any parcel.</td>
</tr>
<tr>
<td>Municipal Building Codes</td>
<td>2003</td>
<td>Municipal Building Inspector</td>
<td>• The Plan encourages the Planning and Zoning Commission to ensure current zoning codes limit “additional development” in these vulnerable areas, permitting only temporary or passive recreation. Finally the Plan lists “strengthening and coordinating municipal regulation of flood hazard areas to protect life, property and the continued functioning of the natural flood management system” as an ongoing priority for the Planning Department and town engineer.</td>
</tr>
<tr>
<td>Bristol-Plainville-Plymouth Pequabuck River Flooding Study</td>
<td>2015</td>
<td>Inland Wetlands and Watercourses Commission</td>
<td>• The Bristol-Plainville-Plymouth Pequabuck River Flooding Study was made possible by a $200,000 grant from the Economic Development Administration. This Study will address flooding and the accompanying economic risks that have restrained development and recovery for the communities along the river following</td>
</tr>
</tbody>
</table>
| Zoning Regulations | 2014 | Planning and Zoning Commission | • Plainville’s Floodplain Zone permits basic agricultural, recreational and several industrial uses with restrictions.  
• However nearly all other uses are prohibited including any residential activity, commercial establishment or use requiring a “substantial investment in structure or permanent equipment that could be damaged by flooding.” The Floodplain Zone is laid out to roughly cover the special flood hazard area.  
• The Floodplain Zone is included on the town’s zoning map. |
|-------------------|------|---------------------------------|---------------------------------------------------------------------------------|
| Subdivision Regulations | 2014 | Planning and Zoning Commission | • The Subdivision Regulations stipulate that subdivision must minimize the risk of flood damage. This includes locating public utilities and other facilities away from danger.  
• In particular, the regulations require that drainage be designed to reduce flood exposure, and that elevations and floodway data be included in all subdivision applications for parcels situated in the special flood hazard area. |
| Inland Wetlands and Watercourses Regulations | 2012 | Inland Wetlands and Watercourses Commission | • The Inlands Waterways and Watercourses Commission was established in 1973 to implement the Inland Wetland and Watercourses Regulations, which were adopted in 1974.  
• Under Connecticut General Statutes all municipalities shall regulate activities on those wetlands and watercourses that lie within their borders. The regulations include a list of activities that may be regulated and the environmental justifications for the prohibitions. While these regulations are primarily for the protection of environmental and ecological assets, they do address impacts to safety and public health.  
• As such, the Inland Waterways and Watercourses Commission also has a role to play in mitigating risk in flood hazard areas. Additionally the commission has the mandate to restrict activities beyond the delineated special flood hazard area. |
| Capital Improvement Plan (CIP) | 2015 | All Departments | • Identifies the long-term municipal plans associated with funding equipment and infrastructure improvement. |
| Community Emergency Response Team (CERT) | 2015 | Emergency Management | • Plainville does not currently have a Community Emergency Response Team (CERT), but can improve the safety of its residents by creating a CERT.  
• CERT is composed of volunteers who received training in disaster preparedness and response. Using the training, CERT members are able to assist town personnel and support emergency response functions. For example, in Berlin, CERT members are responsible for staffing the emergency shelter when it is activated. |
<table>
<thead>
<tr>
<th>National Flood Insurance Program (NFIP)</th>
<th>• In addition, CERT members engage with the community to educate fellow residents about disaster preparedness. They also have a library of resources online that provides information about emergency situations. CERT has been an important resource to residents in the preparedness stage.</th>
</tr>
</thead>
</table>
| 1981 Town Manager | • The Town of Plainville is a participating community in FEMA’s National Flood Insurance Program since 1980.  
• The National Flood Insurance Program has paid 66 property damage claims in Plainville totaling $994,086.70 to date.  
• The National Flood Insurance Program has paid 23 repetitive loss property damage claims in Plainville on 7 properties. These claims have totaled $319,075.23. |
| Local Emergency Operations Plan | • All towns in Connecticut must annually prepare a Local Emergency Operations Plan and submit it to the Department of Emergency Management and Homeland Security (DEMHS) for review.  
• These plans are meant to be applied during an emergency to maximize survival, give direction, integrate departments and expertise, define roles to departments and community leaders, and provide a basis for continued preparation. Specifically the plans identify town personnel and assign responsibilities to each department and its personnel during disasters and emergencies. As part of the plan, instructions are also outlined for activation of the emergency operations center.  
• These plans offer communities an important opportunity to take stock of their level of preparedness and consider any additional steps they can take that may influence their ability to cope and recover. |
| 2014-2015 Emergency Management | • The Ordinance acknowledges that there are areas of periodic inundation, “which may result in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety and general welfare.”  
• The purpose of the Ordinance is therefore to restrict uses that result in greater vulnerability. This includes the prohibition of certain uses and strictly stipulates certain conditions for others. It also requires permits for all activities that might alter the river channel or floodplain. The administration of permitting falls under the authority of the town engineer.  
• Plainville only requires that manufactured homes have their lowest floor elevated to or above the BFE within the special flood hazard area.  
• The ordinance generally requires that all new development use construction engineered to resist |
flood forces and elevate the lowest floor to at least two feet above BFE.

- For non-residential construction the lowest floor maybe located below BFE if it is adequately flood proofed to the same elevation. Similarly all utilities and electrical appliances must be located above the BFE or be situated to ensure no water is able to enter their workings.

- Because the storm water management system in Plainville has historically and periodically had trouble handling high volume runoff events, the Town, in an effort to mitigate the impacts, has adopted a low impact development manual.

- Removing some pressure form the storm water management system will decrease many of the negative impacts associated with an overloaded hydrologic system, such as expanding floodplains and river channel erosion.

- If the standards in this manual are extensively applied, the damage caused by a 4% annual flood hazard event, or even a 1% annual flood hazard event can be reduced by detaining a significant portion of the flood waters.

Table X. Town of Plainville Planning Documents.

Current Mitigation and Response Activities

- In 2010 the Town adopted a Low-Impact Development (LID) ordinance. The town has a LID manual that all new developments must use. The manual details a technical framework of methods of stormwater management that are designed to lead to improvements in surface water quality and a reduction in stormwater runoff. This was a strategy contained in the 2011-2016 Natural Hazards Mitigation Plan.

- Plainville has the toughest floodplain regulations of any town in the region. The regulations specifically disallow "any use requiring substantial investment in a structure and permanent equipment that could be damaged by flooding," including residential and commercial uses.

- The town participates in DEMHS Region 3 and follows its Regional Emergency Support Plan.

- The town's evacuation plan, last updated in September 2014 and scheduled for future updates at regular intervals as required by DEMHS, is included in the Emergency Operations Plan. The plan is currently awaiting approval from the DESPP Commissioner.

- The town participates in the State's Reverse-911 system, implemented in November 2009.

- Police notify residents of flood-prone areas (such as Robert Street Extension) of possible flooding to give them time to evacuate. (As of November, 2009, the town is using the statewide reverse-911 system for this process.)

- The town participates in the National Flood Insurance Program, and one of its Repetitive Loss Properties has been mitigated: Eleven Robert St. Ext. houses and two Forestville Ave. houses have
been demolished and removed to date. Twelve occupied single family homes subject to this RLP remain and the town continues to work regularly with homeowners on strategies.

- One approved Red Cross Regional Shelter is located at the Plainville Senior High School, 47 Robert Holcomb Way.

Goals, Objectives, and Strategies
The following section includes updates on objectives and mitigation strategies that were proposed during the 2011-2016 Natural Hazard Mitigation Plan.

**Goal: reduce losses of life and property, and minimize economic consequences of natural hazards**

**Objective 1: Update and formalize existing plans**

**Strategic Action:**

1.1 Develop a formal evacuation plan for the Robert Street Extension area and include it in the EOP

- Activity Description
  - Lead: Emergency Management
  - Priority: High
  - Status:
  - Estimated Cost:
  - Potential Funding Source(s): Municipal
  - Timeframe: 2016

1.2 Update the 1975 Comprehensive Drainage Study with cost/benefit analyses and an eye toward implementation

- Activity Description
  - Lead: Technical Services
  - Priority: High
  - Status:
  - Estimated Cost:
  - Potential Funding Source(s): Municipal
  - Timeframe: 2015

1.3 Revise the subdivision plan/zoning code to include requirements and incentives for low-impact development

- Activity Description
  - Lead: Planning
  - Priority: High
  - Status: Completed in 2010. The town adopted a low impact development ordinance in 2010. Development of brochures on rain gardens, rail barrels, and other handout information for homeowner consumption will be available soon.
  - Estimated Cost:
  - Potential Funding Source(s):
  - Timeframe: 2010

**Objective 2: Increase town capacity to plan for and simulate hazard impacts**

**Strategic Action:**
### 2.1 Develop GIS capacity to assist in emergency planning and response

**i. Activity Description**
- **Lead:** Planning
- **Priority:** Medium
- **Status:** In 2012 the Central Connecticut Regional Planning Agency received a grant to develop digital parcel databases for Burlington, Plainville, and Plymouth. This project was completed in November 2014.
- **Estimated Cost:**
- **Potential Funding Source(s):** Municipal, CRCOG, OPM
- **Timeframe:** 2012-2014

### Objective 3: Improve critical infrastructure and ensure access to critical facilities

#### Strategic Action:

#### 3.1 Improve bridges identified as needing repair through the bridge and dam inspection program

**i. Activity Description**
- **Lead:** Public Works
- **Priority:** High
- **Status:** In Progress/Ongoing. The bridge on Stillwell Drive has been repaired and the Tomlinson Avenue Bridge is currently in the approval process. Both bridges span the Quinnipiac River.
- **Estimated Cost:**
- **Potential Funding Source(s):** Municipal, ConnDOT
- **Timeframe:**

#### 3.2 Harden primary clarifiers at WPCA by adding approximately 2 feet to the top of the tanks. Actual height to be determined by a study.

**ii. Activity Description**
- **Lead:** WPCA
- **Priority:** High
- **Status:**
- **Estimated Cost:**
- **Potential Funding Source(s):** Municipal
- **Timeframe:** 2016

### Objective 4: Enable resident to better help themselves through preparedness education

#### Strategic Action:

#### 4.1 Develop and distribute a pamphlet about household preparedness for natural hazards

**i. Activity Description**
- **Lead:** Emergency Management
- **Priority:** High
- **Status:** Completed. Emergency preparedness pamphlets are provided at Town Hall, the Senior Center, and Public Library
- **Estimated Cost:**
- **Potential Funding Source(s):** Municipal
- **Timeframe:**
4.2 Post pamphlet and evacuation plan on town website

  ii. Activity Description
  ▪ Lead: Emergency Management, Staff
  ▪ Priority: High
  ▪ Status:
  ▪ Estimated Cost:
  ▪ Potential Funding Source(s): Municipal
  ▪ Timeframe:

4.3 Encourage preparedness workshops in schools

  iii. Activity Description
  ▪ Lead: Emergency Management, Public Schools
  ▪ Priority: Low
  ▪ Status:
  ▪ Estimated Cost:
  ▪ Potential Funding Source(s): Municipal
  ▪ Timeframe:

**Objective 5: Continue participation in National Flood Insurance Program**

**Strategic Action:**

5.1 Continue enforcement of floodplain management ordinances by regulating all new and substantially improved construction in flood zones.

  v. Activity Description
  ▪ Lead: Engineering
  ▪ Priority: High
  ▪ Status:
  ▪ Estimated Cost:
  ▪ Potential Funding Source(s):
  ▪ Timeframe:

5.3 Work with FEMA to update FIRMs as necessary

  vi. Activity Description
  ▪ Lead: Planning, Technical Services
  ▪ Priority: High
  ▪ Status:
  ▪ Estimated Cost:
  ▪ Potential Funding Source(s): Municipal
  ▪ Timeframe: 2015

5.3 Continue to distribute information about the NFIP to homeowners

  vii. Activity Description
  ▪ Lead: Technical Services
  ▪ Priority: High
  ▪ Status:
  ▪ Estimated Cost:
5.4 Continue to assist homeowners with amendments to NFIP maps as necessary

vi. Activity Description
- Lead: Technical Services
- Priority: High
- Status:
- Estimated Cost:
- Potential Funding Source(s): Municipal
- Timeframe:

THE FOLLOWING ADDITIONAL OBJECTIVES AND MITIGATION STRATEGIES ARE PROPOSED TO BE INCLUDED IN THE 2011 – 2016 PLAN UPDATE:

Contributors

Larry Sutherland (Fire Marshal / Civil Preparedness Director)
John Bossi (Town Engineer)
Mark DeVoe (Director of Planning & Economic Development)
Camen Matteo (Director of Public Works)

The map below shows the locations of “critical facilities” in Plainville, as well as the relationship between them, flood zones, and the most populated areas of town. As shown in the map, a large portion of Plainville is located within the 1% annual flood zone; this includes both Town Hall and the police headquarters. While one of the town’s schools is located in a flood zone, the town’s primary emergency shelter is not. Most of the most densely populated areas of town are close to a flood zone, but not in one.
While the above assets are necessary to keep the town up and running, emergency planners also pay close attention to their most vulnerable citizens. Populations that may be particularly vulnerable include: people living under the poverty line, people with limited or no English proficiency, minorities, and people who are dependent on transit. The maps below illustrate where these populations are located.

10 Vulnerability addresses the inability to withstand the impacts of a hazard.
11 In the final document, these maps will be moved to the regional analysis section. Data is not available on a small enough scale to make town-level analysis useful.
TOWN OF PLYMOUTH

Introduction

The Central Connecticut Region, which includes Plymouth, is updating its Natural Hazards Mitigation Plan. This plan lays out a series of goals, objectives, and projects that will be pursued by the region and its seven member municipalities over the next five years. The plan contains two parts. The first is a regional section that looks at risks from various natural hazards, and lays out a series of broad goals and objectives. The second is a collection of municipal plans. These municipal plans serve three functions. The first is to gather, in one place, information from various municipal departments about how the town currently prepares for, and responds to, natural disasters. The second is to gather the projects and priorities that the town will pursue to improve its disaster preparedness and strengthen its disaster response efforts. The last purpose is to make the town eligible for funding from the Federal Emergency Management Agency (FEMA). To be eligible for many of FEMA’s grant and assistance programs, a municipality must have a current FEMA-approved Natural Hazards Mitigation Plan.

What is presented below is Plymouth’s updated municipal section of the plan. It presents a brief overview of the town, its challenges, its vulnerabilities, and its goals and objectives for the next five years.

Background

The Town of Plymouth is the region’s gateway to Litchfield County. As a suburb of Bristol, Plymouth is primarily zoned for residential development, but the town is also home to commercial and retail development along State Route 6 and State Route 72 corridors, both of which cross the town and connect in other parts of the region to Interstate Highway 84. In addition, the town is home to small to medium-sized industrial zones located in Pequabuck and Greystone, and near Harwinton Avenue.

The Town of Plymouth was home to 12,193 residents in 2012, spread throughout 22.3 square miles. The 546 persons per square mile is below the state average of 644 persons per square mile, but more than double of Litchfield County’s average of 200. The town is also home to several distinct residential sections, including: Terryville (the largest section) located in the East of Plymouth, but also Pequabuck, Greystone, Fall Mountain, Lake Plymouth, East Church, and Plymouth Center. Topography and historical settlement patterns in the Town of Plymouth have maintained distinct boundaries between the sections.

According to its Plan of Conservation and Development (POCD), last published in 2005, the central focus was to increase economic development and conservation of open space. In particular, the plan included water supply and district mapping while identifying areas that require infrastructure upgrades. Sewers, water, and gas utilities are available in densely populated areas of the town of Plymouth.

Vulnerability and Risk

Winter storms and flooding represent the biggest natural hazard concerns for Plymouth. Winter plowing and deicing operations are performed exclusively by Public Works Department staff, and at times stretch manpower and resources beyond the available budget. Occasionally state forces are not available and the town will need to treat state roads, particularly when accidents occur. Plymouth has also had its emergency services strained during prolonged icing events, which can lead to power outages, shelter establishment and road closures throughout town. Preventive tree removal is also a high priority program that is under budgeted.
The town faces the same challenges from winter storms as do the other towns in the region: cleanup and management of the storms can be expensive; residents can be isolated by snowy and icy roads; and downed trees can block roads and cause power outages, depriving residents of electricity, communications, and even heat. As in other towns, the vast majority of residents, accustomed to Connecticut's weather, choose to shelter in place, waiting out the storms from the comfort of their own homes.

Removal of the ice and snow for Plymouth’s town-owned roads is handled by a combination of town workers and contractors; the town also handles debris removal. The table below considers the impact of Severe Winter Storms on the Town of Plymouth:

<table>
<thead>
<tr>
<th>Estimated Losses from a Severe Winter Storm like the October 2011 Snow Storm</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Customers Served (2013)</td>
<td>5,777</td>
</tr>
<tr>
<td>Maximum Outages During Severe Winter Storm (2011)</td>
<td>5,732</td>
</tr>
<tr>
<td>Maximum Outages Percentage of Customers (2011)</td>
<td>99.22%</td>
</tr>
<tr>
<td>Number of Businesses Experiencing Outages</td>
<td>25</td>
</tr>
<tr>
<td>Total Lost Wages (Daily)</td>
<td>$4,115.58</td>
</tr>
<tr>
<td>Average Lost Wages (Weekly)</td>
<td>$42,195.00</td>
</tr>
<tr>
<td>Miles of Local Roads Plowed by Town of Berlin</td>
<td>94.8</td>
</tr>
<tr>
<td>Municipal Cost (Plowing, Road Treatment)</td>
<td></td>
</tr>
<tr>
<td>Tons of Debris Removed</td>
<td>tons</td>
</tr>
</tbody>
</table>

Plymouth experiences regular flooding in three of its sub-regional watershed basins: the Poland River to the Northeast, the Pequabuck River in central Terryville, and Hancock Brook to the south. In the Poland River watershed, flooding problems include:

- Residential flooding on North Main Street due to insufficient capacity
- River level at the North Main Street bridge coming within inches of breach
- Marsh Brook breaches on North Riverside Ave at Sandra Ave, causing significant bank erosion in the rear of properties on Hoye Street.

The Pequabuck River watershed faces the following flooding risks:

- Insufficient culvert and channel capacity, which causes flooding from Beach Avenue through the rear of properties on Main Street and across Main to the junction of the Pequabuck and Poland rivers
- Flooding in the post office parking area can render it unusable
- Flooding has caused significant damage to the river bank that protects the Water Pollution Control Facility on Canal Street
- Floodwaters nearly reach the electrical substation on Woodside Lane

Flooding issues with Hancock Brook, to the south, include:

- Road closures and washouts along Old Waterbury Road due to inadequate private culverts in the area
- Regular flooding along Todd Hollow Brook due to combination of culvert and downstream capacity
- Localized street flooding which affects private properties when storm events exceed street drainage capacity

Drainage easements in many places are not clearly defined, which complicates maintenance and repair efforts.

CCRPA used FEMA’s Hazus-MH model to analyze potential risks that the Town of Plymouth might face from a major flooding event. The model estimates not only economic losses in the town including residential and commercial damage, but also business interruptions due to a flood having a 1% chance of occurring in any given year (the 100-year flood) would be $94,640,000. Key impact areas of such a flooding event are summarized in the table immediately below:

<table>
<thead>
<tr>
<th>Estimated Damages from 100-Year Flood</th>
<th>Households Displaced</th>
<th>266</th>
</tr>
</thead>
<tbody>
<tr>
<td>People Needing Shelter</td>
<td>418</td>
<td></td>
</tr>
<tr>
<td>Buildings at Least Moderately Damaged</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Total Estimated Economic Losses</td>
<td>$67,330,000.00</td>
<td></td>
</tr>
<tr>
<td>Total Residential Building &amp; Content Losses</td>
<td>$8,420,000.00</td>
<td></td>
</tr>
<tr>
<td>Total Commercial, Industrial, &amp; Other Building &amp; Content Losses</td>
<td>$58,590,000.00</td>
<td></td>
</tr>
<tr>
<td>Total Business Interruption Losses</td>
<td>$320,000.00</td>
<td></td>
</tr>
</tbody>
</table>

Plymouth’s large proportion of open space leads to some local concern over wildfires. Although wildfires do sometimes occur in Plymouth, the existence of an all-terrain response vehicle helps first responders’ access and control them.

A final concern in Plymouth is access: Routes 6 and 72 are both crossed by low railroad bridges with restrictive clearances that limit the height of approaching vehicles. This limits the ability of trucks and other large vehicles to access the town, which could be problematic in the case of a natural hazard.

CRCOG also used FEMA’s Hazus-MH model to analyze the risks that the Town of Plymouth might face from a hurricane as powerful as the 1938 hurricane. The model estimates the economic losses to the town including residential and commercial damage and business interruptions due to such a Category 3 hurricane would be approximately $20.7 million. The impacts of such a storm are summarized below:

<table>
<thead>
<tr>
<th>Estimated Damages from a 1938 Strength Hurricane</th>
<th>Households Displaced</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>People Needing Short-Term Shelter</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Buildings at Least Moderately Damaged</td>
<td>1,187</td>
<td></td>
</tr>
<tr>
<td>Building Completely Damaged</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Total Estimated Economic Losses</td>
<td>$20,721,230.00</td>
<td></td>
</tr>
<tr>
<td>Total Residential Building Losses</td>
<td>$16,750,330.00</td>
<td></td>
</tr>
<tr>
<td>Total Commercial, Industrial, &amp; Other Building Losses</td>
<td>$3,345,550.00</td>
<td></td>
</tr>
<tr>
<td>Total Business Interruption Losses</td>
<td>$625,350.00</td>
<td></td>
</tr>
<tr>
<td>Total Debris Generated (in tons)</td>
<td>192,815</td>
<td></td>
</tr>
<tr>
<td>Truckloads (at 25 tons/truck) of building debris</td>
<td>7,713</td>
<td></td>
</tr>
</tbody>
</table>

According to information from the town and the FEMA Public Assistance Funded Projects Summary (Open Government Initiative), there were 5 federally declared disasters between 2011 and 2013 that resulted in total expenses to the town and other local public and non-profit agencies of over $815
These expenses included debris and snow removal, emergency protective measures, and repairs to damaged infrastructure and buildings experienced by private citizens and businesses.

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<th>Applicant Municipality &amp; Other Agencies</th>
<th>DR-1958-CT 2011 Snow WS Charlotte</th>
<th>DR-4023-CT 2011 Tropical Storm Irene</th>
<th>DR-4046-CT 2011 Severe Storm Alfred</th>
<th>DR-4087-CT 2012 Hurricane Sandy</th>
<th>DR-4106-CT 2013 Severe Winter Storm</th>
<th>Total Damages Eligible for Public Assistance Due to 2011 - 2013 Disasters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Town of Plainville</td>
<td>$55,960.77</td>
<td>$259,621.49</td>
<td>$302,449.23</td>
<td>$197,408.79</td>
<td>$815,440.28</td>
<td></td>
</tr>
<tr>
<td>Other Agencies</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Plainville Total</td>
<td>$55,960.77</td>
<td>$259,621.49</td>
<td>$302,449.23</td>
<td>$197,408.79</td>
<td>$815,440.28</td>
<td></td>
</tr>
</tbody>
</table>

*Other Agencies = Fire Districts, Schools, Housing Authorities, Private and Non-Profit Agencies

**Existing Strategies**

The Town of Plymouth has in place codes and ordinances to reduce the risks to public health and property posed by flooding. These regulations primarily limit any activities on floodplains that would increase flood heights and velocities, or reduce or alter naturally occurring floodplains and water catchment areas. The town defines floodplains, hereafter special flood hazard areas, off of the Federal Flood Insurance Rate Maps identified in FEMA’s Flood Insurance Study. The following includes a brief description of how the Town of Plymouth is addressing flood risk in its most important planning documents.

<table>
<thead>
<tr>
<th>Planning Documentation</th>
<th>Year Established or Updated</th>
<th>Lead Department(s)</th>
<th>Recommendation for Natural Hazard Mitigation</th>
</tr>
</thead>
</table>
| Plan of Conservation & Development (POCD) | 2004 | Planning and Zoning Commission | • Each town in Connecticut is required to write a Plan of Conservation and Development at least once every 10 years. State statute requires that these plans address “protection of environmental assets critical to public health and safety” (Sec.8-23 CGS). Municipalities that comply with the requirements will become eligible for discretionary state funding.  
• The Plymouth Plan of Conservation and Development does not directly address flood risk. |
| Bristol-Plainville-Plymouth Pequabuck River Flooding Study | 2015 | Inland Wetlands and Conservation Commission | • The Bristol-Plainville-Plymouth Pequabuck River Flooding Study was made possible by a $200,000 grant from the Economic Development Administration.  
• This study will address flooding and the accompanying economic risks that have restrained development and recovery for the communities along the river following extensive flooding caused by rainfall during Hurricane Irene in 2011. |
The Town of Plymouth addresses development in special flood hazard areas in the Zoning Regulations (adopted 2008) under the Flood Damage Prevention Regulations.

These regulations fulfill the requirement for participation in the National Flood Insurance Program. The regulations apply to all special flood hazard areas identified by the Federal Emergency Management Agency in its “Flood Insurance Study.”

The regulations acknowledge that there are areas of periodic inundation, “which may result in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety and general welfare.”

The purpose of the regulations is therefore to restrict uses that result in greater vulnerability. This includes the prohibition of certain uses and the restriction of others. It also requires permits for all activities that might alter the river channel or floodplain. The Planning and Zoning Commission is authorized to administer permitting.

The regulations generally require that all new development is engineered to resist flood forces and that the lowest floor is elevated to at least one foot above base flood elevation (BFE). For non-residential construction, the lowest floor maybe located below BFE if it is adequately flood proofed to BFE. Similarly all utilities and electrical appliances must be located above the BFE or be situated to ensure no water is able to enter their workings.

Plymouth requires that manufactured homes and recreation vehicles that are parked in a special flood hazard area for longer than 180 days have their lowest floor elevated to or above the BFE within the special flood hazard area.

The Flood Damage Prevention Regulations stipulate that subdivision must minimize the risk of flood damage. This includes locating public utilities and other facilities away from danger.

In particular, the regulation requires that drainage be designed to reduce flood exposure, and that elevations and floodway data be included in all subdivision applications for parcels situated in the special flood hazard area.

The Plymouth Inland Wetlands and Conservation Commission was established in 1973 to implement the Inland Wetlands and Watercourses Regulations. Under Connecticut General Statutes all municipalities shall regulate activities on those wetlands and watercourses that lie within their borders. The regulations include a list of activities that may be regulated and the environmental justifications for the prohibitions.
<table>
<thead>
<tr>
<th><strong>Community Emergency Response Team (CERT)</strong></th>
<th>2015</th>
<th><strong>Emergency Management</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• While these regulations are primarily for the protection of environmental and ecological assets, they do address impacts to safety and public health. As such, the Inland Waterways and Watercourses Commission also has a role to play in mitigating risk in flood hazard areas.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>National Flood Insurance Program (NFIP)</strong></th>
<th>1982</th>
<th><strong>Town Manager</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Plymouth does not currently have a Community Emergency Response Team (CERT), but can improve the safety of its residents by creating a CERT.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Bristol, Burlington, New Britain and Southington have Community Emergency Response Teams (CERT). CERT is composed of volunteers who received training in disaster preparedness and response. Using the training, CERT members are able to assist town personnel and support emergency response functions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• For example, in Bristol CERT members are responsible for staffing the emergency shelter when it is activated. In addition, CERT members would engage with the community to educate fellow residents about disaster preparedness. They also have a library of resources online that provides information about emergency situations.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• The Town of Plymouth is a participating community in FEMA’s National Flood Insurance Program since 1982.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• The National Flood Insurance Program has paid 21 property damage claims in Plymouth totaling $223,229.84 to date.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• The National Flood Insurance Program has also paid 7 repetitive loss property damage claims in Plymouth on 3 properties. These claims have totaled $138,808.73.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Local Emergency Operations Plan</strong></th>
<th>2014-2015</th>
<th><strong>Emergency Management</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• All towns in Connecticut must annually prepare a Local Emergency Operations Plan and submit it to the Department of Emergency Management and Homeland Security (DEMHS) for review.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• These plans are meant to be applied during an emergency to maximize survival, give direction, integrate departments and expertise, define roles to departments and community leaders, and provide a basis for continued preparation. Specifically the plans identify town personnel and assign responsibilities to each department and its personnel during disasters and emergencies. As part of the plan, instructions are also outlined for activation of the emergency operations center.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• These plans offer communities an important opportunity to take stock of their level of preparedness and consider any additional steps they can take that may influence their ability to cope and recover.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Table X. Town of Plymouth Planning Documents.*
Current Mitigation and Response Activities

- Plymouth has flood control regulations that require certain improvements for development in the flood plain, including the use of flood resistant construction, raised connections to utilities and maintaining floodway capacity
- The Fire Department pumps out basements when they are inundated with more than 4 inches of water
- The Subdivision and site plan regulations require a zero increase in net runoff for new developments for the 25 year storm event for the Pequabuck and Poland River watersheds.
- Open Space Acquisition through subdivision regulations
- Annual Catch Basin cleaning
- The Town participates in DEMHS Region 5 for Regional Emergency Planning
- The town has intergovernmental mutual aid agreements in place with Burlington, Wolcott, Thomaston, Bristol, and Harwinton
- Completed NIMS training and a Tabletop exercise to test preparedness.
- The town has a portable 60KW generator that can be used when needed during an emergency.
- The centralized dispatch in Town Hall has been upgraded to allow for multiple dispatcher operation.
- Subdivision regulations require utilities to be buried.
- Town Hall is a Red Cross Certified Shelter.
- The EOC is located at 7 North Main St.

Goals, Objectives, and Strategies

The following section includes updates on objectives and mitigation strategies that were proposed during the 2011-2016 Natural Hazard Mitigation Plan.

**Goal:** maximize survival of people, prevent and/or minimize injuries and preserve property and resources of the Town of Plymouth in the event of natural disasters

**Objective 1: Improve town infrastructure to reduce hazard impacts**

**Strategic Action:**

1.1 Resolve flooding problems on Todd Hollow Road and Beach Avenue by reconstructing the drainage systems and roads

i. Activity Description
   - Lead: Public Works
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

1.2 Improve Bemis Street and Seymour Road
iii. Activity Description
   - Lead: Public Works
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

1.3 Upgrade bridges as necessary to alleviate flooding problems including North Main Street bridge

iv. Activity Description
   - Lead: Public Works
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

1.4 Provide for an increase in selective tree trimming and removal

v. Activity Description
   - Lead: Public Works
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

1.5 Increase the railroad clearances on Route 72 in Pequabuck

vi. Activity Description
   - Lead: Public Works
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

**Objective 2: Upgrade town facilities and assets to maximize response capabilities**

**Strategy Action:**

2.1 Certify the high school, fire houses, and Eli Terry Middle School as Red Cross Shelters

i. Activity Description
   - Lead: Public Works
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

2.2 Provide indoor space for equipment storage and build salt shed at the highway facility
ii. Activity Description
   - Lead: Public Works
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

2.3 Upgrade fire trucks and the traffic signals on Main Street to allow for emergency signal preemption

iii. Activity Description
   - Lead: Public Works
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

2.4 Install computer at EOC

iv. Activity Description
   - Lead: Public Works
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

2.5 Improve communication system

v. Activity Description
   - Lead: Public Works
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

2.6 Follow the objectives listed in the Fire Department’s Master Plan, including constructing a new Fire Station in the Fall Mountain area.

vii. Activity Description
   - Lead: Public Works
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

2.7 Increase size of the Police Department through Town Hall expansion

viii. Activity Description
   - Lead: Public Works
<table>
<thead>
<tr>
<th>Priority: High</th>
<th>Status:</th>
<th>Estimated Cost:</th>
<th>Potential Funding Source(s):</th>
<th>Timeframe:</th>
</tr>
</thead>
</table>

**Objective 3: Invest in training and equipment to increase response capacity**

**Strategic Action:**

3.1 Have a full-scale, multi-agency emergency response drill

i. Activity Description
   - Lead: Public Works
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

3.2 Train additional staff in WebEOC

ii. Activity Description
   - Lead: Public Works
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

3.3 Purchase additional emergency generator for Plymouth Fire House

iii. Activity Description
   - Lead: Public Works
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

3.4 take advantage of statewide Reverse-911 service through Everbridge

iv. Activity Description
   - Lead: Public Works
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

3.5 Use GIS to improve and coordinate response services

v. Activity Description
   - Lead: Public Works
Objective 4: Use policy and planning tools to address potential impacts of hazards

Strategic Action:

4.1 Prepare Dam Emergency Response Plan
   i. Activity Description
      - Lead: Public Works
      - Priority: High
      - Status:
      - Estimated Cost:
      - Potential Funding Source(s):
      - Timeframe:

4.2 Update the Town Emergency Response Plan at regular intervals
   ii. Activity Description
      - Lead: Public Works
      - Priority: High
      - Status:
      - Estimated Cost:
      - Potential Funding Source(s):
      - Timeframe:

4.3 Update the Shelter Management Plan
   iii. Activity Description
      - Lead: Public Works
      - Priority: High
      - Status:
      - Estimated Cost:
      - Potential Funding Source(s):
      - Timeframe:

4.5 Develop a Town Evacuation Plan
   iv. Activity Description
      - Lead: Public Works
      - Priority: High
      - Status:
      - Estimated Cost:
      - Potential Funding Source(s):
      - Timeframe:

4.6 Develop low-impact development regulations with incentives
   v. Activity Description
      - Lead: Public Works
- Priority: High
- Status:
- Estimated Cost:
- Potential Funding Source(s):
- Timeframe:

4.7 Prepare a town-wide Drainage/Flooding study

vi. Activity Description
- Lead: Public Works
- Priority: High
- Status:
- Estimated Cost:
- Potential Funding Source(s):
- Timeframe:

4.8 Better define drainage easements

vii. Activity Description
- Lead: Public Works
- Priority: High
- Status:
- Estimated Cost:
- Potential Funding Source(s):
- Timeframe:

4.9 Use GIS to improve governmental and emergency services

viii. Activity Description
- Lead: Public Works
- Priority: High
- Status:
- Estimated Cost:
- Potential Funding Source(s):
- Timeframe:

**Objective 5: Enable residents to better help themselves through preparedness education**

**Strategic Action:**

5.1 Provide emergency planning tools on the town website

i. Activity Description
- Lead: Public Works
- Priority: High
- Status:
- Estimated Cost:
- Potential Funding Source(s):
- Timeframe:

5.2 Encourage preparedness workshops in schools

ii. Activity Description
- Lead: Public Works
5.4 Take advantage of statewide Reverse-911 service through Everbridge

iii. Activity Description
- Lead: Public Works
- Priority: High
- Status:
- Estimated Cost:
- Potential Funding Source(s):
- Timeframe:

Objective 6: Coordinate plans and response efforts with neighboring parties to increase efficacy

Strategic Action:

6.1 Coordinate dam releases with upstream dam owners prior to significant rainfall events to reduce potential for downstream flooding

i. Activity Description
- Lead: Public Works
- Priority: High
- Status:
- Estimated Cost:
- Potential Funding Source(s):
- Timeframe:

6.2 Test coordination plans (above) with neighboring municipalities and other affected parties through a practice exercise, either tabletop or full-scale

ii. Activity Description
- Lead: Public Works
- Priority: High
- Status:
- Estimated Cost:
- Potential Funding Source(s):
- Timeframe:

Objective 7: Continue participation in National Flood Insurance Program

Strategic Action:

7.1 Continue enforcement of floodplain management ordinances by regulating all new and substantially improved construction in flood zones

i. Activity Description:
- Lead: Planning & Zoning
- Priority: High
- Status:
- Estimated Cost:
7.2 Work with FEMA to update FIRMs as necessary
   
   ii. Activity Description:
   - Lead: Planning, Public Works
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

7.3 Continue to distribute information about the NFIP to homeowners
   
   iii. Activity Description:
   - Lead: Planning
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

7.4 Continue to assist homeowners with amendments to NFIP maps as necessary
   
   iv. Activity Description:
   - Lead: Planning
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

THE FOLLOWING ADDITIONAL OBJECTIVES AND MITIGATION STRATEGIES ARE PROPOSED TO BE INCLUDED IN THE 2016 – 2021 PLAN UPDATE:

Contributors

The map below shows the locations of “critical facilities” in Plymouth, as well as the relationship between them, flood zones, and the most populated areas of town. As shown in the map, a large portion of Plainville is located within the 1% annual flood zone; this includes both Town Hall and the police headquarters. While one of the town’s schools is located in a flood zone, the town’s primary emergency shelter is not. Most of the most densely populated areas of town are close to a flood zone, but not in one.
While the above assets are necessary to keep the town up and running, emergency planners also pay close attention to their most vulnerable citizens. Populations that may be particularly vulnerable include: people living under the poverty line, people with limited or no English proficiency, minorities, and people who are dependent on transit. The maps below illustrate where these populations are located.

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12 Vulnerability addresses the inability to withstand the impacts of a hazard.
13 In the final document, these maps will be moved to the regional analysis section. Data is not available on a small enough scale to make town-level analysis useful.
TOWN OF SOUTHINGTON

Introduction

The Central Connecticut Region, which includes Southington, is updating its Natural Hazards Mitigation Plan. This plan lays out a series of goals, objectives, and projects that will be pursued by the region and its seven member municipalities over the next five years. The plan contains two parts. The first is a regional section that looks at risks from various natural hazards, and lays out a series of broad goals and objectives. The second is a collection of municipal plans. These municipal plans serve three functions. The first is to gather, in one place, information from various municipal departments about how the town currently prepares for, and responds to, natural disasters. The second is to gather the projects and priorities that the town will pursue to improve its disaster preparedness and strengthen its disaster response efforts. The last purpose is to make the town eligible for funding from the Federal Emergency Management Agency (FEMA). To be eligible for many of FEMA’s grant and assistance programs, a municipality must have a current FEMA-approved Natural Hazards Mitigation Plan.

What is presented below is Southington’s updated municipal section of the plan. It presents a brief town overview, its challenges, its vulnerabilities, and its goals and objectives for the next five years.

Background

The Town of Southington is a suburban community located in the south central part of the region. Southington shares borders with Berlin to the East, New Britain to the Northeast, Plainville to the North, and Bristol to the Northwest. The Town of Southington has historically been an agricultural community, but over time, it has grown to incorporate industrial and commercial districts, including a revitalized downtown. In addition, Southington also has several designated historic districts. In terms of land area, Southington is the largest town in the region, at 36 square miles, and the town is home to a variety of natural landscapes. Interstate Highways 84 and 691 flow through Southington; the interchange converges at the town’s Southern border. However, Southington is one of three towns in the CCRPA region that is not served by public transportation.

In 2012, the Town of Southington’s population was 43,731 residents, which translates to 1,195 persons per square mile. This falls slightly above the average of Hartford County (1,190 persons per square mile), but above the state average (644 persons per square mile). The median age increased to 43.8, which is older than the county and state medians (40 years old). According to the UCONN State Data Center, Southington is projected to see a 51% increase in its population, age 60 and over, from 2000 to 2025; this cohort is expected to comprise one-third of the town’s population by 2025. The percentage of single-family homes in Southington has increased to 78%, compared to the 77% in the 2000 census. By 2020, the population is expected to grow by .6%, which is higher than county or state growth rates, while the population proportion above age 60 will continue to rise above county and state averages.

In order to account for population growth and changes, the Town of Southington emphasized in the Plan of Conservation & Development (last adopted in 2006) to promote efficient development that accommodates a growing population and promotes additional infrastructure improvements to existing development. The Town of Southington aims to achieve these goals through remediation of brownfields and a review of zoning regulations to improve quality development and re-development. Furthermore, Southington recognized the importance of preserving open space that links preservation of resources, landscapes, historic and cultural districts, and recreational opportunities.
Vulnerability and Risk

Flooding from the Quinnipiac River is the main challenge for Southington. The town is relatively flat throughout, which means that floodwaters tend to recede very slowly. The Plantsville area, along West Main Street, is particularly hard-hit by flooding. It has an undersized drainage system that needs to be upgraded, especially within the floodplain of the Quinnipiac. Upgrading the system would improve the situation during smaller flood events, although the area would still likely flood during larger events.

Woodruff Street is another area with recurrent flooding. Although the publicly-owned culvert was replaced 15 years ago and is in good condition, the channel that runs across private land is undersized and needs to be widened and deepened for a length of approximately 3,000 feet. As the flooding issue occurs on private land, it is beyond the town’s ability to remedy. Additional recurring flood areas are along Curtis Street, North Main Street, Pratt Street, River Street, and Shweky Lane. The town’s floodplain ordinance mandates zero increase in storm water runoff in flood plain areas, and town staff places high priority on convincing property owners to provide adequate on-site floodwater storage.

CCRPA used FEMA’s Hazus-MH model to analyze potential risks that the Town of Southington might face from a major flooding event. The model estimates not only economic losses in the town including residential and commercial damage, but also business interruptions due to a flood having a 1% chance of occurring in any given year (the 100-year flood) would be $165,580,000. Key impact areas of such a flooding event are summarized in the table immediately below:

<table>
<thead>
<tr>
<th>Estimated Damages from 100-Year Flood</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Households Displaced</td>
<td>1,152</td>
</tr>
<tr>
<td>People Needing Shelter</td>
<td>2,574</td>
</tr>
<tr>
<td>Buildings at Least Moderately Damaged</td>
<td>173</td>
</tr>
<tr>
<td>Total Economic Losses</td>
<td>$165,580,000.00</td>
</tr>
<tr>
<td>Total Residential Building &amp; Content Losses</td>
<td>$45,490,000.00</td>
</tr>
<tr>
<td>Total Commercial, Industrial, &amp; Other Building &amp; Content Losses</td>
<td>$119,200,000.00</td>
</tr>
<tr>
<td>Total Business Interruption Losses</td>
<td>$900,000.00</td>
</tr>
</tbody>
</table>

The town faces the same challenges from winter storms as do the other towns in the region: cleanup and management of the storms can be expensive; residents can be isolated by snowy and icy roads; and downed trees can block roads and cause power outages, depriving residents of electricity, communications, and even heat. As in other towns, the vast majority of residents, accustomed to Connecticut’s weather, choose to shelter in place, waiting out the storms from the comfort of their own homes.

Removal of the ice and snow for Southington’s town-owned roads is handled by a combination of town workers and contractors; the town also handles debris removal. The table below considers the impact of Severe Winter Storms on the Town of Southington:

<table>
<thead>
<tr>
<th>Estimated Losses Resulting from a Severe Winter Storm like the October 2011 Snow Storm</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Customers Served (2013)</td>
<td>19,422</td>
</tr>
<tr>
<td>Maximum Outages During Severe Winter Storm (2011)</td>
<td>13,457</td>
</tr>
<tr>
<td>Maximum Outages Percentage of Customers (2011)</td>
<td>69.29%</td>
</tr>
<tr>
<td>Number of Businesses Experiencing Outages</td>
<td>15</td>
</tr>
<tr>
<td>Total Lost Wages (Daily)</td>
<td>$2,331.62</td>
</tr>
<tr>
<td>Average Lost Wages (Weekly)</td>
<td>$39,730.00</td>
</tr>
<tr>
<td>Miles of Local Roads Plowed by Town of Berlin</td>
<td>226.61</td>
</tr>
<tr>
<td>Municipal Cost (Plowing, Road Treatment)</td>
<td></td>
</tr>
<tr>
<td>Tons of Debris Removed</td>
<td></td>
</tr>
</tbody>
</table>
CRCOG also used FEMA’s Hazus-MH model to analyze the risks that the Town of Southington might face from a hurricane as powerful as the 1938 hurricane. The model estimates the economic losses to the town including residential and commercial damage and business interruptions due to such a Category 3 hurricane would be approximately $144.3 million. The impacts of such a storm are summarized below:

<table>
<thead>
<tr>
<th>Estimated Damages from a 1938 Strength Hurricane</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Households Displaced</td>
<td>160</td>
</tr>
<tr>
<td>People Needing Short-Term Shelter</td>
<td>34</td>
</tr>
<tr>
<td>Buildings at Least Moderately Damaged</td>
<td>5,096</td>
</tr>
<tr>
<td>Building Completely Damaged</td>
<td>59</td>
</tr>
<tr>
<td>Total Estimated Economic Losses</td>
<td>$144,303,410.00</td>
</tr>
<tr>
<td>Total Residential Building Losses</td>
<td>$115,541,930.00</td>
</tr>
<tr>
<td>Total Commercial, Industrial, &amp; Other Building Losses</td>
<td>$24,559,920.00</td>
</tr>
<tr>
<td>Total Business Interruption Losses</td>
<td>$4,201,560.00</td>
</tr>
<tr>
<td>Total Debris Generated (in tons)</td>
<td>522,484</td>
</tr>
<tr>
<td>Truckloads (at 25 tons/truck) of building debris</td>
<td>20,899</td>
</tr>
</tbody>
</table>

According to information from the town and the FEMA Public Assistance Funded Projects Summary (Open Government Initiative), there were 5 federally declared disasters between 2011 and 2013 that resulted in total expenses to the town and other local public and non-profit agencies of over $1.2 million. These expenses included debris and snow removal, emergency protective measures, and repairs to damaged infrastructure and buildings experienced by private citizens and businesses.

<table>
<thead>
<tr>
<th>Applicant Municipality &amp; Other Agencies</th>
<th>DR-1958-CT 2011 Snow Storm Irene</th>
<th>DR-4023-CT 2011 Tropical Storm Irene</th>
<th>DR-4046-CT 2011 Severe Storm Alfred</th>
<th>DR-4087-CT 2012 Hurricane Sandy</th>
<th>DR-4106-CT 2013 Severe Winter Storm</th>
<th>Total Damages Eligible for Public Assistance Due to 2011 - 2013 Disasters</th>
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</thead>
<tbody>
<tr>
<td>Town of Plainville</td>
<td>$86,570.24</td>
<td>$145,446.73</td>
<td>$785,017.55</td>
<td>$ -</td>
<td>$215,891.33</td>
<td>$1,232,925.85</td>
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<td>Other Agencies</td>
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<td>$ -</td>
<td>$ -</td>
<td>$4,122.75</td>
<td>$ -</td>
<td>$4,122.75</td>
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<tr>
<td>Plainville Total</td>
<td>$86,570.24</td>
<td>$145,446.73</td>
<td>$785,017.55</td>
<td>$4,122.75</td>
<td>$220,014.08</td>
<td>$1,237,048.60</td>
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</tbody>
</table>

*Table X. 2011 - 2013 Disasters Damage Amounts Eligible for 75% Reimbursement Under FEMA Public Assistance Program*

*Other Agencies = Fire Districts, Schools, Housing Authorities, Private and Non-Profit Agencies*

**Existing Strategies**

The Town of Southington has in place codes and ordinances to reduce the risks to public health and property posed by flooding. These regulations primarily limit any activities on floodplains that would increase flood heights and velocities, or reduce or alter naturally occurring floodplains and water catchment areas. The town defines floodplains, hereafter special flood hazard areas, off of the Federal Flood Insurance Rate Maps identified in FEMA’s Flood Insurance Study. The following includes a brief description of how the Town of Southington is addressing flood risk in its most important planning documents.
<table>
<thead>
<tr>
<th>Planning Documentation</th>
<th>Year Established or Updated</th>
<th>Lead Department(s)</th>
<th>Recommendation for Natural Hazard Mitigation</th>
</tr>
</thead>
</table>
| Plan of Conservation & Development (POCD) | 2006 | Planning and Zoning Commission | - Each town in Connecticut is required to write a Plan of Conservation and Development at least once every 10 years. State statute requires that these plans address “protection of environmental assets critical to public health and safety” (Sec.8-23 CGS). Municipalities that comply with the requirements will become eligible for discretionary state funding.  
- The POCD provides a brief introduction to the flood hazard within Southington. It diagrams the elements of a river corridor, provides a map of all floodplains within the municipality and broadly outlines the risk associated with flooding within the community. |
| Community Emergency Response Team (CERT) | 2015 | Emergency Management | - Southington has a Community Emergency Response Team (CERT).  
- CERT is composed of volunteers who received training in disaster preparedness and response. Using the training, CERT members are able to assist town personnel and support emergency response functions. For example, in Southington CERT members are responsible for staffing the emergency shelter when it is activated. CERT members engage with the community to educate fellow residents about disaster preparedness. They also have a library of resources online that provides information about emergency situations. CERT has been an important resource to residents in the preparedness stage. |
| National Flood Insurance Program (NFIP) | 1981 | Town Manager | - Moreover, the Town of Southington is a participating community in FEMA’s National Flood Insurance Program since 1981.  
- The National Flood Insurance Program has paid 68 property damage claims in Southington totaling $770,413.60 to date.  
- The National Flood Insurance Program has paid 30 repetitive loss property damage claims in Southington on 10 properties. These claims have totaled $541,025.91. |
<table>
<thead>
<tr>
<th>Regulation Type</th>
<th>Year</th>
<th>Commission/Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zoning Regulations</td>
<td>2014</td>
<td>Planning and Zoning Commission</td>
</tr>
<tr>
<td>- The Town of Southington addresses construction in special flood hazard areas in the Zoning Regulations, adopted in 1957 and amended 2014.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- The Town has adopted a Flood Damage Prevention Regulations that addresses floodplain management. The regulations apply to all special flood hazard areas identified by the Federal Emergency Management Agency in its “Flood Insurance Study.”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- The regulations acknowledge that there are areas of periodic inundation, “which may result in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety and general welfare.”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- The purpose of the regulations is therefore to restrict uses that result in greater vulnerability. This includes the prohibition of certain uses and the restriction of others. It also requires permits for all activities that might alter the river channel or floodplain. The town planner is appointed to administer and implement the regulations.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- The regulations require that all new development is engineered to resist flood forces and that the lowest floor is elevated to at least two feet above BFE. For non-residential construction, the lowest floor must be elevated to at least one foot above BFE. If the lowest floor is located below BFE it must be adequately flood proofed to the BFE. Similarly all utilities and electrical appliances must be located above the BFE or be situated to ensure no water is able to enter their workings.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Zoning Regulations require that manufactured homes and recreation vehicles that are parked in a special flood hazard area for longer than 180 days have their lowest floor elevated to two feet or higher above the BFE within the special flood hazard area.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subdivision Regulations</td>
<td>2005</td>
<td>Planning and Zoning Commission</td>
</tr>
<tr>
<td>- The Flood Damage Prevention Regulations stipulate that subdivision must minimize the risk of flood damage. This includes locating public utilities and other facilities away from danger.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- In particular, the regulation requires that drainage be designed to reduce flood exposure, and that elevations and floodway data be included in all subdivision applications for parcels situated in the special flood hazard area.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inland Wetlands and Watercourses Regulations</td>
<td>2013</td>
<td>Inland Wetlands and Conservation Commission</td>
</tr>
<tr>
<td>- The Inlands Waterways and Watercourses Agency of the Town of Southington was established in 1974 to implement the Inland Wetlands and Watercourses Regulations.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Under Connecticut General Statutes all municipalities shall regulate activities on those wetlands and watercourses that lie within their borders. The regulations include a list of activities that may be</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
regulated and the environmental justifications for the prohibitions. While these regulations are primarily for the protection of environmental and ecological assets, they do address impacts to safety and public health. As such, the Inland Waterways and Watercourses Commission also has a role to play in mitigating risk in flood hazard areas.

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• All towns in Connecticut must annually prepare a Local Emergency Operations Plan and submit it to the Department of Emergency Management and Homeland Security (DEMHS) for review. These plans are meant to be applied during an emergency to maximize survival, give direction, integrate departments and expertise, define roles to departments and community leaders, and provide a basis for continued preparation. Specifically the plans identify town personnel and assign responsibilities to each department and its personnel during disasters and emergencies. As part of the plan, instructions are also outlined for activation of the emergency operations center. These plans offer communities an important opportunity to take stock of their level of preparedness and consider any additional steps they can take that may influence their ability to cope and recover.</td>
<td></td>
</tr>
</tbody>
</table>

Table X. Town of Southington Planning Documents.

Current Mitigation and Response Activities

- The town's Open Space and Land Acquisition Committee cites “water quality / resource protection” and “flood control” as two of its rationales for acquisitions and targets wetlands and other properties valuable for pursuing those ends.

- The health department keeps lists of crucial facilities and vulnerable populations, and assists with evacuations during emergencies. The health director, Shane Lockwood, is also the deputy emergency management director.

- The water department has a water conservation plan in place, to be used in the event of drought.

- Town tests its emergency operations plan every 12 to 18 months; the last test was in June 2014.

- Flood plain regulations limit development that can occur in flood zones and flood ways.

- The town participates in the National Flood Insurance Program

- Participates in DEMHS Region 3 planning activities

Goals, Objectives, and Strategies

The following section includes updates on objectives and mitigation strategies that were proposed during the 2009-2014 Natural Hazard Mitigation Plan.

**Goal:** reduce losses of life and property, and minimize economic consequences of natural hazards.

**Objective 1:** Increase capacity to shelter large numbers of people in the case of an emergency
Strategic Action:

1.1 Inventory town shelters
   i. Activity Description:
      ▪ Lead: Emergency Management
      ▪ Priority: High
      ▪ Status:
      ▪ Estimated Cost:
      ▪ Potential Funding Source(s):
      ▪ Timeframe:

1.2 Invest in supplies sufficient to stock at least one shelter in case of a major event
   ii. Activity Description:
      ▪ Lead: Emergency Management
      ▪ Priority: High
      ▪ Status: Completed
      ▪ Estimated Cost:
      ▪ Potential Funding Source(s):
      ▪ Timeframe:

1.3 Develop a comprehensive shelter plan
   iii. Activity Description:
      ▪ Lead: Emergency Management
      ▪ Priority: Medium
      ▪ Status: Plan developed and is currently undergoing review and amendment.
      ▪ Estimated Cost:
      ▪ Potential Funding Source(s):
      ▪ Timeframe:

Objective 2: Improve town’s capacity to deal with hazards by investing in necessary equipment and upgrading infrastructure

Strategy Action:

2.1 Invest in emergency generators in order to keep critical facilities online during emergencies
   i. Activity Description:
      ▪ Lead: Public Works
      ▪ Priority: High
      ▪ Status:
      ▪ Estimated Cost:
      ▪ Potential Funding Source(s):
      ▪ Timeframe:

2.2 Invest in chainsaws and a wood chipper(s) to expedite removal of downed trees
   ii. Activity Description:
      ▪ Lead: Public Works
      ▪ Priority: High
      ▪ Status:
      ▪ Estimated Cost:
      ▪ Potential Funding Source(s):
2.3 Invest in sump pumps to more quickly remove floodwaters
   iii. Activity Description:
   - Lead: Public Works
   - Priority: High
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

2.4 Increase capacity of Plantsville drainage system
   iv. Activity Description:
   - Lead: Public Works
   - Priority: Medium
   - Status:
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

Objective 3: Improve citizen notification, awareness, and response time

Strategic Action:

3.1 Take advantage of the statewide Reverse-911 system offered through Everbridge
   i. Activity Description:
   - Lead: Administration, Emergency Management
   - Priority: High
   - Status: Personnel have been trained on the usage of the state system, however, the town invested in its own local Everbridge system.
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

3.2 Develop and distribute household preparedness pamphlets
   ii. Activity Description:
   - Lead: Emergency Management
   - Priority: High
   - Status: Completed
   - Estimated Cost:
   - Potential Funding Source(s):
   - Timeframe:

3.2 Encourage preparedness workshops in schools
   iii. Activity Description:
   - Lead: Emergency Management
   - Priority: High
   - Status: Established as part of STEPS (Southington Town-wide Effort to Promote Success) program and project is underway.
### Objective 4: Continue participation in National Flood Insurance Program (NFIP)

#### Strategic Action:

4.1 Continue enforcement of floodplain management ordinances by regulating all new and substantially improved construction in flood zones

   i. Activity Description:
      - Lead: Planning & Zoning
      - Priority: High
      - Status:
      - Estimated Cost:
      - Potential Funding Source(s):
      - Timeframe:

4.2 Work with FEMA to update FIRMs as necessary

   ii. Activity Description:
      - Lead: Planning, Public Works
      - Priority: High
      - Status:
      - Estimated Cost:
      - Potential Funding Source(s):
      - Timeframe:

4.3 Continue to distribute information about the NFIP to homeowners

   iii. Activity Description:
      - Lead: Planning
      - Priority: High
      - Status:
      - Estimated Cost:
      - Potential Funding Source(s):
      - Timeframe:

4.4 Continue to assist homeowners with amendments to NFIP maps as necessary

   iv. Activity Description:
THE FOLLOWING ADDITIONAL OBJECTIVES AND MITIGATION STRATEGIES ARE PROPOSED TO BE INCLUDED IN THE 2016 – 2021 PLAN UPDATE:

Contributors

Robert A. Phillips (Director of Planning and Community Development)
Harold Clark (Fire Chief)
Mark Sciota (Deputy Town Manager / Emergency Management Director),
Keith Hayden (Town Engineer)
Steve Wlodkowski (Director of Public Works)
Jim Grappone (Assistant Town Engineer)

The map below shows the locations of “critical facilities” in Southington, as well as the relationship between them, flood zones, and the most populated areas of town. As shown in the map, a large portion of Plainville is located within the 1% annual flood zone; this includes both Town Hall and the police headquarters. While one of the town’s schools is located in a flood zone, the town’s primary emergency shelter is not. Most of the most densely populated areas of town are close to a flood zone, but not in one.
While the above assets are necessary to keep the town up and running, emergency planners also pay close attention to their most vulnerable citizens. Populations that may be particularly vulnerable include: people living under the poverty line, people with limited or no English proficiency, minorities, and people who are dependent on transit. The maps below illustrate where these populations are located.

Supplemental Charts and Information

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14 Vulnerability addresses the inability to withstand the impacts of a hazard.
15 In the final document, these maps will be moved to the regional analysis section. Data is not available on a small enough scale to make town-level analysis useful.
<table>
<thead>
<tr>
<th>Municipality</th>
<th>Number of Facilities</th>
<th>Total Known Building Value</th>
<th>Total Known Contents Value</th>
<th>Estimated Building Value</th>
<th>Estimated Contents Value</th>
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Table X. Number of State Facility/Infrastructure and Building Values (2014). *Based on building and contents values outlined in State of Connecticut NHMP Update 2014

<table>
<thead>
<tr>
<th>Municipality</th>
<th>Correctional Institution</th>
<th>EMS</th>
<th>Fire Station(s)</th>
<th>Health Department(s)</th>
<th>Law</th>
<th>Enforcement</th>
<th>Nuclear Power Plant</th>
<th>Storage Tank</th>
<th>Farm</th>
<th>WPCF Privately Owned</th>
<th>WPCF Municipally Owned</th>
<th>Total</th>
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<tbody>
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<td>53</td>
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Table X. Inventory of critical facilities..
<table>
<thead>
<tr>
<th>Municipality</th>
<th>Thunderstorm Losses</th>
<th>Hurricane Losses</th>
<th>Tornado Losses</th>
<th>Winter Weather Losses</th>
<th>Flood Losses</th>
<th>SLR Losses</th>
<th>Erosion Losses</th>
<th>Dam Inundation Losses</th>
<th>WUI Losses</th>
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Loss Estimate by Hazard for CCRPA facilities and infrastructure (2014)