6.0 City of Bristol Annex

6.1 Introduction

The former Central Connecticut Region, which includes Bristol, is updating its Natural Hazard Mitigation Plan (the Plan). The goal of the Plan for the City of Bristol is to reduce losses of life and property, and minimize economic consequences of natural hazards. The City of Bristol has developed a series of objectives to meet this goal as discussed in Section 6.3, and specific strategies are identified under appropriate objectives with the goal of enacting these strategies by 2021.

The Plan contains two parts. The first four chapters comprise a regional section that considers risks from various natural hazards, and lays out a series of broad goals and objectives. The final seven chapters is a collection of municipal plans referred to as "annexes". These municipal annexes serve three functions. The first is to gather, in one place, information from various municipal departments about how the City currently prepares for, and responds to, natural hazards. The second is to gather the projects and priorities that the community will pursue to improve its natural hazard preparedness and strengthen its disaster response efforts. The final purpose is to make the community 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 Hazard Mitigation Plan that is adopted by the local governing body by resolution.

Chapter 6 presents the updated municipal annex of the Plan for the City of Bristol. It presents a brief overview of the city, its challenges, its vulnerabilities, and its goals, objectives, and strategies for the next five years.

6.1.1 Background

The City of Bristol is situated in the west central section of the former CCRPA region, with Burlington to the north, Plainville to the east, Southington to the south, and Plymouth to the west. Other neighboring communities include Farmington to the northeast and Wolcott to the southwest.

Bristol encompasses 26.4 square miles of land area and is home to 60,477 residents as of the 2010 census. Bristol has a population density of 2,290 persons per square mile, which is above the Hartford County average (1,190 persons per square mile) and the state average (644 persons per square mile). The median age in Bristol (as of 2012) 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. Housing in the City of Bristol is varied with only 59.9% of residences classified as single-family households.

Elevation in Bristol ranges from approximately 190 to 980 feet. Most of the land area in Bristol drains to the Pequabuck River, a tributary to the Farmington River. Some of the southern portion of the city eventually drains to the Quinnipiac River, while the southwest portion of the city eventually drains to the Naugatuck River. A small portion of the northeast corner drains directly to the Farmington River. Aside from the Pequabuck River, other major streams in Bristol include Coppermine Brook, Negro Hill Brook, and Polkville Brook.

The city contains several distinct sections, including Chippens Hill, Edgewood, and Forestville. 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. Bristol's major businesses and industries include entertainment, manufacturing, and health care. Top employers include ESPN (3,400 employees), and Bristol Hospital (1,750 employees). An active segment of the Hartford, Providence and Fishkill Railroad is operated by Pan Am Southern for freight between New Britain and Waterbury. The city is relatively built-out, with most recent commercial and industrial development occurring on properties that have previously been developed. A small amount of residential development and redevelopment is also occurring.

The City of Bristol is professionally managed by staff assisting a full-time Mayor. The Police and Court complex includes the Emergency Operations Center. The Police Department is comprised of approximately 125 full-time police officers, and additional emergency dispatch personnel and support staff. Fire protection is provided by a full-service fire department with five engine companies and one tower company.

In its most recent iteration of the Plan of Conservation and Development (POCD 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. To this end, recent updates to the City's zoning and subdivision regulations include requirements for land to be set aside for open space purposes.

The 2015 POCD incorporates several elements of the initial 2011 Plan, including a discussion of 1% annual chance and 0.2% annual chance floodplains and steep slopes and the need to avoid building in unsafe areas. The POCD anticipates the future adoption of low-impact development policies to mitigate the impacts of stormwater runoff on flooding and natural resources. As the population of the community, building square footage, and associated infrastructure increases, so does the risk of damage from natural hazards as discussed in the next section.

6.2 Challenges

The top three natural hazards that present a high risk to Bristol include flooding, winter storms, and tropical storms/hurricanes. According to information from the City and the FEMA Public Assistance Funded Projects Summary (Open Government Initiative), there were 10 federally declared disasters or emergencies since 1999 that resulted in reimbursement requests to FEMA. These expenses included debris and snow removal, emergency protective measures, and repairs to damaged infrastructure and buildings experienced by private citizens and businesses. A summary is presented in Table 6-1. The types of events in this table are consistent with the top three natural hazards listed above.

Event	Name	Declaration Date	City of Bristol Reimbursement	Other Local Agency[1] Reimbursement	Total Cost[2]
DR-1302	Tropical Storm Floyd	9/23/1999	$187,324.80	$0	$249,766.40
EM-3176	Snow (February)	3/11/2003	$136,862.55	$0	$182,483.40
EM-3192	Snow (December)	1/15/2004	$135,751.50	$4,505.07	$187,008.76

Event	Name	Declaration Date	City of Bristol Reimbursement	Other Local Agency[1] Reimbursement	Total Cost[2]
EM-3200	Snow (January)	2/17/2005	$147,482.14	$4,145.40	$202,170.05
DR-1619	Severe Storms and Flooding (October)	12/16/2005	$159,403.80	$0	$212,538.40
EM-3266	Snow (February)	5/2/2006	$167,392.85	$0	$223,190.47
DR-1958	Severe Winter Storm	3/3/2011	$120,809.11	$7,367.75	$170,902.48
DR-4023	Tropical Storm Irene	9/2/2011	$370,895.08	$0	$494,526.77
DR-4046	Severe Storm Alfred	11/17/2011	$2,834,682.16	$45,732.20	$3,840,552.48
DR-4106	Severe Winter Storm	3/21/2013	$287,038.28	$20,871.49	$410,546.36

Table 6-1 Recent Disasters Where Bristol Applied for Public Assistance.

1. Other Agencies = Fire Districts, Schools, Housing Authorities, Private and Non-Profit Agencies
2. Assuming that federal reimbursement was 75% of damages.

Source: FEMA

Other natural hazards present a moderate or low risk. A general discussion of the City of Bristol's emergency response capabilities and a discussion of the vulnerability of the community to each hazard is discussed in more detail in the sections below.

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 and state 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.

6.2.1 All Hazards

The City of Bristol has a variety of emergency operation procedures in place to respond to the effects of natural hazards. In addition to maintaining an Emergency Operations Plan (updated annually) and an Emergency Operations Center, the City maintains shelters, has identified warming/charging stations, and has identified a variety of resources to assist with response to natural hazard events. The City maintains a training program for its emergency personnel and maintains extensive information regarding preparedness on its website. The City utilizes the statewide CT Alerts emergency notification system when residents need to be informed about a natural hazard event. The City is considering performing a registration drive to encourage residents to sign up for the service.

The Senior Center and Chippens Hill Middle School are currently used as shelters, with the Senior Center being the primary shelter. The generator at the Senior Center is relatively new, but the generator at Chippens Hill Middle School is 20 years old and failed to operate during a recent disaster. The City is prioritizing this generator for replacement. Bristol acquires shelter supplies whenever possible, and all shelters have been recently restocked with cots and blankets. Bristol residents may also use the regional shelter in Plainville. The City recognizes that most residents choose to shelter in place if possible, and recommends that residents stock five days of supplies.

Several additional facilities are equipped with backup power, although additional generators are needed. All of the local fire stations have generators, but the generators at two of the stations are greater than 10 years old and are believed to be appropriate for updating. In particular, the generator

at Station 5 is only large enough to provide minimal power to the facility and an upgrade is desired. The City of Bristol installed a new generator at the Police Station in 2015 with funding provided by a FEMA grant. The generator at City Hall needs to be upgraded as it can only power the lowest floor of the building where Public Works and Engineering is located. All water and sewer pumping stations have been recently outfitted with backup power supplies. The City has relatively remote installations supplying the communications to municipal and emergency services. These installations have generators but several are greater than 10 years old. The City would like to acquire a portable generator to provide additional redundancy to the existing backup power supplies. Bristol Hospital also has generators for backup power supply.

While the above assets are necessary to keep the city 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.

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 former CCRPA region, at 9%. This is, however, lower than the state and national averages.

The FEMA Student Tools for Emergency Planning (STEP) program began in May 2015 for local fifth graders. This program teaches students how to prepare for emergencies.

6.2.2 Flooding

Flooding is a primary concern in the city with recurrent flooding occurring throughout the city and regular localized flooding occurring at known locations several times per year. 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.

Location

Figure 6-1 below shows the locations of critical facilities in Bristol, as well as the relationship between them, flood zones, and the most populated areas of the city. 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.

Areas at risk of flooding are generally unchanged since the initial Plan. These include the confluence of Coppermine Brook and the Pequabuck River, Coppermine Brook in the vicinity of Farmington Avenue and Stevens Street, and the Pequabuck River in Forestville and downtown.

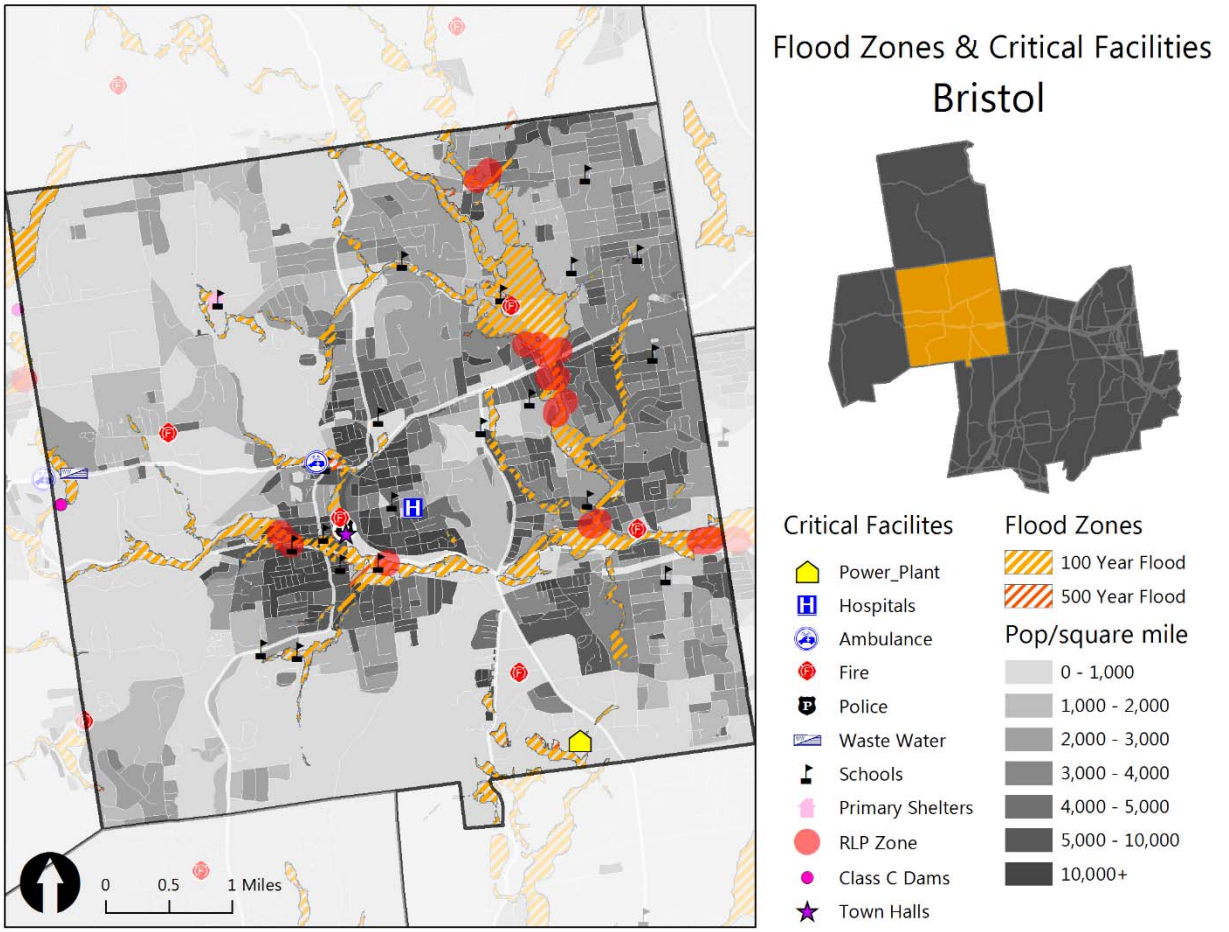

Figure 6-1. Flood Zones, Critical Facilities, and Population Density in Bristol.

Existing Capabilities

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, but also stipulate the use of flood-resistant materials, floodproofing, and requirements for the elevation of the lowest floor and on-site water storage. All new buildings constructed since the city joined the NFIP have not been allowed to have their first floor below the base flood elevation, and the City adopted a one-foot freeboard requirement as part of its 2008 floodplain management ordinance update.

The City defines floodplains, hereafter special flood hazard areas, off of the Federal Flood Insurance Rate Maps identified in FEMA's Flood Insurance Study. Table 6-2 includes a brief description of how the City of Bristol is addressing flood risk in its most important planning documents. Approximately 2,700 housing units and buildings in the city are located within the 1% annual chance floodplain based on a 2014 risk assessment prepared for the Bristol Fire Department.

Planning Documentation	Year Established or Updated	Lead Department(s)	Recommendation for Natural Hazard Mitigation
Plan of Conservation & Development (POCD)	Last Adopted: 2000 Amended: 2011 Draft Plan: 2015	Planning and Zoning Commission	• 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. • 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. • The POCD stresses a need to discourage development that negatively affects wetlands and watercourses, particularly along the Pequabuck River.
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." • The ordinance requires one foot of freeboard for all new construction or substantial improvement.
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

Planning Documentation	Year Established or Updated	Lead Department(s)	Recommendation for Natural Hazard Mitigation
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 in 2015	Conservation Commission	• The Bristol-Plainville-Plymouth Pequabuck River Flooding Study was made possible by a $200,000 grant from the Economic Development Administration. • The study 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.

Planning Documentation	Year Established or Updated	Lead Department(s)	Recommendation for Natural Hazard Mitigation
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	Engineering Department	• The City of Bristol is a participating community in FEMA's National Flood Insurance Program since 1988 and intends to continue participation in the NFIP for the foreseeable future. • 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. Two of the properties are considered to be severe repetitive loss properties.
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 6-2. City of Bristol Planning Documents.

City staff believe that existing ordinances do a good job of discouraging development in and near wetlands and in floodplains. Enforcement and outreach regarding floodplain activities is performed by Public Works and Engineering, with outreach typically occurring on a case-by-case basis. Members of the public commented at the public information meeting that the reduction of impervious surfaces is needed to reduce peak runoff and flash flooding, and also noted that the City should increase its public outreach efforts regarding flooding. The City plans to develop low-impact development regulations over the next few years to mitigate the effect of stormwater runoff as identified in the POCD.

The City of Bristol recently completed the Copper Mine Brook Study which included the evaluation of many flood mitigation alternatives to reduce local and downstream flooding. Four projects were selected to be brought to permitting-level design. The Frederick Street project and Staples projects are

moving forward, and the Richards Court project has been modified to eliminate the berm due to easement issues. The water company land floodplain storage area project has been abandoned due to cost-benefit issues.

The Pequabuck River Study began in 2013 and was nearing completion at the time of this writing. This study (prepared by the engineering firm AECOM and paid for with the assistance of a grant from the State of Connecticut) has examined the impact of the Pequabuck River on the communities of Plymouth, Bristol, and Plainville and identifies measures to reduce the impact of flooding. The study includes major revisions to the hydrology and hydraulics originally used to generate the special flood hazard area for the Pequabuck River, and it is expected that the effective FIS and FIRMs for the three communities will be updated with the new information. Although hoped for by the three communities, the Pequabuck River Study did not identify any one project that would provide significant mitigation for all three communities.

The Pequabuck River Study evaluated numerous alternatives for mitigating flooding, including the installation of flood control structures to detain flows, channelization of the river, construction of levees and floodwalls, sediment removal to enlarge the channel, removal of vegetation, enlargement of bridge crossings, removal of instream obstructions, individual floodproofing, acquisitions, and modifications of local ordinances. The following potential structural strategies and actions have been identified for Bristol:

- Joining the FEMA Community Rating System (CRS) program. The initial goal for Bristol would be to become rated Class 8 which would provide a 10% cost savings to residents with flood insurance.

- Implementing a floodproofing technical assistance program. AECOM estimates that there are 311 buildings within the 1% annual chance floodplain, and floodproofing could reduce the risk of regular flooding damage. City activities would include coordinating a citywide educational program on floodproofing, providing individual assistance to property owners to determine if they are eligible for Letters of Map Amendment (LOMAs) to reduce insurance rates, researching and maintaining a list of qualified vendors, and coordinating grant funding with FEMA and the State of Connecticut.

- Constructing an elevated floodwall at the Pequabuck River Culvert inlet headwall and wing walls. This downtown culvert has the capacity to convey the 1% annual chance flood, but no freeboard is available to mitigate the effect of debris blockages. This project would reduce the flooding potential of approximately 11 buildings.

- Implementing a predictive flood warning program specific to Bristol. This project involves re-activation of the USGS gaging station in Forestville, and coordination with the National Weather Service to incorporate the Forestville gage into the Advanced Hydrologic Prediction System to estimate flood elevations and potential flood inundation zones based on forecast precipitation.

Other non-structural mitigation measures are also identified, including updating this Plan, developing low-impact development guidance and adopting standards in conjunction with other watershed communities, updating the local floodplain management ordinance to meet current model ordinance requirements, and developing a Pequabuck River flood response plan to allow dam operators with gated spillways a chance to close or open spillways to mitigate the effect of flooding. These include adding a freeboard requirement of two feet for all new development and substantial improvement, and selective acquisitions of properties.

Other strategies and actions identified in the Pequabuck River Study will not be pursued. These include large-scale sediment removal from the river and excavating banks to increase conveyance. Both options are considered to be too costly, may have only a temporary benefit (for dredging), and are unlikely to be permitted by regulatory authorities.

At the location where Copper Mine Brook empties into the Pequabuck, an existing railroad bridge has long been believed to exacerbate 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 have prevented the City from taking action and replacing it. This issue was evaluated during the Pequabuck River Study, with the preliminary findings suggesting that only a nearby pump station would benefit from replacement of the bridge. Therefore, mitigation activities specific to this railroad bridge are not anticipated to be pursued further.

There are local concerns regarding culvert capacity, although the City has worked to improve a number of culverts. This is performed wherever necessary, although information is not available regarding the condition of culverts on private property. For example, replacement of the Frederick Street bridge near the mouth of Copper Mine Brook is ongoing, and the drainage system on Barnes Street is being upgraded. The City has an annual inspection and maintenance (if needed) schedule for its bridges and culverts.

All new construction is designed using the most recent NRCC rainfall return periods in accordance with December 2014 CT DOT guidance. The City has not evaluated other culverts in the community based on the new rainfall return periods. Drainage and flooding complaints are routed to either the Fire Department or Public Works, depending on if it is an emergency. Usually Public Works will be involved in resolving any complaint.

The $13.5 million sanitary sewer overflow project identified in the initial Plan is essentially completed. There are a few areas that are in the 10-year capital improvement plan which will be updated in that timeframe. The phased inflow and infiltration reduction project (a separate project) is still in progress. The City purchased a grout truck to grout the sewer mains and has an active grouting program ongoing.

Following Tropical Storm Irene in August 2011, the NRCS performed four projects in Bristol related to the mitigation of flooding. One involved the removal of debris from channels. The remaining three were bank stabilization projects. The City also attempted to acquire properties at risk of flooding following Irene, but grant funding was not available to do so.

The City's capability to mitigate flooding damage is considered to be effective at preventing damage to new development and substantial improvements. In general, the level of capability of the City of Bristol relative to all facets of flood mitigation has slightly increased since the 2011 Plan. The recent studies have enabled the City to move towards mitigation projects that will reduce the impacts of flooding over the long-term. The City's participation in the MapMod program several years ago resulted in digital FIRMs for the community which make it easier to demonstrate floodplain boundaries to property owners.

Impacts and Loss Estimates

Flood losses reported under the NFIP to properties in Bristol are listed in Table 6-2. Several historical events were noted by City personnel. In particular, Tropical Storm Irene caused extensive flooding in

the city, particularly along the Pequabuck River. A total of $8 million in damage was reported. Parts of Farrell Avenue and Route 72 were washed away or collapsed.

The area along Frederick Street is prone to flooding from both Copper Mine Brook and the Pequabuck River, and City assistance is often needed to pump water back to the brook. Local residents on Frederick Street claimed that the cost of flood insurance has essentially doubled in the last 10 years as a result of the MapMod program and recent changes to flood insurance.

Members of the public claimed that there are several areas where private retention ponds are not properly designed or maintained. These overtop during large storms and overflow into streets, causing localized flooding and exacerbating storm drainage system overflows. Broad Street was also mentioned as a recurring flooding area.

CCRPA used FEMA's HAZUS-MH model to analyze potential risks that the City of Bristol might face from a major flooding event. A Level 1 HAZUS-MH Analysis was prepared by CCRPA. Such analyses are known to generally skew high in part based on the limited data entered by the user. Thus, while the numbers below are likely higher than would actually be experienced under a 1% annual chance flood event, they are nonetheless useful for planning purposes. The model estimates that the total economic losses in the city including residential and commercial damage and business interruptions due to a flood having a 1% chance of occurring in any given year (the 100-year flood) would be $189,690,000. Key impact areas of such a flooding event are summarized in Table 6-3.

Impact of Flooding	Estimated Damage from 1% Annual Chance Flood Event
Households Displaced	1,504
People Needing Shelter	3,487
Buildings at Least Moderately Damaged	108
Total Estimated Economic Losses	$189,690,000
Total Residential Building & Content Losses	$44,410,000
Total Commercial, Industrial, & Other Building & Content Losses	$144,070,000
Total Business Interruption Losses	$1,210,000

Table 6-3. HAZUS-MH 1% Annual Chance Flood Losses for Bristol.
Source: HAZUS-MH

Based on the public assistance reimbursements in Table 6-1, the City of Bristol has incurred approximately $956,831.57 since 1999 for impacts due to flooding. Based on the information for the NFIP in Table 6-2, a total of $3,713,058.85 has been paid out to NFIP-insured properties since 1988 (26 years). The annualized loss due to flooding based on this information is $206,598.73. The annualized loss estimate based on the county-wide damages presented in the 2014 *Connecticut Natural Hazards Mitigation Plan Update* (CT NHMP) as described in Section 3.2 is much lower at $35,186. The greater figure is utilized herein as an estimate of annualized loss for the community.

6.2.3 Winter Storms

Winter storms are among the greatest natural hazard concerns for the City of Bristol. Snow and ice removal can become quite expensive, exceeding municipal budgets. Ice and snow can make roads

impassable and knock down tree limbs which in turn disrupts utility service. The combined effect can leave people stranded in their homes, potentially without heat or power.

Location

All areas of Bristol are susceptible to winter storms. Higher elevations may be at a greater risk because the frequency of winter storm events is typically greater in such areas. Areas in floodplains are at increased risk of winter storm damage due to any flooding that may accompany a winter storm.

Existing Capabilities

The City has a Winter Operations Plan that governs municipal response to winter storm events. The effect of recent winter storms has led the City to modify the plan, including adjustments to snow plowing priorities.

The City has 125 miles of local roads and several tens of miles of state roads. Removal of the ice and snow (and debris removal) for Bristol's city-owned roads is handled by a combination of staff and contractors. Most of the work is given to contractors, with several contractors having large equipment on standby for specialized needs. When the police requests assistance, the City will plow Route 6 if the Connecticut DOT is not able to clear the state road in a reasonable amount of time. In general, major thoroughfares and routes to the hospital are cleared first, followed by higher elevation areas. Minor roads have the lowest priority unless they are part of a route to a critical facility.

The Chippens Hill area, such as Perkins Street and Hill Street have occasional problems with drifting snow because they are open farmland. These are mitigated through additional municipal plowing efforts. When icing occurs, Public Works investigates and eventually installs a drainage system if necessary. City staff believe that there are very few areas where icing is a recurring issue.

The majority of roofs on City-owned buildings are flat, including the schools. The City has an informal program to review snow accumulation on town-owned roofs each winter, with clearing occurring when depths are sufficiently deep or wet. The City does not believe that it needs a formal snow load evaluation and removal program at this time.

The City 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. Following a microburst in the summer of 2011, the City was already working to build a better relationship with Eversource when the severe storms hit. 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 current plans to bury older infrastructure. One member of the public suggested that the City should require the use of hardened poles (steel or concrete) moving forward similar to what is now required in Florida. This strategy allows wires to be restrung without having to replace a snapped pole.

The City's capabilities are considered to be effective in regards to response to winter storms, although the City's capability to mitigate severe winter storm damage is limited to City facilities. In general, the level of capability of the City of Bristol relative to all facets of winter storm mitigation has slightly increased since the 2011 Plan with the introduction of the informal snow load evaluation procedures, the improved coordination between the City and Eversource, and the recent adjustments to Bristol's Winter Operations Plan.

Impacts and Loss Estimates

Two recent storms had a significant impact on the city. The first was Winter Storm Alfred in late October 2011, and the second was the blizzard of January 2013.

Table 6-4 below considers the impact of Winter Storm Alfred on the city. Debris removal was the largest impact, although residents were left without heat for up to nine days. The Emergency Operations Center was open full time for three days while power was being restored. Businesses with refrigerated goods had substantial losses.

Impact of Severe Winter Storm	Estimated Losses from a Severe Winter Storm Comparable to Winter Storm Alfred (October 2011)
Number of Electrical 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 City of Bristol	223.24
Municipal Cost (Plowing, Road Treatment, Cleanup)	$3,840,552.48

Table 6-4. October 2011 Severe Winter Storm Losses for Bristol.
Source: Eversource, CCRPA Internal Analysis

The January 2013 blizzard produced a significant amount of snow in Bristol. Snow removal was the primary financial impact, and the City needed two large loaders to remove it. The City expended its entire snow removal budget along with the contingency fund on that one event.

Based on the public assistance reimbursements in Table 6-1, the City of Bristol has incurred $5,216,854.00 since 1999 (15 years) for impacts due to winter storms. The annualized loss due to winter storms based on this information is $347,790.26. The annualized loss estimate based on the county-wide damages presented in the 2014 CT NHMP as described in Section 3.2 is much lower at $64,451. The greater figure is utilized herein as an estimate of annualized loss for the community.

6.2.4 Tropical Cyclones and Hurricanes

Bristol faces a number of challenges due to tropical storms and hurricanes. The primary problem is dealing with the impact of downed trees which can interrupt power supply for many days and hinder egress through neighborhoods. Secondary impacts are generally caused by heavy rainfall accompanying the storm.

Location

All areas of Bristol are susceptible to tropical storms and hurricanes. Higher elevations may be at a greater risk because the speed of the wind may be greater. Areas in floodplains are at increased risk of tropical storm and hurricane damage due to any flooding that may accompany such an event. A few mobile home parks exist in the city with structures that may be more susceptible to strong winds.

Existing Capabilities

The City of Bristol uses a variety of preparedness and response procedures to deal with the impacts of tropical storms and hurricanes. City departments have purchased sufficient supplies over the past few years to be prepared for the next major storm event. The City believes it has an adequate budget dedicated to tree maintenance. The City has a full tree crew and hires contractors for larger jobs. Much of the tree trimming in Bristol near power lines is conducted by Eversource Energy. A significant amount of trimming occurred in Bristol following the 2011 storms.

The City's capabilities are considered to be effective with regard to mitigating hurricane damage. In general, the level of capability of the City of Bristol relative to all facets of tropical storm and hurricane mitigation has slightly increased since the 2011 Plan given that the recent trimming by Everbridge has reduced the overall vulnerability of the city.

Impacts and Loss Estimates

Following Tropical Storm Irene in 2011, power was lost for approximately five days in Bristol, and with power restored to most areas within two days. A maximum of 7,479 customers were without power.

CCRPA 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 city 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 in Table 6-5.

Impact of Simulated 1938 Hurricane Today	Estimated Losses from 1938 Hurricane Event
Households Displaced	395
People Needing Short-Term Shelter	95
Buildings at Least Moderately Damaged	6,684
Building Completely Damaged	58
Total Estimated Economic Losses	$192,182,090
Total Residential Building Losses	$151,866,830
Total Commercial, Industrial, & Other Building Losses	$35,032,500
Total Business Interruption Losses	$5,282,760
Total Debris Generated (in tons)	436,423
Truckloads (at 25 tons/truck) of building debris	17,457

Table 6-5. HAZUS-MH 1938 Hurricane Simulated Losses for Bristol.
Source: HAZUS-MH

Based on the public assistance reimbursements in Table 6-1, the City of Bristol has incurred $494,526.77 in damages since 1999 (15 years) for impacts due to tropical storms and hurricanes. The annualized loss due to tropical storms and hurricanes based on this information is $32,968.45. The annualized loss estimate based on the county-wide damages presented in the 2014 CT NHMP as estimated by HAZUS-MH is much higher at $3,791,216. The greater figure is utilized herein as an estimate of annualized loss for the community.

6.2.5 Thunderstorms and Tornadoes

Bristol faces regular challenges due to tornadoes and thunderstorms, although these events are typically less damaging than tropical storms or hurricanes. The primary problem is dealing with the impact of downed trees which can interrupt power supply and hinder egress through neighborhoods. Secondary impacts are generally caused by heavy rainfall accompanying the storm, and direct wind damage or lightning and hail damage to structures and vehicles.

Location

All areas of Bristol are susceptible to tornadoes and thunderstorms. Higher elevations may be at a greater risk because the speed of the wind may be greater. Areas in floodplains are at increased risk of thunderstorm damage due to any flooding that may accompany such an event.

Existing Capabilities

The strategies used to mitigate tornado and thunderstorm damage are similar to those used to mitigate damage from tropical storms and hurricanes. The City budget for tree maintenance is considered sufficient at this time. This is only for City properties and right-of-ways.

The City's capability to mitigate thunderstorm damage is similar to that for tropical storms and hurricanes, but the City's ability to mitigate tornado damage is relatively limited. In general, the level of capability of the City of Bristol relative to all facets of thunderstorm and tornado mitigation has slightly increased since the 2011 Plan with the recent tree trimming work that has been performed over the past few years.

Impacts and Loss Estimates

According to City staff, there are no areas of the City that are specifically prone to wind damage. The tornado that touched down in Bristol in 2010 had a path approximately 1.73 miles long and caused an estimated $550,000 in damage. Most of the damage was to trees and power lines.

The annualized loss estimate for thunderstorms based on the county-wide damages presented in the 2014 CT NHMP as described in Section 3.2 is $8,032. The annualized loss estimate for tornadoes based on the county-wide damages presented in the 2014 CT NHMP as described in Section 3.2 is $887,310.

6.2.6 Wildfires

Bristol does not typically experience wildfires; they are very rare in the city. When wildfires do occur, most are accidentally set, although some have been ignited by lightning or undetermined sources.

Location

Less developed areas in Bristol are at the highest risk for a wildfire, particularly on the large contiguous forested areas adjacent to Willis Street.

Existing Capabilities

The City maintains mutual aid agreements with all surrounding communities for fire protection. The City does not maintain any dry hydrants or cisterns. The public water system is generally relied upon to provide fire protection water. Some areas have been identified that have an insufficient number of hydrants. Tanker trucks are typically used when water is not immediately available. If necessary, the City would draft water from surface water sources. Section 7-17 of the municipal code presents the City's open burning requirements which were adopted as of December 14, 2010 and requires permits issued by the Fire Marshal or Fire Chief to conduct open burning for the control or destruction of pests, diseases, floodplain brush and debris, vegetation management, for the control of frost and the warming

of livestock, or to abate an immediate fire hazard or abate a health hazard as determined by the local director of health. The burning of brush and leaves at residences is not allowed.

The Bristol Fire Department completed a "Community Risk Assessment for Bristol Fire Operations" in August 2014. The plan indicates that less than two wildfires or brush fires occur in Bristol each year, and the severity of these fires is low. No recommendations were provided for improving the City's ability to fight wildfires.

The City's capabilities are considered to be effective in regards to wildfire response, and the City does not believe it needs to participate in the Connecticut DEEP's Open Burning Program at this time. In general, the level of capability of the City of Bristol relative to all facets of wildfire mitigation is unchanged since the 2011 Plan.

Impacts and Loss Estimates

The greatest areas of concern are the areas of city that do not have public water service. These areas are primarily in the southwestern corner of the city. However, as noted above, wildfires are very rare in Bristol.

The annualized loss estimate for wildfires based on the county-wide damages presented in the 2014 CT NHMP as described in Section 3.2 and the population density of Bristol is $1,058.

6.2.7 Drought

Only severe droughts would have the potential to cause damages in Bristol. The short-duration and moderate droughts that generally occur every few years are not a concern to City staff.

Location

All areas of Bristol are susceptible to drought. Property owners with private wells may have an increased risk of damage due to drought as lower groundwater levels could impact water supply wells.

Existing Capabilities

The City primarily relies on regional and statewide measures for mitigating the impacts of drought such as the Connecticut Drought Management Plan. The municipal water department maintains an Emergency Contingency Plan that outlines the necessary response procedures when drought is impacting their sources of supply, including issuing voluntary and mandatory water conservation measures for customers when reservoir levels are sufficiently low. The City Water Department is a member of the Water Utility Coordinating Committee that will be reconvening in 2016 and will discuss regional water supply issues and needs including ensuring that supply is available during periods of drought.

The City does not perform any other mitigation activities for drought and its capability to mitigate drought is relatively limited. In general, the level of capability of the City of Bristol relative to all facets of drought mitigation is unchanged since the 2011 Plan.

Impacts and Loss Estimates

City staff could not recall any specific damages due to drought, although the City Water Department has asked customers to undertake voluntary conservation measures due to drought in recent years. This most recently occurred in September 2015 but also occurred in 2002 and 2007. City staff did not recall any well deepening permits or new drilling permits being issued recently due to private wells going dry during a drought as public water is available in most parts of the community.

Based on the information above, it is likely that the annualized loss due to drought has been minimal over the past 20 years. An annualized loss figure of $0 has been used for this Plan update. This is likely lower than the actual annualized loss due to drought, but the number is considered acceptable at this time and can be revised if needed in future updates of this Plan.

6.2.8 Earthquakes

Although low intensity earthquakes regularly occur in Connecticut, these earthquakes are not damaging and are generally imperceptible to residents. Stronger earthquakes have historically occurred in Connecticut which have the potential to cause critical levels of damage.

Location

All areas of Bristol are susceptible to damages due to earthquakes. Property owners with structures that pre-date current building codes (particularly pre-1990 structures) are considered to be at increased risk of suffering earthquake damages, as well as structures built on sandy soils that could be prone to liquefaction (see Section 3.2.8).

Existing Capabilities

Due to the very infrequent nature of damaging earthquakes, and the fact that earthquakes generally cannot be predicted, local land use policies in Bristol do not directly address earthquake damage. In the event that significant earthquake damage occurred, the City of Bristol would activate its Emergency Operations Plan and respond as appropriate.

The City's capability to mitigate earthquake damage is limited. In general, the level of capability of the City of Bristol relative to all facets of earthquake mitigation is unchanged since the 2011 Plan.

Impacts and Loss Estimates

City staff could not recall any damages occurring due to earthquakes. The annualized loss estimate for earthquakes based on the county-wide damages presented in the 2014 CT NHMP is $13,792. The low figure is consistent with the lack of earthquake damage in the recent historical record.

6.2.9 Dam Failure

Several tens of dams could affect the City of Bristol with their failure, although only one Class C (high hazard) dam lies within the city boundaries. Several significant and high hazard dams lie upstream of Bristol in Plymouth and Burlington.

Location

Only areas of Bristol that lie immediately downstream of dams, or near watercourses that are downstream of dams, are susceptible to dam failure. In many cases a breach could flood a similar area to the 1% annual chance or 0.2% annual chance flood; in some cases (particularly for high hazard dams) the impacted area could be much wider. Table 6-6 summarizes the high and significant hazard dams that could affect Bristol based on files maintained by the Connecticut DEEP. None of the dams were listed to be in poor condition on the 2013 list.

Dam Name	Hazard Class	Dam Use	Dam Condition	Owner	Downstream Watercourse
Bristol Reservoir #1 Dam	C	Water Supply	Fair	City of Bristol	Pequabuck River
Bristol Reservoir #3 Dam	B	Water Supply	Not Rated	City of Bristol	Poland River

Dam Name	Hazard Class	Dam Use	Dam Condition	Owner	Downstream Watercourse
Jacklin Lake Dam (Dunham Mill Pond)	B	Recreation	Not Rated	Private	Tributary to Pequabuck River
Old Marsh Pond Dam (Bristol Reservoir #7)	C	Water Supply	Good	City of Bristol	Marsh Brook
Page Park Pond Dam	B	Recreation	Not Rated	City of Bristol	Tributary to Copper Mine Brook
Whigville Reservoir	C	Water Supply	Satisfactory	City of New Britain	Whigville Brook
Zeiner Pond Dam (Lake Winfield Dam)	B	Recreation	Good	Town of Plymouth	Tributary to Pequabuck River

Table 6-6. Summary of Dams Whose Failure Could Significantly Impact Bristol.
Source: Connecticut DEEP

Existing Capabilities

The Bristol Water Department owns several Class C (high hazard) and Class B (significant hazard) dams. All of the Class C dams reportedly have EAPs. The Water Department recently hired a consultant to perform dam inspections on a two-year / 5-year basis for its dams for the next few years based on the inspection requirements of Connecticut DEEP. These dams are reportedly well-maintained and in fair or good condition.

The Bristol Brass Dam was recently removed from the Pequabuck River. The low hazard dam was a full barrier to fish passage, and its removal opened up an additional 8.5 stream miles to fish coming from Long Island Sound.

City staff were not aware of any concerns with privately-owned dams in Bristol. An earthen dam overtopped during Irene and washed out Farrell Avenue, but this was an isolated incident that occurred during construction. The City has copies of EAPs prepared for other dams whose failure could affect Bristol; this information is maintained by the Emergency Management Director.

The Bristol Storm Water Control Trust functions similar to a land trust but oversees 22 storm water control areas, holding ponds, detention ponds, dams, and other structures related to storm water in the city. Maintenance is performed by Public Works as authorized by the Trust and these areas are generally in good condition.

The City's ability to mitigate dam failure is considered to be good for City-owned dams but limited for privately owned dams and dams owned by other municipalities (in these cases, preparation for emergency response is the primary goal). In general, the level of capability of the City of Bristol relative to all facets of dam failure mitigation has slightly increased since the 2011 Plan with the recent dam safety law revisions that have occurred statewide.

Impacts and Loss Estimates

Potential losses downstream of Class C (high hazard) dams could be catastrophic, while potential losses downstream of Class B (significant hazard) dams could be significant. An annualized loss estimate for dam failure was developed assuming that failure had a 0.1% annual chance of occurrence in consideration of the estimated value of properties within the 0.2% annual chance floodplain in Bristol. The annualized loss in Bristol due to dam failure is estimated to be $5,000. This figure is low consistent with the very few dam failure incidents which have occurred in the city.

6.3 Goals, Objectives, and Strategies

The goal and five objectives from the 2011 Plan were upheld. No additional objectives were identified, although Objective #5 was re-written to "Mitigate impacts to properties in the National Flood Insurance Program" because the City of Bristol intends to continue participation in the NFIP.

6.3.1 Status of Previous Strategies and Actions

Table 6-7 presents the status of the strategies and actions originally developed in the initial 2011 Plan.

Objective	Task	Priority	Responsible Department	Comment	Status
1. Improve City's Capacity to Deal with Hazards by Investing in Necessary Equipment and Training	Invest in supplies sufficient to stock existing shelter for major mass care event	Medium	Emergency Management	Shelters are now stocked	Completed
2. Improve Infrastructure to Minimize Flooding Impacts	Increase capacity of culverts where necessary; encourage private property owners to improve capacity of culverts on private land where necessary	High	Public Works	This is done when necessary and as funding allows and is a capability	Delisted
	Improve City sewer system to prevent sewer backups during flood events	Medium	Public Works	This project is essentially completed except for the remaining areas scheduled in the 10-year Capital Improvement Plan	Completed
	Replace railroad bridge where Coppermine Brook empties into the Pequabuck River (requires railroad cooperation)	Medium	Public Works	This strategy was evaluated as part of the Pequabuck River Study and found to not be viable because it will have minimal mitigation benefit	Delisted
3. Build Upon Existing Preparedness Education Efforts	Encourage preparedness workshops in schools	High	Emergency Management	The FEMA STEP program began in May 2015	Completed
	Consider posting signs along evacuation routes to raise public awareness	High	Emergency Management	The City does not have formal evacuation routes, instead they are event specific	Delisted

Objective	Task	Priority	Responsible Department	Comment	Status
4. Continue Participation in the National Flood Insurance Program	Continue enforcement of floodplain management ordinances by regulating all new and substantially improved construction in flood zones	High	Inland Wetlands & Watercourses Commission	This is regularly performed and is a capability	Delisted
	Work with FEMA to update FIRMs as necessary	High	Public Works, Inland Wetlands & Watercourses Commission	The MapMod program was completed several years ago	Completed
	Continue to distribute information about the NFIP to homeowners	High	Inland Wetlands & Watercourses Commission	This is performed on request and is a capability	Delisted
	Continue to assist homeowners with amendments to NFIP maps as necessary	High	Inland Wetlands & Watercourses Commission	This is performed on request and is a capability	Delisted

Table 6-7. Status of Previous Strategies and Actions for Bristol.

6.3.2 Current Strategies and Actions

This section includes new strategies and actions as well as updates on objectives. No mitigation strategies were carried forward from the 2011-2016 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 and training

Strategies and Actions:

1.1 Acquire generators to increase backup power capability for critical facilities

Action Description:	The City has identified several backup generator needs. Chippens Hill Middle School (backup shelter) has a 20-year old generator which is unreliable and failed during a recent storm event. The generator at City Hall only powers the lowest floor of the building and needs to be upgraded to allow additional City services to be available. The generators at two of the City's Fire Stations and several of the City communications facilities are greater than 10 years old and could be approaching the end of their useful life, and the generator at Station 5 can only provide minimal power to the facility and should be upgraded. The City would like to obtain a portable generator for use as a backup to ensure that communications are not affected.
Lead:	Emergency Management
Priority:	Medium
Status:	Not Started (Grant Dependent)
Estimated Cost:	Moderate
Potential Funding Source(s):	Municipal Capital Budget, HMGP
Timeframe:	7/2016 to 6/2021

1.2 Install additional fire hydrants in areas with insufficient spacing.	
Action Description:	City staff indicated that there are an insufficient number of hydrants in certain areas of the city, and additional hydrants are needed. Such areas include outlying areas near the urban-wildland interface that are at risk of damage from wildfires.
Lead:	Emergency Management
Priority:	High
Status:	Not Started
Estimated Cost:	Moderate
Potential Funding Source(s):	Municipal Capital Budget
Timeframe:	7/2016 to 6/2021.

Objective 2: Improve infrastructure to minimize flooding impacts

Strategies and Actions:

2.1 Revise the subdivision/zoning code to include policies for low-impact development	
Action Description:	Low-impact development techniques are anticipated to reduce the amount of stormwater runoff from new developments which could reduce the amount of flooding experienced over time. These are anticipated to be developed in conjunction with other Pequabuck River Watershed communities.
Lead:	Planning Staff
Priority:	Medium
Status:	Not Started (Recommendation of 2015 POCD and Pequabuck River Study)
Estimated Cost:	Moderate
Potential Funding Source(s):	Municipal Operating Budget
Timeframe:	7/2016 to 6/2021

2.2 Construct an elevated floodwall at the Pequabuck River Culvert inlet headwall and wing walls.	
Action Description:	This project would reduce the flooding potential of 11 buildings by reducing the effect of debris blockage at the culvert during the 1% annual chance flood.
Lead:	Public Works
Priority:	Medium
Status:	Not Started (Recommendation of Pequabuck River Study)
Estimated Cost:	High
Potential Funding Source(s):	Municipal Capital Budget, HMGP, PDM, FMA
Timeframe:	7/2016 to 6/2021

2.3 Develop a Pequabuck River flood response plan to provide dam operators guidance on how to use dams to mitigate the effect of downstream flooding.	
Action Description:	Several dams in the Pequabuck River watershed have spillways which can be controlled by gates. A coordinated plan to mitigate peak flows could allow for reduced flooding damage in downstream communities.
Lead:	Public Works, Water Department
Priority:	Low
Status:	Not Started (Recommendation of Pequabuck River Study)
Estimated Cost:	Moderate
Potential Funding Source(s):	Municipal Operating Budget
Timeframe:	7/2016 to 6/2018

Objective 3: Build upon existing preparedness education efforts

Strategies and Actions:

3.1 Perform a registration drive to encourage signups for CT Alerts Emergency Notification System	
Action Description:	The City wishes to perform a registration drive to encourage residents to sign up to be automatically informed about natural hazard events as they are occurring. Targeted mailings may be used to encourage signups in particularly vulnerable areas, such as special flood hazard areas and dam failure inundation areas.
Lead:	Emergency Management
Priority:	High
Status:	Not Started
Estimated Cost:	Low
Potential Funding Source(s):	Municipal Operating Budget
Timeframe:	7/2016 to 6/2017

3.2 Increase outreach efforts regarding flood mitigation	
Action Description:	Members of the public requested that the City increase the amount of outreach performed to educate residents about flood insurance, flood mitigation techniques, and ongoing activities to reduce flood damage in the city. In addition, the Pequabuck River Study identified a need to implement a floodproofing technical assistance program. This would include a citywide educational program on floodproofing, providing individual assistance to property owners to determine if they are available for LOMAs to reduce insurance rates, researching and maintaining a list of qualified vendors, and coordinating grant funding.
Lead:	Public Works
Priority:	Low
Status:	Not Started (Recommendation of Pequabuck River Study)
Estimated Cost:	Moderate
Potential Funding Source(s):	Municipal Operating Budget
Timeframe:	7/2016 to 6/2018.

3.3 Implement a predictive flood warning program specific to Bristol	
Action Description:	The City would retain the USGS to reactivate the USGS gage on the Pequabuck River in Forestville, and coordinate with the National Weather Service to incorporate the gage into the Advanced Hydrologic Prediction System to estimate flood elevations and potential flood inundation zones based on forecast precipitation.
Lead:	Public Works
Priority:	High
Status:	Not Started (Recommendation of Pequabuck River Study)
Estimated Cost:	Moderate
Potential Funding Source(s):	Municipal Operating Budget
Timeframe:	7/2016 to 6/2019

3.4 Incorporate updated hazard mitigation information into community plan updates	
Action Description:	Hazard mitigation information will be incorporated into future plan updates such as the POCD
Lead:	Planning Staff
Priority:	High
Status:	Not Started
Estimated Cost:	Low
Potential Funding Source(s):	Municipal Operating Budget
Timeframe:	7/2016 to 6/2021

3.5 Participate in the statewide Water Utility Coordinating Committee process	
Action Description:	The Connecticut DPH is preparing a Coordinated Water Supply Plan for the entire state beginning in 2016. The City Water Department will participate to address drought-related public water supply needs throughout the community.
Lead:	Water Department
Priority:	High
Status:	Not Started
Estimated Cost:	Low
Potential Funding Source(s):	Municipal Operating Budget
Timeframe:	7/2016 to 6/2018

3.6 Ensure local officials have most updated version of the Connecticut Drought Management Plan	
Action Description:	The Connecticut Drought Management Plan is periodically updated. Local officials, land use commissions, health departments, fire departments, and local water utilities should all be made aware of updates to this plan.
Lead:	Water Department
Priority:	Medium
Status:	Not Started
Estimated Cost:	Minimal
Potential Funding Source(s):	Municipal Operating Budget
Timeframe:	7/2016 to 6/2021

Objective 4: Mitigate damage to properties in National Flood Insurance Program

Strategies and Actions:

4.1 Join the FEMA Community Rating System at Class 8	
Action Description:	Joining CRS at Class 8 would provide a 10% discount on flood insurance for all policyholders in Bristol.
Lead:	Public Works
Priority:	Medium
Status:	Not Started (Recommendation of Pequabuck River Study)
Estimated Cost:	Moderate
Potential Funding Source(s):	Municipal Operating Budget
Timeframe:	7/2016 to 6/2019

4.2 Update the local floodplain management ordinance to meet current model ordinance requirements	
Action Description:	The City of Bristol last updated this ordinance in 2008. Since that time, FEMA and the Connecticut DEEP have revised the model ordinance. In addition, one of the recommendations of the Pequabuck River Study is to increase the freeboard requirement to two feet for new buildings and substantial improvements.
Lead:	City Council / Inland Wetlands & Watercourses Commission
Priority:	High
Status:	Not Started (Recommendation of Pequabuck River Study)
Estimated Cost:	Moderate
Potential Funding Source(s):	Municipal Operating Budget
/Timeframe:	7/2016 to 6/2018

4.3 Work with RLP owners to mitigate RLPs upon property owner request	
Action Description:	Repetitive loss properties in Bristol are typically only damaged during severe flood events. 34 repetitive loss properties are located in Bristol that have experienced 107 flood losses. Two of these RLPs are considered to be severe RLPs. Mitigation could include acquisition/demolition, elevation, floodproofing, or other techniques.
Lead:	Public Works
Priority:	Medium
Status:	Not Started (Property Owner and Grant Dependent)
Estimated Cost:	High
Potential Funding Source(s):	Municipal Capital Budget, HMGP, PDM, FMA
Timeframe:	7/2016 to 6/2021

6.4 Contributors to Plan Update

Walter Veselka, P.E. (Public Works Director)
Harley Graime (Emergency Management Director)
Paul Strawderman (City Engineer)
Ray Rogozinski (Assistant City Engineer)
Alan Weiner (City Planner)
Jay Kolakoski (Fire Chief)
John Ziogas (Deputy Chief, Fire Department)

James Blasehke (Fire Department)
Tom Calvello (Captain, Police Department)
Brian Gould (Captain, Police Department)
Thomas Grimaldi (Police Chief)
Paul Daprile (Resident)
Paula Donaghy (Resident)
Steve Donaghy (Resident)