

## 10.0 Town of Plymouth Annex

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### 10.1 Introduction

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The former Central Connecticut Region, which includes Plymouth, is updating its Natural Hazard Mitigation Plan (the Plan). The goal of the Plan for the Town of Plymouth is to 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. The Town of Plymouth has developed a series of objectives to meet this goal as discussed in Section 10.3, 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 Town 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 10 presents the updated municipal annex of the Plan for the Town of Plymouth. It presents a brief overview of the town, its challenges, its vulnerabilities, and its goals, objectives, and strategies for the next five years.

#### 10.1.1 Background

The Town of Plymouth is located at the western edge of the former CCRPA region and is the only former CCRPA community located in Litchfield County. The City of Bristol borders Plymouth to the east, and Burlington borders to the northeast. Other neighboring communities include Harwinton to the north, Thomaston to the west, and Waterbury and Wolcott to the south.

Plymouth encompasses 21.7 square miles of land area and is home to 12,243 residents as of the 2010 census. Plymouth has a population density of 564 people per square mile which is below the state average (644 persons per square mile) but more than double the Litchfield County average (200 persons per square mile).

Elevation in Plymouth ranges from approximately 450 to 950 feet. Most of the land area in Plymouth drains to the Naugatuck River with the remainder draining to the Pequabuck River. Notable streams in Plymouth include the Poland River and Marsh Brook which drain to the Pequabuck River; and Sutcliffe Brook, Nibbling Brook, Todd Hollow Brook and Hancock Brook which drain to the Naugatuck River in Thomaston and Waterbury. The town is home to several distinct residential sections, including Terryville (the largest section) located in the east side of Plymouth, 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.

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 former CCRPA region to Interstate 84. Another major thoroughfare is Route 262. In addition, the town is home to small to medium-sized industrial zones located in Pequabuck and Greystone, and near Harwinton Avenue. A railroad line carries freight from Waterbury to New Britain through the southeastern section of Plymouth.

Plymouth's major businesses and industries include local government (including schools), manufacturing, health care and social assistance, and construction. Top employers include Nicard Enterprises, Alliance One, Inc., Al Simmons Co. Inc., and the cook Willow Convalescent Hospital. Recent development has been relatively steady in the community. Several new stores have been built on Route 6 over the past few years, and the Plymouth Business Park has reached its third construction phase with 40 acres of land still available. A major redevelopment project is underway on South Main Street for the construction of a propane gas wholesale distribution center which, when constructed, will be the largest propane distribution center in Connecticut. This facility will receive supplies by rail for distribution to retailers. Residential development has been relatively slow over the past five years, with only a few single family homes being built.

The Town of Plymouth is professionally managed by a full-time Mayor who is assisted by municipal staff. The basement of Town Hall (the Police Department) serves as the Emergency Operations Center and the Middle School acts as the backup. The Police Department is comprised of 24 full-time police officers and additional dispatch and support staff. Fire protection is provided by the volunteer Plymouth Fire Department through three fire stations.

Sewers, water, and gas utilities are available in the more densely-populated areas of Plymouth. The Plymouth 2015 Plan of Conservation and Development (POCD) update identifies that 3,438 acres of buildable (unconstrained) land remains in Plymouth, with a potential population increase of 7,684 people at full-buildout over the next 40 years. The POCD update includes recommendations such as considering low-impact development regulations, reconvening the Town's Storm Water Committee, and implementing the recommendations of the Pequabuck River Study. The 2015 POCD update incorporates several elements of natural hazard mitigation planning as presented in the 2011 initial plan, including discussion of the impact of extreme weather events and the need to adhere to local floodplain regulations. 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.

## 10.2 Challenges

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The top three natural hazards that present a high risk to Plymouth include flooding, winter storms, and tropical storms/hurricanes. According to information from the Town and the FEMA Public Assistance Funded Projects Summary (Open Government Initiative), there were 11 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 10-1. The types of events in this table are consistent with the top three natural hazards listed above.

Other natural hazards present a moderate or low risk. A general discussion of the Town of Plymouth'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.

Event	Name	Declaration Date	Town of Plymouth Reimbursement	Other Local Agency <sup>1</sup> Reimbursement	Total Cost <sup>2</sup>
DR-1302	Tropical Storm Floyd	9/23/1999	\$10,158.92	\$0	\$13,545.23
EM-3176	Snow (February)	3/11/2003	\$34,284.45	\$0	\$45,712.60
EM-3192	Snow (December)	1/15/2004	\$30,061.99	\$0	\$40,082.65
EM-3200	Snow (January)	2/17/2005	\$56,338.01	\$0	\$75,117.35
DR-1619	Severe Storms and Flooding (October)	12/16/2005	\$34,828.21	\$0	\$46,437.61
DR-1700	Severe Storms and Flooding (April)	5/11/2007	\$16,283.28	\$0	\$21,711.04
DR-1958	Severe Winter Storm	3/3/2011	\$55,960.77	\$0	\$74,614.36
DR-4023	Tropical Storm Irene	9/2/2011	\$259,621.49	\$19,242.68	\$371,818.89
DR-4046	Severe Storm Alfred	11/17/2011	\$302,449.23	\$0	\$403,265.64
DR-4087	Hurricane Sandy	10/30/2012	\$31,631.72	\$0	\$42,175.63
DR-4106	Severe Winter Storm	3/21/2013	\$197,408.79	\$0	\$263,211.72

*Table 9-1 Recent Disasters Where Plymouth 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*

While the Town of Plymouth 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 and state routes and highways, rail lines, historical sites, business and employment centers, schools, elderly populations, building and building content value, and 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.

### **10.2.1 All Hazards**

The Town of Plymouth 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 Town maintains shelters, has identified warming/charging stations, and has identified a variety of resources to assist with response to natural hazard events. The current Emergency Operations Plan for the Town will need to be revised to include procedures specific to the proposed propane distribution facility.

The Town maintains a training program for its emergency personnel, and utilizes low-band radios and ham radio to provide emergency and regional communications during extended outages when traditional services are not available. The Town coordinates with DEMHS Region 5 for regional emergency response, and has GIS capabilities to coordinate emergency planning and response. In general, the Town attempts to get emergency response activated as many as five days prior to a natural hazard event. The Town utilizes the statewide CT Alerts emergency notification system when residents need to be informed about a natural hazard event, but performs door to door notifications when necessary. The Town also participates in DEMHS Region 5 for regional emergency planning.

The Town maintains extensive information regarding preparedness on its website, preparedness pamphlets are available at municipal buildings, and the local cable access channel is used to discuss emergency planning and preparedness. The Emergency Management Director publishes one to two monthly safety bulletins (including articles related to natural hazard preparedness) in the Plymouth Connection, a free monthly newspaper mailed to every home and business in Plymouth. The Town also conducts fire education programs at local schools, and plans to look into the FEMA STEP program for students to learn about emergency preparedness in the near future.

The Eli Terry Middle School is the primary shelter in the community and is the backup Emergency Operations Center. The town uses a mobile 60 kW generator at the site when needed. This facility was used as the Emergency Operations Center during Irene and Alfred because the generator can power a significant part of the building, and because a variety of offices and food stuffs are available. Terryville High School is the backup shelter and has a generator, but is located at the edge of Town so it is geographically less preferable than the Middle School. The shelters can sleep 100 people. The Town plans to create a tertiary shelter at Plymouth Center School once a generator is installed.

Shelters are operated in accordance with a Shelter Management Plan that was recently updated. Shelter staff include a registered nurse, EMS, and the police department along with other emergency personnel. The Town acquires shelter supplies whenever possible, and all shelters have been recently restocked with cots and blankets. The local bus company provides a bus for Town staff to pick up seniors and others who need transportation to shelters. The shelters can sleep 100 people, and although there were a lot of people at the shelters following Irene and Alfred not every bed was filled. The Town recognizes that most residents choose to shelter in place if possible, and recommends that residents stock three days of supplies.

Other critical facilities in the community also have backup power supplies. The Town Hall previously had a generator that could only power the lowest floor of the building (the Police Department), but this generator failed in June 2015. The Town has prioritized this generator for replacement so that the primary Emergency Operations Center can have long-term backup power. The Fire Department Headquarters in Terryville has a 40-year old generator that is the Town's second priority for replacement. The Water Pollution Control Facility also has a very old generator from the 1970s, and the generator may no longer power all of the facility due to successive expansions. The remaining two Fire Stations also have generators, with one (Hose Company No. 2's) being attached to a portable light stand that can be transported when needed during an emergency. The Maintenance Garage and Highway Garage (collectively, the Town Garage) both have relatively new generators, and the volunteer ambulance facility has a generator.

Although the Town is interested in creating micro-grids, it would be difficult for one micro-grid to provide backup power to all of the necessary buildings. Gas stations in Plymouth are typically located near the edges of the community, so a localized solution would be needed for these businesses.

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.

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 if

supplies are needed. Although the Town would like to see these railroad bridges elevated to increase clearance, staff do not anticipate that it will happen due to the expense.

**10.2.2 Flooding**

Flooding is a primary concern in the town with recurrent flooding occurring throughout the town and regular localized flooding occurring at known locations several times per year. The Pequabuck River winds through Terryville, and a number of structures are within the floodplain. The Poland River, Marsh Brook, Todd Hollow Brook, and Hancock Brook flood frequently as well.

**Location**

Figure 10-1 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 Plymouth is located within the 1% annual flood zone, and the Fire Department Headquarters is located in the 0.2% annual chance floodplain. Most of the most densely populated areas of town are close to a flood zone.

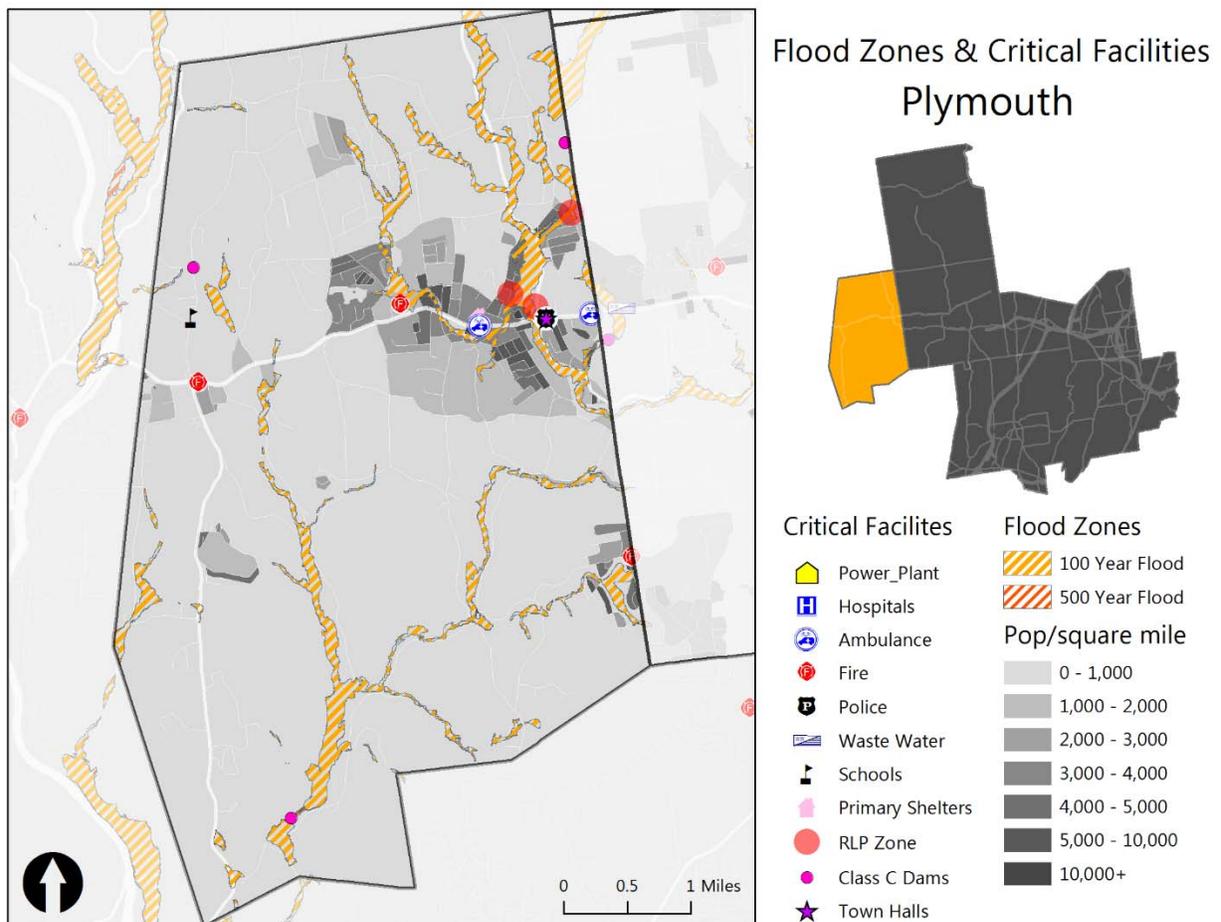


Figure 10-1. Flood Zones, Critical Facilities, and Population Density in Plymouth.

Areas at risk of flooding are generally unchanged since the initial Plan. North Main Street, North Riverside Avenue at Sandra Avenue, Beach Avenue, the Post Office, Canal Street, Woodside Lane, and Old Waterbury Road among other localized areas.

### Existing Capabilities

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 regulations require certain improvements for development in floodplains, including the use of flood-resistant construction, raise-connections to utilities, and maintaining floodway capacity. The Town defines floodplains, hereafter special flood hazard areas, off of the Federal Flood Insurance Rate Maps identified in FEMA’s Flood Insurance Study. Table 10.2 includes a brief description of how the Town of Plymouth is addressing flood risk in its most important planning documents.

Planning Documentation	Year Established or Updated	Lead Department(s)	Recommendation for Natural Hazard Mitigation
Plan of Conservation & Development (POCD)	2015	Planning and Zoning Commission	<ul style="list-style-type: none"> <li>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.</li> <li>The Plymouth Plan of Conservation and Development does not directly address flood risk but identifies floodplains as “constrained” areas.</li> </ul>
Municipal Building Codes	2003	Building Department	<ul style="list-style-type: none"> <li>The Town of Plymouth requires buildings be constructed in accordance with the Connecticut State Building Code; 2003 International Building Code.</li> </ul>
Bristol-Plainville-Plymouth Pequabuck River Flooding Study	2015	Inland Wetlands and Conservation Commission	<ul style="list-style-type: none"> <li>The Bristol-Plainville-Plymouth Pequabuck River Flooding Study was made possible by a \$200,000 grant from the Economic Development Administration.</li> <li>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.</li> </ul>
Subdivision Regulations	2005	Planning and Zoning Commission	<ul style="list-style-type: none"> <li>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.</li> <li>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.</li> </ul>
National Flood Insurance Program (NFIP)	1982	Town Manager	<ul style="list-style-type: none"> <li>The Town of Plymouth is a participating community in FEMA’s National Flood Insurance Program since 1982 and intends to continue participation in the NFIP for the foreseeable future.</li> <li>The National Flood Insurance Program has paid 21 property damage claims in Plymouth totaling \$223,229.84 to date.</li> <li>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.</li> </ul>

Planning Documentation	Year Established or Updated	Lead Department(s)	Recommendation for Natural Hazard Mitigation
Zoning Regulations	2012	Planning and Zoning Commission	<ul style="list-style-type: none"> <li>• The Town of Plymouth addresses development in special flood hazard areas in the Zoning Regulations (adopted 2008) under the Flood Damage Prevention Regulations.</li> <li>• 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.”</li> <li>• 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.”</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> </ul>
Inland Wetlands and Watercourses Regulations	2010	Inland Wetlands and Conservation Commission	<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> </ul>

Planning Documentation	Year Established or Updated	Lead Department(s)	Recommendation for Natural Hazard Mitigation
Community Emergency Response Team (CERT)	2015	Emergency Management	<ul style="list-style-type: none"> <li>• Plymouth does not currently have a Community Emergency Response Team (CERT), but can improve the safety of its residents by creating a CERT.</li> <li>• 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.</li> <li>• 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.</li> </ul>
Local Emergency Operations Plan	2014-2015	Emergency Management	<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> </ul>

Table 10-2. Town of Plymouth Planning Documents.

Town 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 the Land Use Department, with outreach typically occurring on a case-by-case basis. Town staff do not believe that the Community Rating System program will be cost-effective for the community at this time given the relatively limited number of homes that are subject to flooding, although there are some areas where the Town regularly brings sandbags in an effort to mitigate flooding.

According to the Town of Plymouth FIS, the State of Connecticut appropriated \$170,000 in 1978 for the construction of flood control improvements in Terryville. These included the reconstruction of the upper portion of Main Street bridge, the demolition of a dwelling immediately upstream of the bridge, and channel modifications. Reconstruction of the Main Street bridge was completed in 1996.

The Town's Public Works Department has had success over the last few years in acquiring money from state and federal bridge programs to replace deficient bridges. North Main Street, Keegan Road, and two other bridges will be replaced in the near future. Many old corrugated metal pipes used for culverts are concerns because the salt is deteriorating them. The Town is replacing these with concrete or plastic culverts. Culverts are replaced whenever possible, although culvert replacements are generally timed to coincide with other road improvements (such as paving) to save costs. Recent improvements have also been performed along Seymour Road. The Town conducts annual catch basin cleaning with maintenance as needed.

All new construction is designed using the most recent NRCC rainfall return periods in accordance with December 2014 CT DOT guidance. The Town 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. The Fire Department pumps out basements when they are inundated with more than four inches of water. Usually Public Works will be involved in resolving any road-related complaint. Drainage easements in many places are not clearly defined, which complicates maintenance and repair efforts. Specific regulations are required to clarify both new and existing easements, and mapping is needed to assist with identification of these areas.

The Pequabuck River Study should be completed in October 2015. This study (prepared by 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 Plymouth:

- Increase capacity of secondary driveway bridge serving Plymouth Village Apartments. The existing bridge over the Pequabuck River serves as part of a secondary mode of egress from the apartment complex, with the main entrance being on Route 6. The bridge is undersized and it increases the 1% annual chance flood elevation upstream of the bridge by approximately 2.5 feet. Resizing the bridge to pass the 1% annual chance flood event would result in the removal of 15 buildings from the 1% annual chance floodplain and the reduction in flood risk for other buildings remaining in the floodplain. Alternatively, the bridge could be removed for a similar benefit (and likely lower overall project cost) provided another secondary mode of egress can be determined.
- Removal of White House at 150 Main Street and conducting channel clearing. Removal of the currently Town-owned structure at risk of flooding would eliminate damages to this property, and the site could be redeveloped into a parking lot or other nonstructural use. Clearing the channel upstream and downstream of this location will help to reduce the impact of debris blockages that can exacerbate flooding conditions. AECOM believes that the home removal should qualify for a FEMA grant.

In addition to these priority recommendations, other recommendations for further consideration are provided including floodproofing of commercial and industrial buildings and modifying private driveways. 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 are not recommended to be pursued to generate flood mitigation benefits, including replacing the bridge at Route 6 and performing dam modifications to the Upper and Lower Pond dams.

The Town'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 Town of Plymouth relative to all facets of flood mitigation has slightly increased since the 2011 Plan. The recent studies have enabled the Town to move towards mitigation projects that will reduce the impacts of flooding over the long-term.

### Impacts and Loss Estimates

Flood losses reported under the NFIP to properties in Plymouth are listed in Table 10-2. 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; and
- 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;
- Floodwaters can overtop the berm near Upper Pond and flood Bemis Street;
- Flooding in the Terryville Post Office parking area can render it unusable. When the possibility of flooding is predicted, mail trucks are moved to a nearby private parking lot which is at a higher elevation;
- Flooding has caused significant damage to the river bank that protects the Water Pollution Control Facility on Canal Street; and
- Floodwaters nearly reach the electrical substation on Woodside Lane.

Flooding concerns 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 such as on Todd Hollow Road due to combination of insufficient culvert size and downstream capacity; and

- Localized street flooding which affects private properties when storm events exceed street drainage capacity.

Town staff noted that flooding in the upper reaches of the Pequabuck River is exacerbated by the Upper Pond Dam. A sufficient level of rainfall can cause water levels in the pond to rise and overflow a natural berm onto Bemis Street which can cause severe damage to the road as the river essentially finds a new course. This most recently happened during Tropical Storm Irene and FEMA money was used to repair the three- to five-foot deep gullies in the road near Sherman Lane. As the Pequabuck River Study determined that dam modifications would have little flood mitigation benefit, the Town is interested in determining other methods to protect this area.

In addition, two homes near Bemis Street to the north of Armbruster Road regularly flood, and the Town regularly delivers sandbags to this area to help protect the properties. Site specific mitigation measures are needed for these properties. Although the Town believes that changing the river profile in Terryville from the vicinity of Beach Avenue downstream to the flatter area near Route 72 would mitigate peak flows by lengthening the profile, this activity is not believed feasible due to permitting difficulty and access constraints. Finally, the flooding problems on Todd Hollow Road and Beach Avenue continue to require drainage system reconstruction, which has not yet been accomplished because grant funding could not be obtained to assist with the work.

CCRPA used FEMA’s HAZUS-MH model to analyze potential risks that the Town of Plymouth 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 town 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 \$67,330,000. Key impact areas of such a flooding event are summarized in Table 10-3.

Impact of Flooding	Estimated Damage from 1% Annual Chance Flood Event
Households Displaced	266
People Needing Shelter	418
Buildings at Least Moderately Damaged	35
Total Estimated Economic Losses	\$67,330,000
Total Residential Building & Content Losses	\$8,420,000
Total Commercial, Industrial, & Other Building & Content Losses	\$58,590,000
Total Business Interruption Losses	\$320,000

Table 10-3. HAZUS-MH 1% Annual Chance Flood Losses for Plymouth.

Source: HAZUS-MH

Based on the public assistance reimbursements in Table 10-1, the Town of Plymouth has incurred approximately \$453,512.77 since 1999 for impacts due to flooding. Based on the information for the NFIP in Table 9-2, a total of \$223,229.84 has been paid out to NFIP-insured properties since 1982 (32 years). The annualized loss due to flooding based on this information is \$37,210.12. 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 similar at \$37,412. The greater figure is utilized herein as an estimate of annualized loss for the community.

### **10.2.3 Winter Storms**

Plymouth faces challenges during winter storms as ice and snow 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 Plymouth 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. In addition, a winter storm could have very different effects in Plymouth depending on the elevation; for example, higher elevations could be receiving snow and need plowing while the lower elevations could be dealing with flooding during the same storm. Areas in floodplains are at increased risk of winter storm damage due to any flooding that may accompany a winter storm.

#### **Existing Capabilities**

Winter storms are one of the primary natural hazards affecting Plymouth. The Town has approximately 95 miles of local roads and many additional miles of state roads. Removal of the ice and snow for Plymouth's town-owned roads is primarily handled by town workers although some contractors are also used; the town also handles debris removal. The Town has established plowing routes that prioritize access to critical facilities.

Severe storms can stretch manpower and resources beyond expectations, but in general the plows do a very good job of keeping roads clear. Occasionally state forces are not available and the Town will need to treat state roads, particularly when accidents occur. Plymouth has had its emergency services strained during prolonged icing events when power outages and road closures occur throughout town and shelters are opened. The budget for preventive tree removal has recently increased and is now considered adequate.

There are a few areas in Plymouth where icing is a problem on hills. Town staff mitigate these areas using additional treatment, or install drainage systems if necessary if a high groundwater table is present. Many of the icing concerns are reportedly temporary in nature and occur due to homeowners directing their basement sump pumps into the street. There are also a few areas that are prone to drifting snow, such as near the Business Park and the High School, and on Preston Road and North Harwinton Avenue. These are mitigated through additional plowing efforts.

The majority of roofs on Town-owned buildings are flat, including the schools and snow load is a concern for Town staff. The former Highway Garage roof collapsed during the 2011 winter due to snow load and has been replaced by a new building, and another roof collapsed on the old factory site that is being redeveloped for the propane distribution facility. The Town has an informal program to review snow accumulation on town-owned roofs each winter, with clearing occurring when depths are sufficiently deep or wet each year. Of note is that the Town has embarked on a solar panel installation program for Town-owned buildings. There is concern among local emergency personnel that the solar panels being installed on the Middle School roof and two elementary schools will exacerbate concerns with snow load due to the additional year-round weight. Roofs with solar panels will be more closely monitored in the future, and snow removal will need to occur much more carefully than previously. A formal snow load evaluation plan for buildings fitted with solar panels will be considered by the Town.

The Town subdivision regulations require that utilities in new residential developments are installed underground, and the underground installation of utilities is encouraged for all new development.

The Town's capabilities are considered to be effective in regards to response to winter storms, although the Town's capability to mitigate severe winter storm damage is limited to Town facilities. In general, the level of capability of the Town of Plymouth relative to all facets of winter storm mitigation has slightly increased since the 2011 Plan because there is now an adequate tree maintenance budget and the recent tree trimming by Eversource reduced the overall vulnerability of the town. One notable change is that new concerns have arisen related to monitoring the snow load on roofs with solar panels.

### Impacts and Loss Estimates

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. Table 10-4 below considers the impact of Severe Winter Storms on the Town of Plymouth based on Winter Storm Alfred in late October 2011. Debris removal was the biggest impact, with the total municipal cost to clean up after the storm totaling approximately \$0.4 million.

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)	5,777
Maximum Outages During Severe Winter Storm (2011)	5,732
Maximum Outages Percentage of Customers (2011)	99.22%
Number of Businesses Experiencing Outages	25
Total Lost Wages (Daily)	\$4,115.58
Average Lost Wages (Weekly)	\$42,195.00
Miles of Local Roads Plowed by Town of Plymouth	94.8
Municipal Cost (Plowing, Road Treatment, Debris Removal)	\$403,265.64

*Table 10-4. October 2011 Severe Winter Storm Losses for Plymouth.  
Source: Eversource, CCRPA Internal Analysis*

Winter Storm Alfred was a particular problem for Plymouth because there was a significant amount of wind damage in addition to the ice and snow. The Town prepared payloaders prior to the storm to ensure that access could be maintained. Trees fell throughout the community, and Plymouth received upwards of 20 inches of snow and several roofs were damaged or needed to be cleared.

Communications were extremely strained during Alfred because power was out for nine to 11 days and cell phone towers were not available. The town has since invested in alternative communication methods (e.g. ham radio) to ensure that some level of communication continues. Town staff reported that the FEMA damage assessor was very cursory and Town staff had to travel to Boston to challenge the inspector's ruling regarding the snow load reimbursement. Congresswoman Elizabeth Esty assisted in getting the Town an additional \$83,000 reimbursement.

The January 2013 blizzard produced a lot of snow in Plymouth and contractors were needed to remove it. Snow removal was the primary financial impact.

Based on the public assistance reimbursements in Table 9-1, the Town of Plymouth has incurred \$902,004.32 since 1999 (15 years) for impacts due to winter storms. The annualized loss due to winter storms based on this information is \$60,133.62. 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 \$6,262. The greater figure is utilized herein as an estimate of annualized loss for the community.

#### **10.2.4 Tropical Cyclones and Hurricanes**

Plymouth 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 Plymouth are susceptible to tropical storms and hurricanes. Higher elevations (such as near the Business Park and the High School) 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. There are mobile home parks in town that would be at increased risk of significant damage during severe wind events.

##### **Existing Capabilities**

The Town of Plymouth uses a variety of preparedness and response procedures to deal with the impacts of tropical storms and hurricanes. Town departments have purchased sufficient supplies over the past few years to be prepared for the next major storm event. Much of the tree trimming in Plymouth near power lines is conducted by Eversource Energy. A significant amount of trimming occurred in Plymouth following the 2011 storms, and there have been few problems with fallen limbs since that time.

Tree complaints are directed to Public Works. The Town has recently increased its tree maintenance budget for town properties and right-of-ways. The Town does not cut trees on private property. The Town has a chipping and trimming contractor on-call for when assistance is needed such as for large jobs.

The Town's capabilities are considered to be effective with regard to mitigating hurricane damage. In general, the level of capability of the Town of Plymouth relative to all facets of tropical storm and hurricane mitigation has slightly increased since the 2011 Plan as the recent trimming by Eversource has reduced the overall vulnerability of the town, and the increased tree maintenance budget has provided more local resources to address these hazards.

##### **Impacts and Loss Estimates**

Following Tropical Storm Irene in 2011, power was lost for approximately one day in Plymouth for most residents, although some residents were without power for four days. A maximum of 1,718 customers were without power. A significant amount of damage in low-lying areas was due to flooding, such as on Todd Hollow Road, Bemis Street, North Main Street, Beach Avenue, and Route 72 at Sandra Avenue. Irene occurred during the Terryville Fair and only one day out of three was able to be held. Shelters were opened for several days and the Lions Club donated the food that would have been used at the fair. Tropical Storm Sandy also caused power outages and the shelters were opened for a couple of days.

CCRPA 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 in Table 10-5.

Impact of Simulated 1938 Hurricane Today	Estimated Losses from 1938 Hurricane Event
Households Displaced	20
People Needing Short-Term Shelter	5
Buildings at Least Moderately Damaged	1,187
Building Completely Damaged	6
Total Estimated Economic Losses	\$20,721,230
Total Residential Building Losses	\$16,750,330
Total Commercial, Industrial, & Other Building Losses	\$3,345,550
Total Business Interruption Losses	\$625,350
Total Debris Generated (in tons)	192,815
Truckloads (at 25 tons/truck) of building debris	7,713

Table 10-5. HAZUS-MH 1938 Hurricane Simulated Losses for Plymouth.

Source: HAZUS-MH

The Town of Plymouth has primarily experienced a combination of wind and flooding damage during recent disasters caused by Tropical Storms. The annualized loss estimate for Plymouth based on the county-wide tropical storm and hurricane damages presented in the 2014 CT NHMP as estimated by HAZUS-MH is \$547,092.

### 10.2.5 Tornadoes and Thunderstorms

Plymouth 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 Plymouth 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 Town has a recently increased budget for tree maintenance which is considered sufficient at this time. This is only for Town properties and right-of-ways. The frequency of power outages has been reduced in recent years since the significant trimming programs conducted following the 2011 storms.

The Town's capability to mitigate thunderstorm damage is similar to that for tropical storms and hurricanes, but the Town's ability to mitigate tornado damage is relatively limited. In general, the level of capability of the Town of Plymouth relative to all facets of thunderstorm and tornado mitigation has

slightly increased since the 2011 Plan with the recent trimming by Eversource and the increased tree maintenance budget.

### Impacts and Loss Estimates

According to Town staff, there are no areas of the Town that are specifically prone to thunderstorm damage. However, the mobile home parks in town would be at increased risk to experience tornado damage.

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 \$3,749. 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 \$99,804. These figures are likely lower than the actual annualized loss for the community as the damages reported to the National Weather Service do not take into account all occurrences of thunderstorm and tornado damage, but the figures are useful for planning purposes.

### 10.2.6 Wildfires

Wildfires in Plymouth regularly occur approximately 12 times per year. When they do occur, they are usually accidentally set, although some may have been ignited by lightning or undetermined sources.

#### Location

Less developed areas in Town are at the highest risk for a wildfire. Many large fires have occurred in the southwestern portion of town.

#### Existing Capabilities

The Town maintains mutual aid agreements with Burlington, Wolcott, Thomaston, Bristol, and Harwinton for fire protection. Fire protection needs are typically reviewed by Emergency Management as part of site plan review. The Town's policy is to not go deep into the woods to attack fires, but rather to control the perimeter to prevent damage to structures. The Town has an all-terrain response vehicle that helps first responders to access and control wildfires. The Town has three local Open Burning Officials certified by the Connecticut DEEP who issue permits for open burning in accordance with Connecticut DEEP regulations.

The outlying areas of town include a variety of state, federal, municipal, land trust, water utility, and private land. Some of the outlying areas are situated where access could be difficult. One suggestion for Town staff is to review areas for potential fire risk by looking at debris accumulation and access issues.

Approximately 63% of the Town has public water supply. The Town has a few dry hydrants and cisterns installed in outlying areas, but may be old and no maintenance plan was required for them. Many are leaking and unreliable. The Town has a moratorium on new dry hydrants and cisterns until a regulation is created to support ongoing maintenance. The Town typically uses its 8,000-gallon tankers to shuttle water into outlying areas for fire-fighting needs, and most small fires can be put out with that much water. Much more water is needed for the larger 40-50 acre fires that can occur.

There is a lot of local concern at the local level regarding State resource restrictions. Whereas the State previously maintained a professional firefighting force, now State responders are being pulled from other jobs at the DEEP. The Town now relies on mutual aid agreements more than state assistance.

The Town's capabilities are considered to be effective in regards to wildfire response. In general, the level of capability of the Town of Plymouth relative to all facets of wildfire mitigation is unchanged since the 2011 Plan.

### Impacts and Loss Estimates

There is relatively little non-forested land left in Plymouth that could be developed, so most recent development has been of previously forested lands. This has increased the wildland-urban interface in town. The greatest areas of concern are the areas of town that do not have public water service and have limited access, which is primarily the western and southern parts of Plymouth. A 100-acre fire recently burned off Graystone Road south of the Boy Scout Camp, and fires this size usually take two to three days to get under control.

The Town is unsure how much it expends each year to fight wildfires. DEEP has a reimbursement list for state land, but the Town hasn't utilized it for a few years. 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 Plymouth is \$3,618.

### 10.2.7 Drought

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

### Location

All areas of Plymouth 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 Town primarily relies on regional and statewide measures for mitigating the impacts of drought such as the Connecticut Drought Management Plan. The local water company (The Connecticut Water Company) maintains an Emergency Contingency Plan that outlines the necessary response procedures when drought is impacting their sources of supply. The company's Rules and Regulations include water use restrictions that could be implemented during times of drought, although such restrictions have not been implemented in recent years. Although the Town of Plymouth is not a member, The Connecticut Water Company 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 Town does not perform any mitigation activities for drought and its capability to mitigate drought is relatively limited. In general, the level of capability of the Town of Plymouth relative to all facets of drought mitigation is unchanged since the 2011 Plan.

### Impacts and Loss Estimates

Town staff could not recall any specific damages due to drought. Town staff indicated that although the Fall Mountain area historically had problems with failing wells, this area now has public water supply available. The private wells in this area were very close to each other in this area which exacerbated the impact of dry conditions. Town staff did not recall any well deepening permits or new drilling permits being issued recently due to private wells going dry during a drought, nor could they recall any specific damages occurring due to drought.

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.

### 10.2.8 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 Plymouth are susceptible 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 Plymouth do not directly address earthquake damage. In the event that significant earthquake damage occurred, the Town of Plymouth would activate its Emergency Operations Plan and respond as appropriate.

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

#### Impacts and Loss Estimates

Town 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 \$3,613. The low figure is consistent with the lack of earthquake damage in the recent historical record.

### 10.2.9 Dam Failure

There are many dams in Plymouth (and upstream in Harwinton) that could affect the Town of Plymouth with their failure, including four Class C (high hazard dams) and 13 Class B (significant hazard dams).

#### Location

Only areas of Plymouth that are 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 10-6 summarizes the high and significant hazard dams that could affect Plymouth 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 #2 Dam	B	Water Supply	Good	City of Bristol	Tributary to Poland River
Bristol Reservoir #3 Dam	B	Water Supply	Not Rated	City of Bristol	Poland River
Bristol Reservoir #4 Dam	B	Water Supply	Fair	City of Bristol	Poland River

Dam Name	Hazard Class	Dam Use	Dam Condition	Owner	Downstream Watercourse
Bristol Reservoir #5 Dam	C	Water Supply	Good	City of Bristol	Tributary to Poland River
Fall Mountain Lake Dam	B	Recreation	Not Rated	Private	Tributary to Hancock Brook
Hancock Brook Lake Dam	C	Flood Control	Not Rated	U.S. Army Corps of Engineers	Hancock Brook
Indian Heaven Pond Dam	B	Recreation	Not Rated	Private	Tributary to Hancock Brook
Old Marsh Pond Dam (Bristol Reservoir #7)	C	Water Supply	Good	City of Bristol	Marsh Brook
Plymouth Reservoir Dam	C	Recreation	Fair	Town of Plymouth	Tributary to Naugatuck River
Serra Pond Dam	B	Recreation	Not Rated	Private	Tributary to Nibbling Brook
Sheppard Pond (Masterbone Pond) Dam	B	Recreation	Not Rated	Private	Todd Hollow Brook
Wilton Pond Dam	B	Recreation	Fair	Town of Plymouth	Nibbling Brook
Zeiner Pond (Lake Winfield) Dam	B	Recreation	Good	Town of Plymouth	Tributary to Pequabuck River

Table 10-6. Summary of Dams Whose Failure Could Significantly Impact Plymouth.  
Source: Connecticut DEEP

### Existing Capabilities

High hazard dams that could affect Plymouth include those owned by Bristol Water Department, the Plymouth Fish & Game Club, the United States Army Corps of Engineers, and private property owners. The Town participates in dam failure training exercises when offered by the dam owners, and performs its own exercises for its dams. The Town performs releases from its dams prior to storm events when possible.

According to the DEEP, the Town owns one Class C dam (Plymouth Reservoir Dam), and two Class B dams (Wilton Pond Dam and Zeiner Pond Dam). The Town is currently updating its Emergency Action Plans for its dams to meet current DEEP guidelines. The Town previously had a committee to study the condition of dams in town, but it is not currently active. The Town has copies of EAPs prepared for other dams whose failure could affect Plymouth; this information is maintained by the Emergency Management Director. Town staff report that many residents would like to see the old defunct dams removed.

The Town's ability to mitigate dam failure is considered to be good for Town-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 Town of Plymouth relative to all facets of dam failure mitigation is slightly improved since the 2011 Plan due to 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, and potential losses downstream of a Class B (significant) hazard dam could be critical. Fortunately, the majority of the dams in Plymouth are in good condition.

The Hancock Brook Dam (Class C) is a federal flood control dam for the Naugatuck River owned by the United States Army Corps of Engineers and is reportedly in good condition. The dam was constructed in 1966 and the impounded lake provides a public recreational resource. Failure of this dam would primarily affect Waterbury, although Greystone Road and homes along Graystone Road Extension would likely be affected.

The Plymouth Reservoir Dam (Class C) is located on North Street. Failure of this dam would likely primarily impact Thomaston, although homes on North Street, Blakeman Road, and Railroad Street could be affected in Plymouth. Similarly, Wilton Pond Dam (Class B) could impact Wilton Road and Carter Road with its failure, but most impacts would be felt downstream in Thomaston. The failure of Zeiner Pond Dam (Class B) would cause significant flooding along the Pequabuck River in Terryville.

The Bristol Water Department owns several Class C and Class B dams that could affect Plymouth. The Bristol Water Department recently retained a consultant to perform dam inspections in accordance with the new DEEP regulations, and the dams are believed to be in generally fair to good condition although they are very old. The Town has concerns regarding Bristol Reservoir No. 3 as the Bristol Water Department activated its Emergency Action Plan a few years ago when they believed a failure was possible. The Town evacuated downstream areas to protect residents, but fortunately the dam ultimately did not fail.

The Plymouth Fish & Game Club owns the Upper Pond Dam (Class BB). This dam is 110 years old and was originally installed for hydropower and reportedly may have historic significance. Modifications to the dam have long been desired to allow for the water level to be lowered in anticipation of flood events in an effort to reduce flooding along Bemis Street. The Fish & Game Club does not have funding to complete the modifications which reportedly will be very expensive. The Town was reportedly willing to assume ownership of the dam if this is necessary to facilitate grant funding. However, the Pequabuck River Study found that modifications to the dam would likely have a limited effect on flooding, although it is unclear from the final draft report the exact modifications that were modeled to make this assessment. The Fall Mountain Lake Dam (Class B) is a privately owned dam that could impact a few homes by its failure.

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 Plymouth. The annualized loss in Plymouth due to dam failure is estimated to be \$4,200. This figure is low consistent with the lack of recorded dam failure incidents which have occurred in the town.

### 10.3 Goals, Objectives, and Strategies

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The goal and seven objectives from the 2011 Plan were upheld. No additional objectives were identified, although Objective #7 was re-written to “Mitigate impacts to properties in the National Flood Insurance Program” because the Town of Plymouth intends to continue participation in the NFIP.

#### 10.3.1 Status of Previous Strategies and Actions

Table 10-7 presents the status of the strategies and actions originally developed in the initial 2011 Plan.

Objective	Task	Priority	Responsible Department	Comment	Status
1. Improve Town Infrastructure to Reduce Hazard Impacts	Resolve flooding problems on Todd Hollow Road and Beach Avenue by reconstructing the drainage systems and roads	High	Public Works	Grant funding could not be obtained for this project	Carry Forward
	Improve Bemis Street and Seymour Road	High	Public Works	Seymour Road is complete, Bemis Street not	Carry Forward
	Upgrade bridges as necessary to alleviate flooding problems including North Main Street bridge	High	Public Works	This is a capability. North Main Street will go to construction soon	Completed
	Provide for an increase in selective tree trimming and removal	High	Public Works	The budget was increased and is now adequate	Completed
	Increase the railroad clearances on Route 72 in Pequabuck	Medium	Public Works	Cannot occur without significant grant funding and buy-in from the railroad is likely a non-starter	Delisted
2. Upgrade Town Facilities and Assets to Maximize Response Capabilities	Certify the high school, fire houses, and Eli Terry Middle School as Red Cross shelters	High	Emergency Management	Work is in process to get all schools certified. The Fire Houses are staging areas and will not be shelters	Carry Forward
	Provide indoor space for equipment storage and build a salt shed at the highway facility	High	Public Works	A new garage has been built and bonding is allocated for the new salt shed	Completed
	Upgrade fire trucks and the traffic signals on Main Street to allow for emergency signal preemption	High	Public Works, Fire Department	Six apparatus have been upgraded and several intersections have been equipped	Completed
	Install computer at EOC	High	Emergency Management	Portable computers have been obtained	Completed
	Improve communication system	High	Emergency Management	The radio system has been upgraded; a new communication tower was recently installed	Completed

Objective	Task	Priority	Responsible Department	Comment	Status
	Follow the objectives listed in the Fire Department’s Master Plan, including constructing a new Fire Station in the Fall Mountain area	Medium	Fire Department	The Fire Station allocation has yet to pass Town referendum	Carry Forward
	Increase the size of Police Department through Town Hall expansion	Medium	Police Department	The Police Department is considering other options	Delisted
3. Invest in Training and Equipment to Increase Response Capability	Have full-scale, multi-agency emergency response drill	High	Emergency Management	These are conducted at least annually and are a capability	Delisted
	Train additional staff in WebEOC	High	Emergency Management	This is conducted as needed and is a capability	Delisted
	Purchase additional emergency generator for Plymouth Fire House	High	Fire Department	Each station now has a generator	Completed
	Take advantage of Statewide Reverse 9-1-1 service through Everbridge	High	Administration, Emergency Management	Plymouth uses CT Alert with signups linked through Town website	Completed
	Use GIS to improve and coordinate response services	Medium	Planning, Emergency Management	This system is installed and is a capability	Completed
4. Use Policy and Planning Tools to Address Potential Impacts of Hazards	Prepare dam Emergency Response Plans	High	Planning, Public Works	This is in process using the recent DEEP guidance	Carry Forward
	Update the Town Emergency Response Plan at regular intervals	High	Emergency Management	This is done annually and is a capability	Delisted
	Update the Shelter Management Plan	High	Emergency Management	The Plan was recently updated	Completed
	Develop a Town Evacuation Plan	High	Emergency Management, Public Works	The Town delayed this Plan in light of the new propane distribution center being built	Carry Forward
	Develop low-impact development regulations with incentives	Medium	Planning	This has been delayed pending recommendations of the Pequabuck River Study	Carry Forward
	Prepare a town-wide drainage/flooding study	Medium	Planning	The Pequabuck River Study has addressed most issues, but other areas need to be considered	Carry Forward

Objective	Task	Priority	Responsible Department	Comment	Status
	Better define drainage easements	Medium	Planning, Public Works	This was not completed due to time and budget constraints	Carry Forward
	Use GIS to improve governmental and emergency services	Medium	Planning, Emergency Management	This system is installed and is now a capability	Completed
5. Enable Residents to Better Help Themselves Through Preparedness Education	Provide emergency planning tools on the town website	High	Emergency Management	Information is posted on the Town website	Completed
	Encourage preparedness workshops in schools	High	Emergency Management	The Town plans to implement the STEP program	Carry Forward
	Take advantage of statewide reverse 9-1-1 service through Everbridge	High	Administration, Emergency Management	Plymouth uses CT Alert with signups linked through Town website	Completed
6. Coordinate Plans & Response Efforts with Neighboring Parties to Increase Efficiency	Coordinate dam releases with upstream dam owners prior to significant rainfall events to reduce potential for downstream flooding	High	Public Works, Dam Operators	The Town performs releases from its dams but could not get private property buy-in and only limited water utility buy-in	Completed
	Test coordination plans (above) with neighboring municipalities and other affected parties through a practice exercise, either tabletop or full-scale	High	Public Works, Dam Operators	These are performed on occasion and are a capability	Delisted
7. 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	Planning	This is regularly performed by Land Use and is a capability	Delisted
	Work with FEMA to update FIRMs as necessary	High	Planning	This will be done for the Pequabuck River Study results	Carry Forward
	Continue to distribute information about the NFIP to homeowners	High	Planning	This is regularly performed by Land Use and is a capability	Delisted
	Continue to assist homeowners with amendments to NFIP maps as necessary	High	Planning	This is regularly performed by Land Use and is a capability	Delisted

Table 10-7. Status of Previous Strategies and Actions for Plymouth.

### 10.3.2 Current Strategies and Actions

This section includes both new strategies and actions as well as updates on objectives and mitigation strategies that were carried forward from the 2011-2016 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

##### Strategies and Actions:

##### 1.1 Install drainage systems and reconstruct Todd Hollow Road and Beach Avenue

Action Description:	Flooding near these streets is exacerbated by insufficient drainage. The Town needs a grant to install drainage in these areas.
Lead:	Public Works
Priority:	Medium
Status:	Not Started (Grant Dependent)
Estimated Cost:	High
Potential Funding Source(s):	Municipal Capital Budget, CT DOT
Timeframe:	7/2016 to 6/2021

##### 1.2 Improve Bemis Street to reduce flooding damage

Action Description:	Improvements will be made contingent upon dam modifications to the Upper Pond Dam or other improvements that will protect the road from the 1% annual chance flooding event.
Lead:	Public Works
Priority:	Low
Status:	Not Started (Carried Forward from Initial Plan, Dependent upon Action 1.3)
Estimated Cost:	High
Potential Funding Source(s):	Municipal Capital Budget
Timeframe:	7/2016 to 6/2021

##### 1.3 Determine other methods to protect Bemis Street from flooding

Action Description:	Although the Pequabuck River Study concluded that modifications to the Upper Pond dam would not significantly reduce the risk of flooding along Bemis Street, other modifications could be enacted including the installation of a low-level outlet on the dam to allow drawdown to occur before a heavy rain event, improvements to the natural berm separating Upper Pond from Bemis Street, and regrading local roads to prevent overflow in the area. The Town will work with the Fish & Game Club to develop mutually acceptable solutions.
Lead:	Public Works
Priority:	Medium
Status:	Not Started (Grant Dependent)
Estimated Cost:	High
Potential Funding Source(s):	Municipal Capital Budget, HMGP, PDM, FMA, Flood & Erosion Control Board Bonding
Timeframe:	7/2016 to 6/2021

**Objective 2: Upgrade town facilities and assets to maximize response capabilities****Strategies and Actions:****2.1 Certify the High School, Middle School, and Plymouth Center School as Red Cross Shelters**

**Action Description:** Work is in progress to get all schools certified as shelters, which includes having adequate infrastructure, equipment, and supplies on site. The Plymouth Center School still requires a generator.

**Lead:** Emergency Management

**Priority:** Medium

**Status:** In Progress (Carried Forward from Initial Plan, Grant Dependent)

**Estimated Cost:** Moderate

**Potential Funding Source(s):** Municipal Operating Budget, HMGP

**Timeframe:** 7/2016 to 6/2018

**2.2 Construct a new Fire Station in the Fall Mountain Area**

**Action Description:** Design of the facility is complete but the budget allocation for the Fire Station has yet to pass Town referendum.

**Lead:** Emergency Management

**Priority:** Medium

**Status:** In Progress (Carried Forward from Initial Plan)

**Estimated Cost:** High

**Potential Funding Source(s):** Municipal Capital Budget

**Timeframe:** 7/2016 to 6/2021

**2.3 Acquire generators to provide adequate backup power to critical facilities**

**Action Description:** The Town has identified several generator needs. The Town Hall generator recently failed and needs a replacement that can power the entire building (including the Emergency Operations Center and the Police Department). The Fire Department Headquarters in Terryville has a 40-year old generator that is the second priority for replacement. The Water Pollution Control Facility has a 40-year old generator which can no longer power the entire facility due to successive expansions over the years. Plymouth Center School also requires a generator in order to be used as a shelter.

**Lead:** Emergency Management, Public Works

**Priority:** Low

**Status:** Not Started (Grant Dependent)

**Estimated Cost:** High

**Potential Funding Source(s):** Municipal Capital Budget, HMGP

**Timeframe:** 7/2016 to 6/2021

**Objective 3: Invest in training and equipment to increase response capability****Strategies and Actions:****3.1 Develop a Community Emergency Response Team (CERT)**

**Action Description:** A local CERT is composed of local volunteers who receive training in disaster preparedness and response. CERT members are able to assist Town personnel and support emergency response functions, such as staffing emergency shelters and engaging with the community regarding disaster preparedness.

**Lead:** Emergency Management

**Priority:** High

**Status:** Not Started

**Estimated Cost:** Low

**Potential Funding Source(s):** Municipal Operating Budget

**Timeframe:** 7/2016 to 6/2021

**Objective 4: Use policy and planning tools to address potential impacts of hazards****Strategies and Actions:****4.1 Prepare dam Emergency Action Plans for Town-owned dams**

**Action Description:** The Town is updating the Emergency Action Plans for the Town-owned dams to meet recent DEEP guidance.

**Lead:** Emergency Management, Public Works

**Priority:** Medium

**Status:** In Progress (Carried Forward from Initial Plan)

**Estimated Cost:** Moderate

**Potential Funding Source(s):** Municipal Operating Budget

**Timeframe:** 7/2016 to 6/2017

**4.2 Develop a Town Evacuation Plan**

**Action Description:** A town-wide evacuation plan will be developed to provide guidance to emergency personnel when an evacuation is necessary. The Town held off preparing this plan due to the proposed installation of the propane distribution center which will require additional study to determine the potential evacuation area.

**Lead:** Emergency Management, Land Use

**Priority:** Low

**Status:** Not Started (Carried Forward from Initial Plan)

**Estimated Cost:** Moderate

**Potential Funding Source(s):** Municipal Operating Budget

**Timeframe:** 7/2016 to 6/2020

**4.3 Develop a Town-wide drainage/flooding study**

Action Description:	The Pequabuck River Study provided recommendations specific to that watershed, but study is still desired for the remaining watersheds in town.
Lead:	Land Use
Priority:	Low
Status:	In Progress (Carried Forward from Initial Plan)
Estimated Cost:	High
Potential Funding Source(s):	Municipal Operating Budget
Timeframe:	7/2016 to 6/2021

**4.4 Better define drainage easements**

Action Description:	Specific regulations are needed to clarify new drainage easements and provide language to standardize old easements. In addition, such easements should be mapped into GIS to provide Public Works with mapping for maintenance purposes.
Lead:	Land Use, Public Works
Priority:	Medium
Status:	Not Started (Carried Forward from Initial Plan)
Estimated Cost:	Moderate
Potential Funding Source(s):	Municipal Operating Budget
Timeframe:	7/2016 to 6/2021

**4.5 Revise the Town Emergency Operations Plan to include procedures for new propane facility**

Action Description:	As the new propane distribution center is built, the Town plans to update its Emergency Operations Plan to account for potential hazards associated with this facility.
Lead:	Emergency Management
Priority:	High
Status:	Not Started
Estimated Cost:	Low
Potential Funding Source(s):	Municipal Operating Budget
Timeframe:	7/2016 to 6/2021

**4.6 Update the local floodplain management ordinance to meet or exceed current model ordinance requirements**

Action Description:	Recent revisions to the NFIP have triggered national and state revisions to the model floodplain management ordinance. Revisions could include increasing the freeboard requirement to two feet for new buildings and substantial improvements to existing buildings.
Lead:	Land Use
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

**4.7 Develop a Pequabuck River flood response plan**

**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. Plymouth would work with downstream communities and dam owners to prepare this plan for reducing downstream flooding.

**Lead:** Land Use, Public Works

**Priority:** Medium

**Status:** Not Started (Recommendation of Pequabuck River Study)

**Estimated Cost:** Low

**Potential Funding Source(s):** Municipal Operating Budget

**Timeframe:** 7/2016 to 6/2018

**4.8 Develop a formal snow load evaluation plan for buildings with roof-mounted solar panels**

**Action Description:** The Town has embarked on a solar panel installation program for Town-owned buildings, and many of the panels are being installed on flat roofs which could exacerbate the effects of snow load. A formal plan should be developed to guide Town staff in evaluating the effect of snow load on these roofs to determine when and how they should be cleared to prevent damage or collapse.

**Lead:** Emergency Management, Public Works

**Priority:** High

**Status:** Not Started

**Estimated Cost:** Moderate

**Potential Funding Source(s):** Municipal Operating Budget

**Timeframe:** 7/2016 to 6/2019

**4.9 Review areas for potential wildfire risk by considering debris accumulation and access issues**

**Action Description:** The Town has many undeveloped areas that are at risk for wildfires. This study would consider debris accumulation and access issues for large contiguous forested areas in order to better inform emergency personnel about fire risk and work towards the development of plans to increase access and water supply in these areas.

**Lead:** Emergency Management

**Priority:** Low

**Status:** Not Started

**Estimated Cost:** Moderate

**Potential Funding Source(s):** Municipal Operating Budget

**Timeframe:** 7/2016 to 6/2021

**4.10 Develop regulations for dry hydrants and cisterns to ensure that maintenance is performed**

**Action Description:** The Town has a few dry hydrants and cisterns in outlying areas, but many are old, leaking, or unreliable and little maintenance has been performed. Development of regulations specifying maintenance responsibilities for this infrastructure is desired.

**Lead:** Emergency Management

**Priority:** High

**Status:** Not Started

**Estimated Cost:** Low

**Potential Funding Source(s):** Municipal Operating Budget

**Timeframe:** 7/2016 to 6/2021

**4.11 Incorporate updated hazard mitigation information into community plan updates**

**Action Description:** Hazard mitigation information will be incorporated into future plan updates of the POCD and other planning documents

**Lead:** Land Use

**Priority:** High

**Status:** Not Started

**Estimated Cost:** Low

**Potential Funding Source(s):** Municipal Operating Budget

**Timeframe:** 7/2016 to 6/2021

**4.12 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 Town will participate as a non-member (or provide comments to The Connecticut Water Company) to encourage that drought-related public water supply needs are met throughout the community.

**Lead:** Mayor

**Priority:** Medium

**Status:** Not Started

**Estimated Cost:** Low

**Potential Funding Source(s):** Municipal Operating Budget

**Timeframe:** 7/2016 to 6/2018

**4.13 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:** Land Use

**Priority:** Medium

**Status:** Not Started

**Estimated Cost:** Minimal

**Potential Funding Source(s):** Municipal Operating Budget

**Timeframe:** 7/2016 to 6/2021

**Objective 5: Enable residents to better help themselves through preparedness educations****Strategies and Actions:****5.1 Encourage preparedness workshops in schools**

Action Description:	The Town plans to implement the FEMA Student Tools for Emergency Planning (STEP) program in the near future.
Lead:	Emergency Management
Priority:	Medium
Status:	Not Started
Estimated Cost:	Moderate
Potential Funding Source(s):	Municipal Operating Budget
Timeframe:	7/2016 to 6/2019

**5.2 Encourage sign-ups for the Ct Alerts emergency notification system**

Action Description:	The Town uses CT Alerts for emergency notification and response. 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:	In Progress
Estimated Cost:	Low
Potential Funding Source(s):	Municipal Operating Budget
Timeframe:	7/2016 to 6/2018.

**Objective 6: Coordinate plans & response efforts with neighboring parties to increase efficiency****Strategies and Actions:****6.1 Develop watershed-wide low-impact development regulations with incentives**

Action Description:	Although such regulations have long been desired, implementation was delayed pending the outcome of the Pequabuck River Study. It is recommended that common regulations be implemented for each community in the watershed as developed through a watershed compact with the other communities. The Town's Storm Water Committee should be reconvened to assist with this effort.
Lead:	Land Use
Priority:	Medium
Status:	Not Started (Recommendation of Pequabuck River Study)
Estimated Cost:	Moderate
Potential Funding Source(s):	Municipal Operating Budget
Timeframe:	7/2016 to 6/2021

**6.2 Encourage the City of Bristol to perform repairs/upgrades to Bristol Reservoir #3**

**Action Description:** The City of Bristol recently activated its EAP for this dam and Town officials prepared to evacuate downstream residents. Town officials will contact the City and Connecticut DEEP to encourage upgrades/repairs to reduce the likelihood of failure.

**Lead:** Emergency Management, Mayor

**Priority:** Low

**Status:** Not Started

**Estimated Cost:** Minimal

**Potential Funding Source(s):** Municipal Operating Budget

**Timeframe:** 7/2016 to 6/2021

**Objective 7: Mitigate impacts to properties in the National Flood Insurance Program****Strategies and Actions:****7.1 Work with FEMA to update FIRMs as necessary**

**Action Description:** The Pequabuck River Study has provided mapping which can be used for the new regulatory floodplain on the river and a revised FIRM based on recent information could be issued for the river.

**Lead:** Land Use

**Priority:** High

**Status:** Not Started (Recommendation of Pequabuck River Study)

**Estimated Cost:** Low

**Potential Funding Source(s):** Municipal Operating Budget

**Timeframe:** 7/2016 to 6/2021

**7.2 Increase capacity of secondary driveway bridge serving Plymouth Village Apartments**

**Action Description:** The Town will work with the property owner to remove or replace the bridge over the Pequabuck River which is undersized and increases upstream flood elevations by 2.5 feet for the 1% annual chance flood. This will remove 15 buildings from the 1% annual chance floodplain and reduce the flood risk to the remaining buildings in the floodplain. Removal of the bridge is the less expensive option but only if another secondary mode of egress for the apartments can be obtained.

**Lead:** Public Works, Emergency Management

**Priority:** Medium

**Status:** Not started (Recommendation of the Pequabuck River Study, Property Owner and Grant Dependent)

**Estimated Cost:** High

**Potential Funding Source(s):** Municipal Capital Budget, HMGP, PDM, FMA

**Timeframe:** 7/2016 to 6/2021

**7.3 Remove house at 150 Main Street and conduct channel clearing.**

Action Description:	The Town owns this structure and removal will eliminate damage to the property. Clearing the channel will reduce the impact of debris blockages that can exacerbate flooding conditions in the area.
Lead:	Land Use, Public Works
Priority:	High
Status:	Not Started (Recommendation of Pequabuck River Study, Grant Dependent)
Estimated Cost:	High
Potential Funding Source(s):	Municipal Capital Budget, HMGP, PDM, FMA
Timeframe:	7/2016 to 6/2021

**7.4 Assist property owners with floodproofing of commercial and industrial structures**

Action Description:	The Town will coordinate an outreach program to commercial and industrial property owners and assist with developing benefit-cost analyses and FEMA grant applications to obtain dry floodproofing if possible. This activity will focus first on repetitive loss properties and then on other floodprone properties.
Lead:	Land Use, Public Works
Priority:	Medium
Status:	Not Started (Recommendation of Pequabuck River Study, Grant Dependent)
Estimated Cost:	Moderate
Potential Funding Source(s):	Municipal Operating Budget, PDM, FMA, HMGP
Timeframe:	7/2016 to 6/2021

**7.5 Assist property owners with modifying private driveways to reduce the impact of flooding**

Action Description:	The Town will coordinate an outreach program to residential property owners to resize culverts to reduce flooding impacts. If desired, the Town could assist with acquiring funding to complete the work.
Lead:	Land Use, Public Works
Priority:	Medium
Status:	Not Started (Recommendation of Pequabuck River Study, Grant Dependent)
Estimated Cost:	Moderate
Potential Funding Source(s):	Municipal Operating Budget, PDM, FMA, HMGP
Timeframe:	7/2016 to 6/2021

**7.6 Pursue site-specific mitigation measures for residential properties that regularly flood**

Action Description:	Several residences are regularly sandbagged to prevent flooding, and other structures are also at risk. The Town will work with the property owners to develop site-specific mitigation measures to protect these properties, such as acquisition, elevation, construction of a floodwall, or other measures. This activity will focus first on repetitive loss properties and then on other floodprone properties.
Lead:	Land Use
Priority:	Low
Status:	Not started
Estimated Cost:	High
Potential Funding Source(s):	Municipal Capital Budget, PDM, FMA, HMGP
Timeframe:	7/2016 to 6/2021

**10.4 Contributors to Plan Update**

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- Margus Laan, AICP (Director of Planning and Economic Development)
- Anthony Orsini (Emergency Management Director)
- David Merchant (Mayor)
- Charles Wiegert (Director of Public Works)
- Mark Sekorski (Fire Chief)
- Karen Krasicky (Police Chief)
- Robert Wright (Assistant Police Chief)
- Pamela Pelletier (Shelter Manager)
- Mike Luba (Resident)