



Western Connecticut Council of Governments Multi-Jurisdiction Hazard Mitigation Plan Update 2021 – 2026

Municipal Annex for **Bethel, CT**

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Bethel, CT 06801
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1.0 INTRODUCTION

1.1 Purpose of Annex

The purpose of this Hazard Mitigation Plan (HMP) annex is to provide a community-specific hazard risk assessment, capability analysis, and evaluation and prioritization of hazard mitigation measures and projects. Background information and the regional effects of pertinent natural hazards are discussed in the main body of the Western Connecticut Council of Governments (WestCOG) Multi-Jurisdictional Hazard Mitigation Plan. This annex is designed to supplement the information presented in the Multi-Jurisdictional HMP with more specific detail for the Town of Bethel and is not to be considered a standalone document.

The primary goal of this HMP, including this Municipal Annex, is to identify natural hazard risks and mitigation opportunities in order to reduce the loss of or damage to life, property, infrastructure, and natural, cultural, and economic resources. This includes the reduction of public and private damage costs. Limiting losses of and damage to life and property will also reduce the social, emotional, and economic disruption associated with a natural disaster.

2.0 COMMUNITY PROFILE

2.1 Geography

2.1.1 Physical Setting

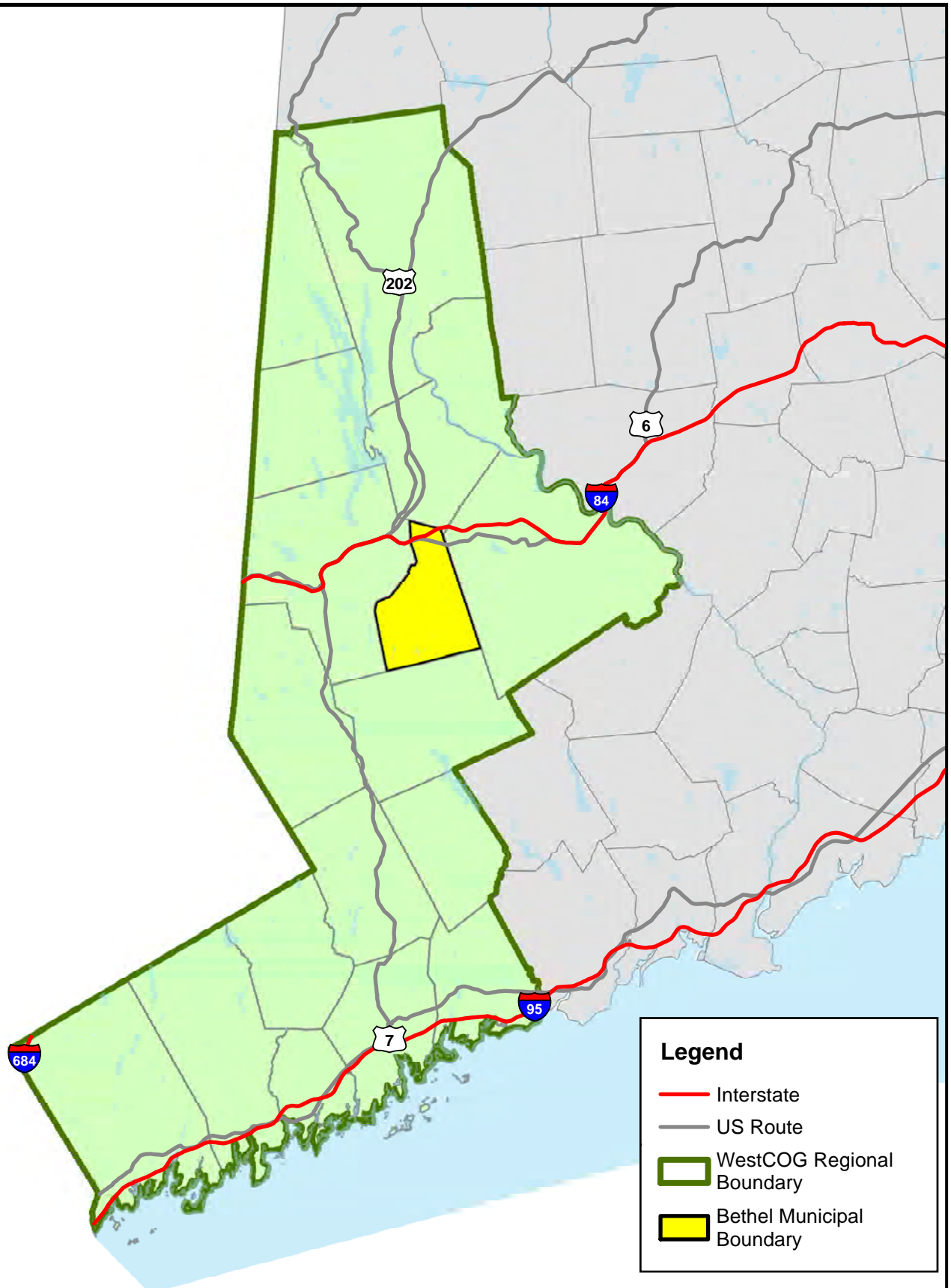
Incorporated in 1855, the Town of Bethel is located in northern Litchfield County and is home to a population of 18,584 (2010 U.S. Census). Bethel is bordered by the municipalities of Brookfield to the north, Newtown to the east, Redding to the south, and Danbury to the west. Refer to Figure 2-1 for a map showing the regional location of Bethel within the WestCOG region.

The topography of the town is characterized by higher elevation hills in the southern region, with developed plateaus in the northern areas, with several stream valleys running throughout. The Dibbles Brook, Limekiln Brook, and East Swamp Brook are a few of the numerous brooks coursing through the town. The varying terrain and land-uses in Bethel makes the town vulnerable to an array of natural hazards.

The Center for Land Use Education and Research (CLEAR) has developed a land cover dataset derived from 2016 satellite imagery to depict statewide land cover. The land cover by percent of total land can be found in Table 2-1.

Table 2-1: Land Cover by Area

Land Cover Class	Percent of total Land
Developed	27.7%
Turf & Grass	12.2%
Other Grasses	0.8%
Agricultural Field	2.2%
Deciduous Forest	49.85
Coniferous Forest	1.5%
Water	1.0%
Non-Forested Wetland	0.3%
Forested Wetland	3.3%
Tidal Wetland	0.4%
Barren Land	0.8%
Utility Corridor	0.0%



2.1.2 Land Use

Bethel is a primarily residential community within the larger Danbury metropolitan area, with some of the densest development settled along the western border which is shared with the City. In general, the town consists of a mixed-use village center, with rural, wooded, and suburban residential areas, along with modern technical commercial parks.

According to the 2020 Plan of Conservation and Development (POCD), the Town of Bethel consists of approximately 10,843 acres, most of which is dedicated to residential use. An estimate of generalized land uses is shown in Table 2-2.

Table 2-2: Permitted Land Use

Land Use	Parcels	Total	% of Total
Residential	6,620	5,634.4	52.0
Single-Family Development	4,662	4,742.1	43.7
Two-Family Development	480	406.4	3.7
Multi-Family Development	1,478	485.9	4.5
Commercial/Industrial	391	689.1	6.4
Mixed-Use	65	28.6	0.3
Commercial	161	162.2	1.5
Industrial	165	498.3	4.6
Institutional	38	270.4	2.5
Community Facility	23	224.2	2.1
Institutional	15	46.2	0.4
Open Space/Agriculture	194	2,408.9	22.2
Open Space	179	2,230.2	20.6
Agriculture	15	178.7	1.6
Other	475	1,841.0	17.0
ROW	43	759.8	7.0
Utility	34	76.2	0.7
Vacant	398	1,005.0	9.3
Total	7,718	10,843.8	100.0

Source: 2020 Bethel Plan of Conservation and Development, based on 2018 parcel data

The POCD notes that the town has worked to preserve open space over the past few decades, and has been successful in protecting over 200 acres since 2007. The preservation of this land plays a vital role in maintaining the town's natural resources.

Table 2-3 summarizes 2006 land cover data which was derived from satellite imagery. Areas shown as turf and grass are maintained grasses such as residential and commercial lawns or golf courses. The southern portion of Bethel is predominantly forested. Consistent with zoning, the highest density development is in the west-central and northern portion of Bethel, areas closest to the City of Danbury. According to these figures, about 50% of Bethel is forested and approximately 27% is developed.

Table 2-3: Land Cover by Area

Land Cover	Area within Town (acres)	Percent of Community
Deciduous Forest	5,461	50.4%
Developed	2,862	26.4%
Turf & Grass	1,383	12.8%
Coniferous Forest	178	1.6%
Water	110	1.0%
Barren	63	0.6%
Agricultural Field	243	2.2%
Forested Wetland	337	3.1%
Other Grasses	74	0.7%
Non-forested Wetland	37	0.3%
Utility (Forest)	96	0.9%
Tidal Wetland	0	0.0%
Total	11,109	100%

Source: UCONN Center for Land Use Education and Research (CLEAR)

2.1.3 Climate and Climate Change

Over the course of the year, the temperature in Bethel typically varies from 19°F to 82°F and is rarely below 3°F or above 89°F. The warm season lasts from May 30 to September 14, with an average daily high temperature above 72°F. The hottest day of the year is July 20, with an average high of 82°F and low of 63°F. The cold season lasts from December 2 to March 11, with an average daily high temperature below 44°F. The coldest day of the year is January 29, with an average low of 19°F and high of 35°F.

Precipitation falls throughout the year in Bethel. The wetter season lasts from April 1 to August 20, with a greater than 29% chance of a given day being a wet day. The chance of a wet day peaks at 36% on August 2. The smallest chance of a wet day is 22% on January 29.

The most rain falls during the 31 days centered around June 3, with an average total accumulation of 3.9 inches. The least rain falls around January 29, with an average total accumulation of 1.7 inches.

The snowy period of the year lasts from November 2 to April 12, with a sliding 31-day liquid-equivalent snowfall of at least 0.1 inches. The most snow falls during the 31 days centered around January 26, with an average total liquid-equivalent accumulation of 1.1 inches.

Climate data was sourced from Weather Spark based on analysis of the years 1980 to 2016.

Climate Change

Climate change projections for Connecticut were sourced from the 2019 Connecticut Physical Climate Science Assessment Report, which was developed by the University of Connecticut (UConn) Atmospheric Sciences Group, commissioned by the Connecticut Institute for Resilience and Climate Adaptation (CIRCA) with funding from the Department of Energy and Environmental Protection (DEEP). All projections are based on the IPCC high CO₂ emission scenario (RCP8.5).

Temperature

Annual temperatures have been increasing throughout Connecticut and is projected to continue to do so in the future. By mid-century, average annual temperature is projected to increase by 5°F. Seasonal average temperatures are also expected to rise, with the greatest increase (6°F) experienced in summer (June to August). The number of nights over which temperature remains above 68°F will quadruple from 10 days per year to more than 40 days, and the number of extremely hot days will increase from above 4 a year to 48 per year.

Precipitation

Rainfall data in "Technical Paper No. 40" by the U.S. Weather Bureau (now the National Weather Service) (Hershfield, 1961) dates from the years 1938 through 1958. According to these data, the 24-hour rainfall amount for a 50% annual-chance storm in Fairfield County is 3.3 inches.

The continued increase in precipitation only heightens the need for hazard mitigation planning as the occurrence of floods may change in accordance with the greater precipitation.

The Northeast Regional Climate Center (NRCC) has partnered with the Natural Resources Conservation Service (NRCS) to provide a consistent, current regional analysis of rainfall extremes (<http://precip.eas.cornell.edu/>). In 2020 this dataset listed the 24-hour rainfall amount for a 50% annual-chance storm in Bethel as 3.42 inches.

The NOAA Atlas 14, released on September 30, 2015 puts the 24-hour rainfall amount for a 50% annual-chance storm in Bethel at 3.56 inches.

These precipitation amounts, and more details, are summarized in Table 2-4, below.

Table 2-4: 24-Hour Rainfall Amounts by Annual-Chance Occurrence

Source	24-Hour Rainfall Amount (inches) by Annual-Chance Occurrence		
	50%	4%	1%
Technical Paper No. 40	3.3	5.7	7.2
NRCC	3.42	6.42	9.09
NOAA Atlas 14	3.56	6.84	8.78

Annual precipitation has been increasing statewide and is projected to continue to increase. By mid-century, annual precipitation is projected to increase by 8.5%, with the greatest increase (13.4%) occurring in the winter months. Extreme precipitation events are projected to increase in both frequency and magnitude. Based on this increase and the precipitation figures above, by 2050 Bethel can expect the 24-hour rainfall amount for a 50% annual-chance storm to be around 3.7 to 3.8 inches or greater.

Despite overall increases in precipitation, drought risk is projected to increase, especially during summer, due to changing precipitation patterns and projected increases in potential evapotranspiration (plants taking up more water in hotter temperatures and longer growing seasons).

2.1.4 Drainage Basins and Hydrology

Bethel is settled between the Housatonic River Valley and the Saugatuck River Valley. In general, the topography of the town slopes northward into major tributaries of the Still River or Housatonic River. This highest elevation in town, which exceeds 850 feet, can be found in the southern areas of town, with elevations decreasing northward to lows of about 300 feet above sea level.

The Town of Bethel is divided among eight sub-regional watersheds. The associated watercourses are summarized below and described in the following sections. All of the water that passes through Bethel eventually empties into Long Island Sound.

- Sympaug Brook, East Swamp Brook, and Limekiln Brook all drain to the Still River, a tributary of the Housatonic River. Flooding along the Still River often affects areas in Danbury, Brookfield, and New Milford, and backwater conditions on the Still River result in flooding on tributary streams in Bethel.
- Pond Brook drains through Newtown to the Housatonic River.
- The Aspetuck River and Little River drain to the Saugatuck River. Flooding along these streams can impact areas in Newtown and Redding.

Aspetuck River

Part of the headwaters of the Aspetuck River lie within Huntington State Park in southeastern Bethel, with the watershed covering a total of 0.67 square miles of area. The Aspetuck River flows generally south through Newtown and Redding, and Easton before reaching its confluence with the Saugatuck River in Weston. The total area of the Aspetuck River watershed is approximately 23 square miles.

East Swamp Brook

The East Swamp Brook watershed is the third-largest watershed in Bethel, covering a total area of 4.75 square miles. The brook has its headwaters in southeastern Bethel just southwest of Codfish Hill. The brook flows generally northwest and is conveyed beneath Codfish Hill Road and Route 302 prior to reaching the confluence with Wolf Pit Brook.

Wolf Pit Brook is a major tributary of East Swamp Brook and has its headwaters just south of Bethel in northeastern Redding on Sunset Hill. This headwater area drains into Wolf Pit Brook downstream of Huntington State Park. Wolf Pit Brook flows generally northwest and is conveyed beneath several minor roads and Route 302 prior to reaching the confluence with East Swamp Brook.

Limekiln Brook

The Limekiln Brook watershed is the largest watershed in Bethel, covering a total area of 5.07 square miles. The brook has its headwaters in western Newtown just south of the Dodgingtown area. The brook flows generally northwest into Bethel and is conveyed beneath Route 302 and Rockwell Road prior to reaching the confluence with Dibbles Brook just upstream of Plumtrees Road.

Dibbles Brook is a major tributary of Limekiln Brook and has its headwaters just south of Bethel in northeastern Bethel just west of Old Hawleyville Road. This headwater area drains south beneath

Route 6 and is conveyed generally south beneath Walnut Hill Road, Plumtrees Road, and Rockwell Road prior to reaching the confluence with Limekiln Brook.

The combined stream continues to flow generally west and northwest and it is conveyed beneath Plumtrees Road and Walnut Hill Road before reaching its confluence with East Swamp Brook downstream of Meckauer Park and Shelter Rock Road near the Danbury boundary. Limekiln Brook continues to flow north into Danbury where it drains into the Still River. In total, Limekiln Brook drains a total area of 8.77 square miles in Bethel, Brookfield, Danbury, and Newtown.

Pond Brook

Pond Brook has its headwaters near Whisconier Road in southern Brookfield. The brook flows generally southeast into Hawleyville where it turns to flow generally northeast to its confluence with the Housatonic River at Lake Lillinonah. A small area (0.38 square miles) of northeastern Bethel to the east of Old Hawleyville Road drains into unnamed tributaries to Pond Brook. The total area of the Pond Brook watershed is approximately 13.9 square miles in Bethel, Brookfield, and Newtown.

Saugatuck River

The Saugatuck River has its headwaters southern Danbury in Wooster Mountain State Park. The river flows generally southeast through West Redding to the Saugatuck Reservoir, where it turns to flow generally south through Weston and Westport to its confluence with Long Island Sound. A small area (0.44 square miles) of southwestern Bethel to the east of Route 53 drains into Ryder Brook, a minor tributary of the river that drains generally south into Redding. The total area of the Saugatuck River watershed is approximately 89 square miles within Bethel, Danbury, Easton, Fairfield, Newtown, Norwalk, Redding, Ridgefield, Weston, Westport, and Wilton.

Still River

The Still River has its headwaters western Danbury near Mill Plain where it forms from the outflow from Sanfords Pond. The river flows generally southeast through Danbury to Mill Plain Swamp before turning generally northeast through the city center and then into Brookfield. The Still River then flows generally northward through Brookfield and New Milford to its confluence with the Housatonic River just upstream of Lake Lillinonah. A small area (0.21 square miles) of northern Bethel (primarily to the east of Vail Road) drains north into Brookfield to its confluence with the river. The total area of the Still River watershed is approximately 71 square miles within Putnam County, New York and Bethel, Brookfield, Danbury, New Fairfield, Newtown, Redding, and Ridgefield, Connecticut.

Sympaug Brook

The Sympaug Brook watershed is the second-largest watershed in Bethel, covering a total area of 4.90 square miles. The brook has its headwaters in southwestern Bethel as the outflow from Sympaug Pond. The brook flows generally north through Bethel and is conveyed beneath Route 53, Metro North, South Street, Beach Street, Route 302, Diamond Avenue, and Metro North again before entering Danbury. The primary tributary to Sympaug Brook is Bethel Reservoir Brook (a.k.a. Terehaute Brook).

Bethel Reservoir Brook has its headwaters as the outflow from Eureka Lake in southeastern Danbury just west of Long Ridge Road. This stream flows generally north from the lake and is conveyed beneath Long Ridge Road and Reservoir Street in Danbury before entering Bethel, where it turns generally northeast and is conveyed beneath Pleasant View Terrace, Lindbergh Street, Fleetwood Avenue, and Route 53 prior to reaching the confluence with Sympaug Brook. The combined stream continues to flow generally north into Danbury before reaching its confluence with the Still River. In total, Sympaug Brook drains a total area of 7.25 square miles in Bethel, Danbury, and Redding.

2.2 Society, Culture and Government

2.2.1 Population and Demographic Setting

According to the 2010 U.S. Census, Bethel had a population of 18,584 with 1,095 persons per square mile. The Connecticut State Department of Public Health estimates the 2019 population of Bethel to be 19,800. The American Community Survey (ACS) project a decline in population, with estimates showing a population of only 16,376 for the year 2030.

According to the 2020 Plan of Conservation and Development population in Bethel has grown 5.6% since 2010, which shifts in age distribution. The median age in Bethel is 42.7 in 2016, which is an increase from 37.1 in 2000.

One important aspect of natural hazard mitigation planning is to identify a community's demographic trends in relation to natural hazards. The Center for Disease Control and Prevention (CDC) Social Vulnerability Index (SVI) is used to identify vulnerable populations in Bethel. The SVI uses census data to identify populations within the town that may be more vulnerable to natural hazards. As a result of this analysis, the town is identified to have a certain level of overall social vulnerability with a rank of 0 to 1; 1 being the most vulnerable and 0 being the least.

To determine social vulnerability, the CDC incorporates 15 factors into the overall SVI calculation under four categories, or themes: socioeconomic status, household composition and disability, minority status and language, and housing type and transportation. Figure 2-2 represents the breakdown of the SVI process. These themes and their ranking are based on census statistics. By evaluating these factors and determining a level of social vulnerability, a community can identify specific needs for before, during, and after an event. Such needs may

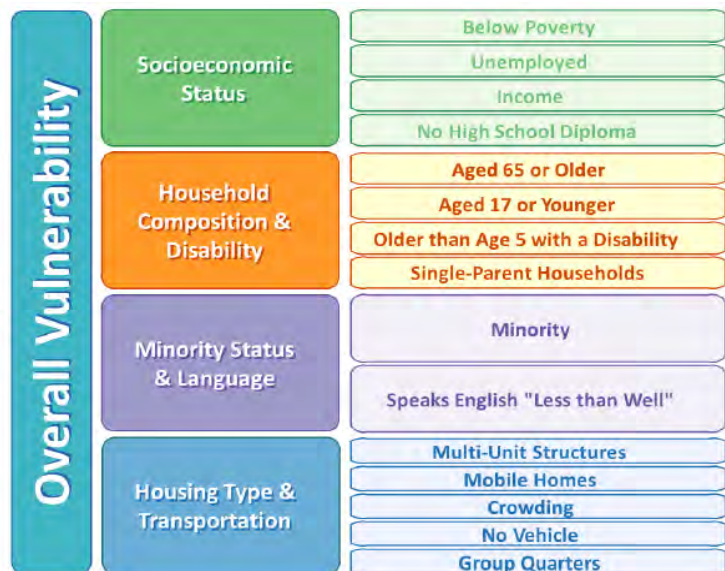


Figure 2-2: The CDC SVI Index Factors.

Graphic: svi.cdc.com

include sheltering capacity, evacuation routes, or to decide how many emergency personnel may be required to respond after an event.

The Town of Bethel is considered to have a low to moderate level of vulnerability, with their most vulnerable population being minorities and those who speak English “less than well”. These vulnerable populations are located within the western most tract of Bethel, which is the shared border between the City of Danbury. In addition, the town has vulnerable populations based on socioeconomic status, and housing type and transportation; socioeconomic status appears to be evenly distributed throughout the town, while populations vulnerable due to housing type and transportation are greater in the two western tracts. Appendix B explores the SVI for Bethel in more depth.

2.2.2 Development Trends

Over the past few decades Bethel’s population has grown significantly, becoming a bedroom community for the neighboring City of Danbury. While development has begun to slow since the rapid rise seen in the 1980’s, the town is still experiencing growth. The town remains an affordable town within Fairfield County with diverse housing stock. The town is primarily single-home dwellings, with lots typically ranging from a quarter acre in the downtown area, to 2 or more acres in the suburban areas. Between 2010 and 2017, the town experienced an increase of over 450 housing units, the 6th highest growth rate in the state. Many of these recent developments include single-family homes as well as apartments and condominiums. Bethel has potential for transit-oriented development (TOD) around the passenger rail station. This could include some limited multi-family and mixed-use development.

Development in Bethel tends to be outside of flood zones and other areas of natural hazard risk. Therefore, community vulnerabilities have not been increasing as development continues.

2.2.3 Governmental Structure

The Town of Bethel is governed by a Selectman-Town Meeting form of government in which legislative responsibilities are shared by the Board of Selectmen and the Town Meeting. The First Selectman serves as the chief executive.

In addition to Board of Selectmen and the Town Meeting, there are boards, commissions and committees providing input and direction to Town administrators. Also, Town departments provide municipal services and day-to-day administration. Many of these commissions and departments play a role in hazard mitigation, including the Land Use Department, Public Works, and the Inland Wetland Commission.

2.2.4 Historic and Cultural Resources

Historic and cultural resources include sites, structures, and objects that are significant in history, architecture, archaeology, engineering, and culture. Protection of these resources grows economies and enhances community character, and following a natural disaster they can help to reinforce neighborhood connections and reestablish a sense of community and normalcy. Consideration of these resources in this HMP is critical.

Historic preservation planning helps protect historic properties and cultural resources from demolition or alteration.

Hazard mitigation planning helps protect life and property from damage caused by natural and manmade hazards.

Integrating these two planning processes helps create safe and sustainable historic communities.

- Paraphrased from FEMA Report 386-6

Historic resources in Bethel are concentrated within the Greenwood Avenue Historic District, which includes 29 contributing buildings, the town green (P. T. Barnum Square), the Bethel Public Library, a former railroad station converted into a brewery, and a World War I Doughboy bronze statue. Bethel's historic resources also include properties on Milwaukee Avenue and Plumtrees Road. See Figure 2-3 for a map of historic resources in Bethel.



Analysis of the State Historic Preservation Office (SHPO) database of historic resources shows that some of these resources are exposed to natural hazards, as shown in Table 2-5.

Table 2-5: Number of Historic Assets Exposed to Different Hazards in Bethel




Hazard	Count
Dam Failure	2
Earthquake	38
Flooding	-
1% Annual	0
0.2% Annual	0
Hurricane/Tropical Storm	38
Thunderstorm	38
Tornado	38
Winter Storm	38
Wildfire	1

Historic buildings and structures may be particularly susceptible to natural hazards because they were built prior to the establishment of more recent construction standards. Additionally, some of the structural integrity of these resources may have been degraded over the decades or centuries since their original construction. Structural retrofits and hazard mitigation methods may be challenging or restricted in cases where alteration of a resource will also diminish its cultural or historical aesthetic and value. Finally, miscommunications or lack of knowledge may lead to historic resources being damaged during the disaster recovery process.




LEGEND

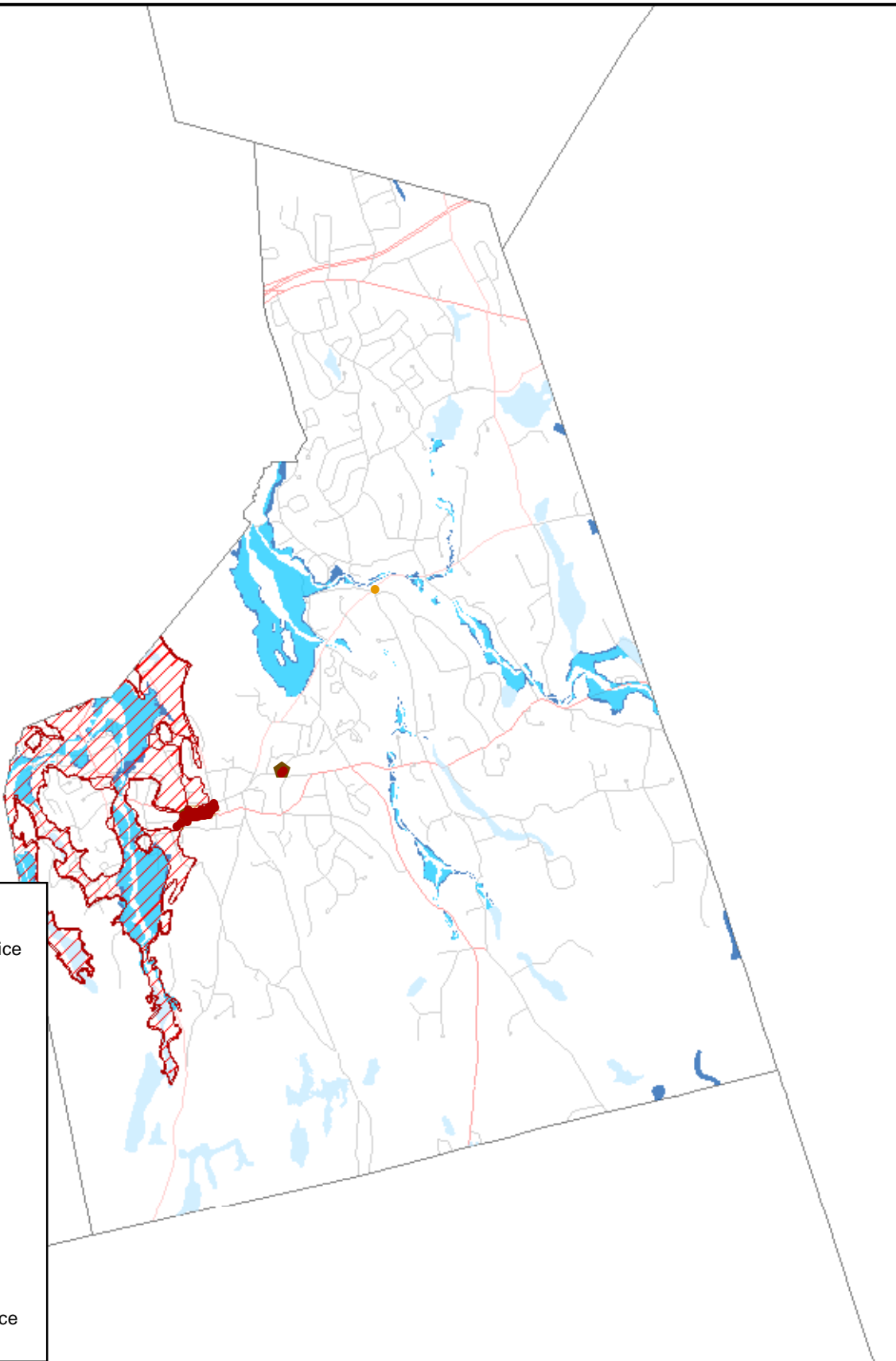
-  National Park Service Cultural Site
-  Cultural District

SHPO Historic Sites

-  National Register
-  State Register
-  Dam Failure Inundation Area

Flood Zones

-  A
-  AE
-  0.2% Annual Chance Flood Hazard





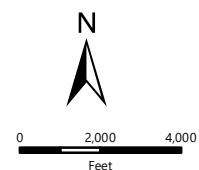
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Historic Resources with Flood Zones and
Dam Failure Inundation Areas

WestCOG Hazard Mitigation Plan
Town of Bethel

NPS: Cultural Resources CT DEEP: DFA FEMA: DFRIM & Q3



SCALE	1" = 4,763'
DATE	1/6/2021
PROJ. NO.	3101-22

FIG. 2-3

Steps to incorporate historical and cultural preservation into hazard mitigation planning include:

- Inventory and survey historic and cultural resources
- Implement appropriate mitigation measures for those resources
- Take steps to move portable resources, such as artwork or documents, to safe locations prior to the occurrence of a hazard, if possible
- Consider these resources in emergency operations plans to prevent accidental damages during recovery efforts

Specific actions to mitigate natural hazard risks to historic resources are listed at the end of this Annex.

2.3 Infrastructure

2.3.1 Transportation

Route 6 and Interstate 84 run parallel, east to west, through the northern most area of town. The other primary routes in town include route 302, which runs east to west and bisects the town, route 53, which runs south from Danbury, and Route 58 which also runs south from 302. There are other main arteries in Town connecting the routes as well such as Chestnut Ridge Road and Old Hawleyville Road.

In addition to roadways, there is a train station in town located at 13 Durant Avenue. This rail line runs from Danbury, through Bethel, and south into Redding. This is a Metro-North Railroad that originates in Danbury and joins the main New Haven line in South Norwalk.

2.3.2 Utilities

The Town of Bethel has public water supply provided by the Bethel Water Department, the Aquarion Water Company, and a number of Transient Non-Community Public Water Systems. The Bethel Water Department operates a system which serves the village center and surrounding area. The Maple Avenue Wells supply 70% of the Town's drinking water and the remaining 30% is pulled from the Chestnut Ridge Reservoir. The Water Department is responsible for the maintenance of the Municipal Drinking Water systems. All system components are critical facilities. The Town of Bethel has backup generators available for these facilities such as the two pumping stations and source facilities. The Aquarion Water Company systems serve the northern portion of the Town.

The Sewer Department maintains the Municipal sewer mains located within the Town to ensure compliance with both state and federal regulations. The Town of Bethel does not operate its own sewage treatment plant and is currently operating under an Interlocal Agreement with the City of Danbury to send its municipal sewage to their treatment facility. The daily capacity allowance as per the Interlocal agreement is 2,000,000 gallons per day.

Eversource is the primary provider in Town for both electricity and natural gas. For those residents that do not utilize natural gas, alternatives for energy include oil and propane.

According to geolSP (geolSP.com), access to Broadband Internet is available to most residents in Bethel. There are 3 DSL Providers (AT&T, MegaPath, and Connecticut Education Network), 1 Cable Internet providers (Xfinity), and 2 Fiber Internet providers (Fibertech Networks, LLC, and Connecticut Education Network). There are also 4 Mobile Broadband (cellular) providers with service available in Bethel.

2.4 Planning and Regulatory Capabilities

2.4.1 Review of Existing Local Plans

The Town of Bethel has a number of plans that are relevant to hazard mitigation. These are noted here:

- **Plan of Conservation and Development (POCD):** Bethel's most recent POCD was adopted in 2020. It addresses natural hazard concerns within the community, and includes strategies that will mitigate risks from those hazards as the community continues to develop.
- **Stormwater Management:** Bethel maintains a Stormwater Management Plan. This document has been updated to comply with the requirements of the US EPA 2017 updated *General Permit for the Discharge of Stormwater from Small Municipal Separate Storm Sewer Systems* (MS4 General Permit).
- **Capital Improvement Plan (CIP):** Bethel maintains a CIP that is updated annually and lays out capital investments for a five-year period. The CIP often includes road, drainage, and other infrastructure improvement projects relevant to hazard mitigation.
- **Economic Development Plan:** Bethel is included within the Western Connecticut Economic Development Plan of 2017, developed by WestCOG. The plan aligns with the COG's other efforts to promote climate sustainability and resiliency in the region.
- **Emergency Operations Plan (EOP):** Bethel's EOP is reviewed annually and updated as needed. Dam failure Emergency Action Plans (EAPs) for dams with failure inundation zones that may impact Bethel, and for which EAPs are available, are on file locally.
- **Watershed Management Plan:** Watershed Management Plans have been developed for the Saugatuck-Aspetuck River Watershed and the Still River Watershed. The Saugatuck River Watershed Based Plan was developed by the former South Western Regional Planning Agency (SWRPA) in 2012, while the Still River Watershed Management Plan was developed by the Housatonic valley Association with support from the Still River Partners in 2019. These plans are focused on water quality, but can help the community mitigate inland flood risks by incorporating watershed management best practices into its planning efforts.
- **Open Space:** Bethel does not maintain a stand-alone Open Space Plan; instead, open space planning is incorporated into the community's POCD. The Town's open space preservation capabilities are robust, and include detailed goals within the POCD, the active Bethel Land Trust, and municipal acquisition capabilities.

2.4.2 Review of Regulatory Structures

Bethel regulates development through a number of regulations, codes, and ordinances. These are summarized below. More detailed information about how these regulations relate to specific natural hazards are described in Section 3.

- **Building Code:** Bethel enforces the Connecticut State Building Code locally.
- **Zoning Regulations:** Most recently updated in November 2012.
- **Inland Wetlands and Watercourses Regulations:** Most recently updated in October 2016.
- **Subdivision Regulations:** Most recently updated in October 2016. Include provisions promoting control of stormwater runoff, installation of firefighting water sources, construction of adequate emergency access and egress, burial of utilities, and use of Low Impact Development techniques and Green Infrastructure.

2.5 Emergency Services, Critical Facilities, Sheltering, and Evacuation

Bethel has identified several critical facilities throughout the town. Table 2-6 and Figure 2-4 identify those critical facilities in Bethel. The Town considers its police, fire, governmental, and major transportation arteries to be its most important critical facilities since these are needed to ensure that emergencies are addressed while day-to-day management of Bethel continues.

2.5.1 Sheltering Capabilities

Emergency shelters are an important subset of critical facilities as they are needed in many emergency situations. There are three identified shelters in the town that are also considered critical facilities. The Municipal Building is the primary shelter for the town, has full back-up power, and can hold approximately 100 people. The town is continuously working to procure funding to install a generator for the high school, and have been doing so for several years. It is anticipated that between 10 to 20% of the population would relocate as a result of a sustained power outage, although not all of those relocating would necessarily utilize a municipal shelter facility.

Table 2-6: Critical Facilities

Facility	Address or Location	Comment	Emergency Power	Shelter	In 1% Chance Floodplain
Police Department	12 Judd Avenue	Public Safety/EOC	✓		
Stony Hill Fire Department	59 Stony Hill Road	Public Safety	✓		
Bethel Fire Department	36-38 South Street	Public Safety	✓		
Municipal Center	1 School Street	Seat of Govt	✓	✓	
Public Works Garage	1 Sympaug Park Road	DPW	✓		
Radio Tower	38 Spring Hill Lane	Communications	✓		
R.M.T. Johnson School	500 Whittlesey Drive	Elementary			
Anna H. Rockwell School	400 Whittlesey Drive	Elementary			
Saint Mary School	24 Dodgingtown Road	Private			
Frank A. Berry School	200 Whittlesey Drive	Elementary	Partial		
Middle School	600 Whittlesey Drive	School	Partial	✓	
Bethel High School	300 Whittlesey Drive	School	✓	✓	
Bethel Healthcare	13 Park Lawn Drive	Convalescent Home	✓		
Augustana Congregate	101 Simeon Road	Elderly Housing	Partial		
Reynolds Ridge	14 Reynolds Ridge	Elderly Housing			
Maplewood of Bethel	46 Stony Hill Rd	Assisted Living			
Simeon Village	1-42 Simeon Road				

Facility	Address or Location	Comment	Emergency Power	Shelter	In 1% Chance Floodplain
Eureka Water Plant	Long Ridge Rd, Danbury	Public Water	✓		
Chestnut Ridge Plant	07U Webb Road	Public Water	✓		
Maple Avenue Wells	17U Ballfield Road	Public Water	✓		✓
Chimney Heights Well	Pondview Drive	Public Water (Aquarion)	✓		
Water & Sewer Pump Stations	Various		✓		✓

Emergency Response Capabilities

The Emergency Management Director (EMD) coordinates and oversees all emergency response capabilities in the town. The town also has an Emergency Operations Plan (EOP) which is updated annually. Evacuation routes have not been developed for the town, but instead these would be implemented depending upon the situation with coordination from the State and regional entities. The Police Department, previously located within a SFHA, was relocated to a new building outside of the SFHA in 2018; this building serves as the EOC during an emergency. The Town also installed a microwave link for the Police Department at the Town's communication tower, improving the department's emergency communication capabilities.

The Town recently acquired a generator for the High School, which allows the facility to be used as a primary shelter, as well as other necessary supplies. The town also has two 5k portable generators in storage if these needed to be utilized during a storm or other emergency event.

Communications

In Connecticut, the Department of Emergency Services and Public Protection (DESPP) has a regional focus. DESPP has divided Connecticut into five emergency planning regions and as part of this new view, the DEMHS subsection of DESPP has been partnering with HVCEO and other regional planning organizations to strengthen emergency response. Bethel is located in Region 5, consisting of 43 towns in western Connecticut.

The Town maintains a tower for emergency communications, and also installed a microwave link at the new Police Department in 2018. This link allows for more reliable communication during an emergency, and less reliance on the use of phone lines and cellular service.

Bethel utilizes the State's emergency notification system, "CT Alert", to direct geographically specific emergency notification telephone calls into affected areas. In addition to the State system, the town utilizes a local alert system as well. This system provides the Town more flexibility with their alerts, allowing for more localized messages to be sent out during an event.

Social media and the town website are also utilized to distribute information. The Bethel Office of Emergency Management (OEM) is active on Twitter and Facebook; both of which are linked through the Town website. Informational flyers and brochures developed by FEMA are available in the municipal buildings, with links to this same information also available on the Town website.

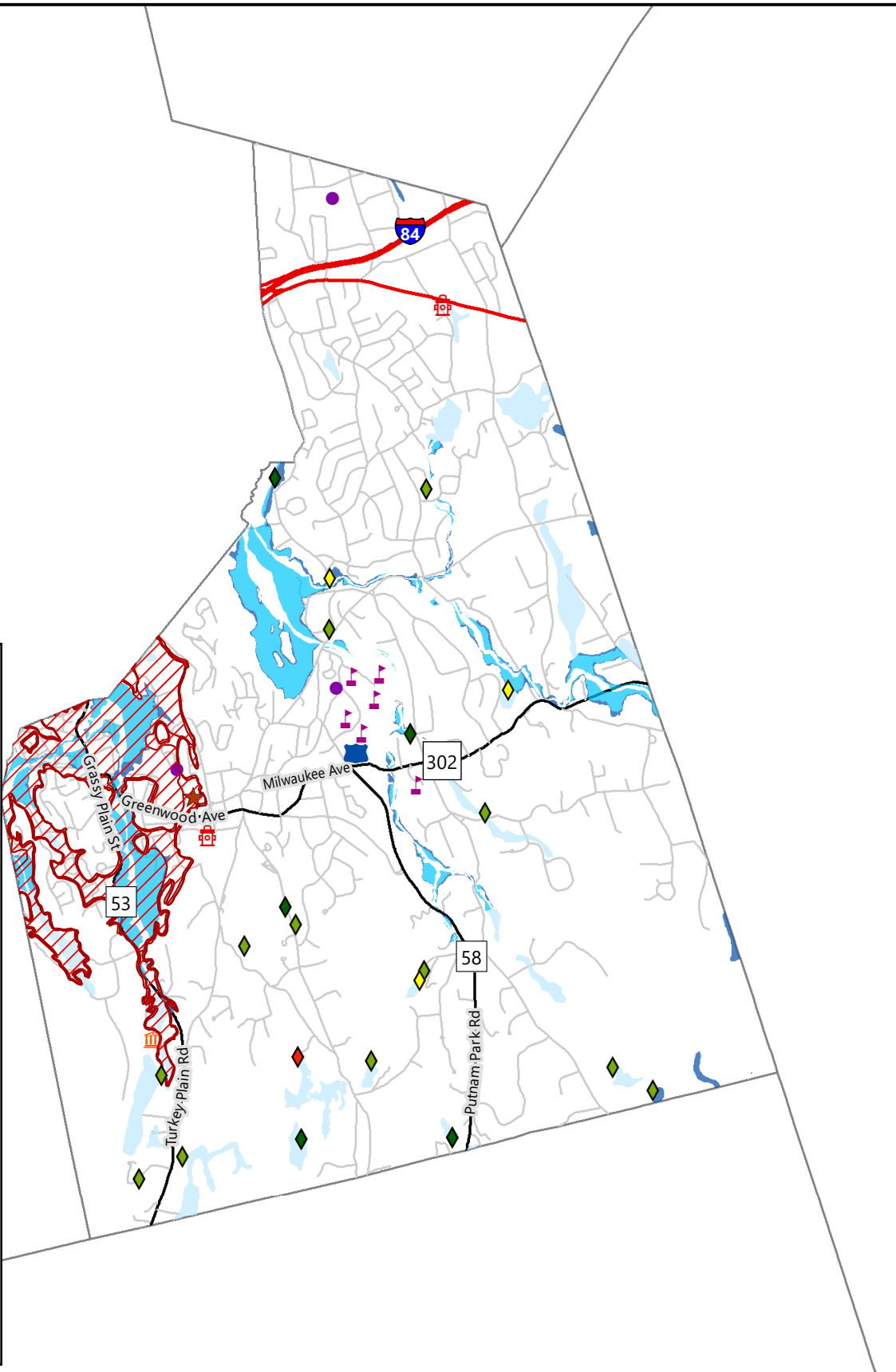
LEGEND

Dams

- AA
- A
- BB
- C
- Dam Failure Inundation Area
- Care Facility
- Municipal
- EOC
- Fire
- Police
- School
- Dam Failure Inundation Area

Flood Zones

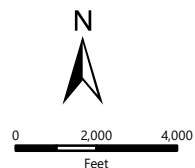
- A
- AE
- 0.2% Annual Chance Flood Hazard



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CHESHIRE, CT 06410
203.271.1773
WWW.MMINC.COM

Critical Facilities with Flood Zones and
Dam Failure Inundation Areas
WestCOG Hazard Mitigation Plan
Town of Bethel

NPS: Cultural Resources CT DEEP: DFA FEMA: DFRIM & Q3



SCALE	1" = 4,758'
DATE	7/29/2021
PROJ. NO.	3101-22

FIG. 2-4

3.0 HAZARD ASSESSMENT

3.1 FLOODING (COASTAL, INLAND, AND ICE JAMS)

3.1.1 Setting

The majority of major flood risk areas in Bethel are located along established SFHAs. The areas impacted by overflow of river systems are generally limited to river corridors and floodplains. Flooding that occurs outside floodplains, and localized nuisance flooding along smaller tributaries, are also potential problems in the town. This type of flooding occurs particularly along roadways as a result of inadequate drainage and other factors. The frequency of flooding in Bethel is considered likely for any given year.

Bethel has experienced various degrees of flooding throughout its history. Melting snow combined with early spring rains has caused spring flooding. Flood events have also occurred in late summer to early autumn resulting from storms of tropical origin moving northeast along the Atlantic coast. Winter floods result from the occasional thaw, particularly during years of heavy snow or periods of rainfall on frozen ground. Other flood events have been caused by excessive rainfalls upon saturated soils, yielding greater than normal runoff.

A regulatory floodplain with AE designation has been mapped along the Sympaug Brook, Limekiln Brook, Dibbles Brook, Wolf Pit Brook, and East Swamp Brook. Areas identified as providing flood storage are identified with A Zone designations, meaning they are regulated as floodplain, but flood elevations have not been established. Refer to Figure 2-4 for the areas of Bethel susceptible to flooding based on FEMA flood zones.

3.1.2 Capabilities

Floodplain Management, NFIP and CRS

The Town has consistently participated in the NFIP since April 23, 1984 and intends to continue participation in the NFIP. SFHAs in Bethel are delineated on a Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS). The FIRM delineates areas within Bethel that are vulnerable to flooding. The original FIS and FIRMs for flooding sources in the town were published in February 15, 1984; the current FIRMs are effective as of June 18, 2010.

The Planning and Zoning Official is the NFIP administrator for Bethel and oversees enforcement of NFIP regulations. The degree of flood protection established by the variety of regulations in Bethel meets the minimum reasonable for regulatory purposes under the NFIP. The Town of Bethel plans to remain compliant with the NFIP and will continue to participate in the NFIP. Given the relatively low number of structures impacted by flooding, the Town of Bethel is not currently considering enrollment in the Community Rating System program.

The current regulations are believed to be generally effective at preventing flood damage to new development and substantial improvements, and the majority of flooding issues within the town of Bethel are related to infrastructure or existing properties. In particular, the current regulations go beyond the minimum standards required under the NFIP by requiring compensatory storage in the floodplain. Freeboard is not currently required by Bethel regulations.

Ordinances, Regulations, and Plans

Regulations, codes, and ordinances that apply to flood hazard mitigation in conjunction with and in addition to NFIP regulations include:

- **Zoning Regulations:** The Town of Bethel Zoning Regulations were updated and effective as of October 15, 2016. The regulations have been enacted to “protect the public health, safety, and welfare; maintain and enhance community character, and; improve the economic value of property and general welfare of residents.” Section 2.2 defines “buildable land” as “The acreage of a tract of land not including any portion of the property classified as inland wetland, watercourse, 100-year floodplain”

Section 5.1 identifies the floodplain overlay zone and floodplain management regulations (effective as of 6/18/2010). The Floodplain Overlay Zone, as shown on the official Zoning Map, is intended to provide reasonable notice to persons regarding property that may be subject to the effects of flooding. It is the purpose of the floodplain management regulations to promote the public health, safety and general welfare and to minimize public and private losses due to flood conditions in specific areas by provisions designed to:

1. Protect human life and health.
 2. Minimize expenditure of public money for costly flood-control projects.
 3. Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public.
 4. Minimize prolonged business interruptions.
 5. Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines and streets and bridges located in areas of special flood hazard.
 6. Help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future flood blight areas.
 7. Ensure that potential buyers are notified that property is in an area of special flood hazard.
 8. Ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.
- Subsection E defines the Substantial Improvement threshold as being cumulative over a three-year period.
 - Subsection (F)(2) specifically identifies the June 18, 2010 FIS and accompanying FIRM as adopted by reference into the Zoning Regulations. SFHAs are identified as those areas mapped as Zone A, Zone AE, or Floodway on the FIRM. Subsection (F)(3) requires that “no structure or land shall hereafter be constructed, located, extended, converted or altered without full compliance of the terms of this section and other applicable regulations.”
 - Subsection (G)(1) requires that a zoning permit be obtained before construction or development begins within an SFHA. Subsection (G)(2) designates the Planning and Zoning Official as the Floodplain Manager responsible for administering and implementing the Floodplain Management Regulations, and by reference, the enforcement of the NFIP regulations. This person is required to obtain, verify, and record

the actual elevation of the lowest floor, including basement, of all new or substantially structures. Subsection H(4)(c) states that “no variance may be issued within a regulatory floodway that will result in any increase in the 100-year (1% annual chance) flood level” except for functionally-dependent uses.

- Subsection I provides the general standards for anchoring, construction materials and methods, location of utilities, additional information required for subdivision proposals (including that base flood elevation is required for proposals which contains at least 50 lots or five acres, whichever is less), equal conveyance, compensatory storage, storage tanks, and requirements for structures partially located in a flood zone or partially built over water.
 - Subsection J indicates that new construction and substantial improvement of any residential structure shall have the lowest floor, including basement, elevated to or above the base flood elevation. New construction and substantial improvement of nonresidential structures shall have the lowest floor, including basement, elevated to the level of the base flood elevation or be floodproofed below the base flood level. Living or working space below the base flood level is not allowed and such space must be designed with wet floodproofing techniques. Utilities are not allowed in this space; placement of utilities therein will result in increased flood insurance rates. Recreational vehicles and manufactured homes placed on a site for 180 or more consecutive days must be elevated to that the lowest floor is above the base flood elevation.
 - Subsection K regulates encroachments and development within floodways. Any encroachments may not result in any increase in flood levels during the 1% annual chance flood.
- **Subdivision Regulations:** Effective October 15, 2016, echo the Zoning Regulations relative to flood mitigation requirements. The regulations define both buildable and unbuildable land, requires subdivisions be designed to preserve floodplains, and comply with flood management ordinances and regulations adopted by the Town.
- Section 3.03, Flood Protection, outlines the requirements of subdivision proposals in order to minimize flood damage if the proposed area is floodprone.
- **Wetlands and Watercourse Regulations:** The Bethel Inland Wetland and Watercourse Regulations, which were adopted October 26, 1973 and amended and effective October 16, 2016, are parallel to zoning and subdivision regulations in that minimizing flooding by way of natural resource conservation or proper design is a critical part of the development process. In addition, the regulations require a permit for certain regulated activities within 100 feet of a wetland or watercourse.
- **Plan of Conservation and Development:** This 2012 document is the Town's vision statement for future development. It is updated every 10 years. The plan identifies flood related objectives, such as infrastructural projects to reduce flooding, a feasibility study for the future use of the old Police Station site, and recommends building capacity to respond to events in the future.

Overall, the intent of these plans and regulations is to promote the public health, safety, and general welfare and to minimize public and private losses due to flood conditions in specific areas of the Town of Bethel.

Drainage and Street Flooding

The town of Bethel has several areas that are subject to flooding away from defined watercourses. Many of these areas flood due to clogged or undersized drainage systems, or flooding is due to the complete lack of a drainage system. Such minor flood events can damage roads and cause ponding of nearby yards, basement flooding, and other damages. These events can usually be repaired by the Department of Public Works through cleaning, curb repair, and asphalt patching. More extreme events can require complete infrastructure replacement.

As a result of climate change, the frequency of damaging events is expected to increase in the future as the intensity and magnitude of rainfall continues to increase. Town staff identified several areas that are prone to flooding due to undersized drainage systems, including Brookwood Drive, Cindy Lane, and Judd Avenue (from Reynolds Ridge). The Town of Bethel should continue evaluating drainage systems in order to prioritize and perform projects to reduce the impacts and frequency of nuisance flooding.

Communications

The National Weather Service issues a flood watch or a flash flood watch for an area when conditions in or near the area are favorable for a flood or flash flood, respectively. A flash flood watch or flood watch does not necessarily mean that flooding will occur. The National Weather Service issues a flood warning or a flash flood warning for an area when parts of the area are either currently flooding, highly likely to flood, or when flooding is imminent.

The Departments of Fire and Emergency Services are responsible for monitoring local flood warnings. The Town can access the National Weather Service website at <http://www.weather.gov/> to obtain the latest flood watches and warnings before and during precipitation events.

Bethel subscribes to the State's CT Alert emergency notification system. The Town receives regular weather updates through Division of Emergency Management and Homeland Security (DEMHS) Region 5 email alerts as well as watches and warnings through the National Weather Service.

Actions Completed and New Capabilities

The Town of Bethel successfully constructed a new Police Station outside the SFHA in 2018. In addition, the building serves as the EOC and animal shelter. The town is considering designating the old station property as open space or a recreational area to reduce risk to future development.

Bethel has improved its GIS mapping capabilities, including development of an online GIS viewer that can display FEMA Special Flood Hazard Areas (SFHA). This tool will help property owners and other residents better understand flood risks on their properties and throughout town.

3.1.3 Vulnerabilities and Risk Assessment

Flooding can impact a variety of river corridors and cause severe damages in the Town of Bethel. Flooding due to poor drainage and streambank erosion are other hazards in the town and can cause minor infrastructure damage and create nuisance flooding of yards and basements.

Vulnerability Analysis of Repetitive Loss Properties

There are four repetitive loss properties (RLP)s in the Town of Bethel, one of those being severe. An RL property is any insurable building that has had two or more claims or more than \$1,000 paid by the NFIP. A severe repetitive loss property (SRLP) is defined by FEMA as a single or multi-family residential building that has had four or more claims each exceeding \$5,000, or has had at least two separate claim payments where the cumulative amount exceeds the market value of the home.

All four of these properties are residential, with three of the four located in the 1% annual chance flood zone. The only property not located in the 1% annual flood zone is located along the tributary to Dibbles Brook. The sources of flood for each property include:

- Bethel Reservoir Brook (a.k.a. Terehaute Brook)
- Tributary to Dibbles Brook
- Tributary to Bethel Reservoir Brook
- Chestnut Brook (Tributary to Sympaug Brook)

Vulnerability Analysis of Critical Facilities

The list of critical facilities provided by the Town (Section 2.5.1) was used with the parcel data to accurately locate each critical facility throughout the town. None of the critical facilities were found to lie within the 1% annual chance floodplain.

There are currently no facilities located in the 1% annual chance floodplain, however flooding may still impact response capabilities. The Municipal Building is susceptible to flooding as the basement sometimes floods. While the EOC is no longer located in this building, flooding to some degree may have its impacts.

While the Town's public water supply wellfield is in the SFHA, flooding is not an issue at the facility, nor at the privately-owned wellfield in the northern area of town. It is important to note however that the town does maintain an emergency contingency plan which details response procedures in the event the wellfield does flood.

Also, the Bethel Reservoir Brook has historically flooded Grassy Plain Street (Route 53) on a regular basis at a greater frequency than that suggested by the Flood Profile in the FIS. This flooding can potentially isolate the highway garage or increase response times due to the flooded roadway.

Vulnerability Analysis of Areas Along Watercourses

Most flooding occurs in the village center area of Bethel with few flooding concerns in the southern and eastern areas of town, and the northern part generally unaffected by flooding. The

flooding that does occur in town typically damages infrastructure and does not affect buildings. However, basement flooding can occur in the downtown area.

While the Still River does not run through Bethel, flood stages along this river are a significant concern for Bethel staff. Backwater conditions may extend upstream and along some of the low lying reaches of Limekiln Brook, East Swamp Brook, and Sympaug Brook. Some of the concern regarding these flooding issues is that many of these shallow, narrow tributary streams can occasionally have erosion control issues. When sediment load reaches these flat tributaries, the lack of velocity causes sediment to settle further reducing the channel capacity. Because of this, Town staff understand the need of Still River and tributary maintenance.

In addition to tributary concerns, many of the areas adjacent to these streams have undersized drainage infrastructure, and components are consistently backing up or becoming clogged. The town maintains a list of detention storage areas, primary basins, etc., that are in need of increased capacity.

The flooding that occurs in the downtown area is mainly the result of the undersized culvert system which conveys portions of the chestnut Brook underground from the vicinity of Chestnut Street to Keeler Street. The culvert system downstream of this one is also undersized and overflows which contributes to basement flooding.

Other areas of concern include the undersized conveyance at the Maple Avenue Extension at the tributary to East Swamp Brook, Benson Road near Bethel Reservoir Brook, Reservoir Street at Terehaute Brook, Saxon Road near a tributary to Bethel Reservoir Brook (where a home at repeatedly flooded), Fleetwood Avenue at Bethel Reservoir Brook, and Plumtrees Road at East Swamp Brook. A combination of increasing culvert sizes and improving drainage systems will mitigate flooding in these areas.

Vulnerability of Other Areas

The other areas of flood concern in Bethel are away from defined watercourse and are due to clogged or undersized drainage systems, or the lack of a system entirely. Such minor flood events can damage roads and cause ponding of nearby yards, basement flooding, and other damages. These events can usually be repaired by the Department of Public Works through cleaning, curb repair, and asphalt patching. More extreme events can require complete infrastructure replacement.

Changes and Improvements

Bethel has removed its Police Station from the SFHA, mitigating that flood risk.

3.2 DAM FAILURE

3.2.1 **Setting**

Dam failures can be triggered suddenly, with little or no warning, and often from other natural disasters such as floods and earthquakes. Dam failures often occur during flooding when the dam breaks under the additional force of floodwaters. In addition, a dam failure can cause a chain reaction where the sudden release of floodwaters causes the next dam downstream to fail. While flooding from a dam failure generally has a moderate geographic extent, the effects are potentially catastrophic. Fortunately, a major dam failure is considered only a possible hazard event in any given year.

The Connecticut DEEP administers the statewide Dam Safety Program and designates a classification to each state-inventoried dam based on its potential hazard.

- *Class AA*: negligible hazard potential
- *Class A*: low hazard potential
- *Class BB*: moderate hazard potential
- *Class B*: significant hazard potential
- *Class C*: high potential hazard

DEEP inventory documents 23 dams within Town limits. Additionally, high hazard dams located in surrounding municipalities have the potential to affect the Town of Bethel in a failure event.

3.2.2 **Capabilities**

The Dam Safety Section of the Connecticut DEEP Inland Water Resources Division is charged with the responsibility for administration and enforcement of Connecticut's dam safety laws. The existing statutes require that permits be obtained to construct, repair, or alter dams and that existing dams be inventoried and periodically inspected to assure that their continued operation does not constitute a hazard to life, health, or property.

Dams regulated by the Connecticut DEEP must be designed to pass the 1% annual chance rainfall event with one foot of freeboard, a factor of safety against overtopping.

Significant and high hazard dams are required to meet a design standard greater than the 1% annual chance rainfall event.

The dam safety requirements are codified in Sections 22a-401 through 22a-411 inclusive of the Connecticut General Statutes. Sections 22a-409-1 and 22a-409-2 of the Regulations of Connecticut State Agencies have been enacted and set requirements for the registration, classification, and inspection of dams. Dams must be inventoried by the owner with the Connecticut DEEP according to Connecticut Public Act 83-38.

Effective October 1, 2013, the owner of any high or significant hazard dam (Class B and C) must develop and implement an EAP after the Commissioner of DEEP adopts regulations. The EAP shall be updated every two years, and copies shall be filed with DEEP and the chief executive officer of any municipality that would potentially be affected in the event of an emergency. New regulations shall establish the requirements for such EAPs, including but not limited to (1) criteria and standards for inundation studies and inundation zone mapping; (2) procedures for monitoring the dam or structure during periods of heavy rainfall and runoff, including personnel

assignments and features of the dam to be inspected at given intervals during such periods; and (3) a formal notification system to alert appropriate local officials who are responsible for the warning and evacuation of residents in the inundation zone in the event of an emergency.

The CT DEEP also administers the Flood and Erosion Control Board program, which can provide noncompetitive state funding for repair of municipality-owned dams. Funding is limited by the State Bond Commission. State statute Section 25-84 allows municipalities to form Flood and Erosion Control Boards, but municipalities must take action to create the board within the context of the local government such as by revising the municipal charter. The Town's Planning and Zoning Commission is responsible for reviewing all development activities that occur within flood hazard or flood-prone areas.

The Town uses the CT Alert system for emergency notification. The dam failure inundation mapping discussed in the next section can be used to help streamline the geographic contact areas if the failure of a major dam is imminent.

Actions Completed and New Capabilities

Bethel continues to maintain its capabilities for mitigating and responding to dam failure risks. The Town has prepared inundation mapping and Emergency Action Plans (EAP) for the two Town-owned high-hazard dams.

3.2.3 Vulnerabilities and Risk Assessment

As of 2013, there were 23 DEEP-inventoried dams within the Town of Bethel. The primary dam failure concern relates to upstream dams located in adjacent municipalities. Failure of these structures would have an impact on Bethel. Dams and dam failure areas, where available, are shown in Figure 2-4.

This section primarily discusses the possible effects of failure of high hazard (Class B and C) dams. Failure of a Class C dam has a high potential for loss of life and extensive property and infrastructure damage.

Class B and C Dams

There is one Class C dam in the Town of Bethel, and four Class C dams located in Danbury that if one were to fail could inundate areas of Bethel. These dams and their owners are detailed in Table 3-1.

Table 3-1: High Hazard Dams that may Impact Bethel

Number	Name	Location	Class	Owner
903	Chestnut Ridge Dam	Unnamed Watercourse, Bethel	C	Town of Bethel
3411	Eureka Lake Dam	Bethel Reservoir Brook, Danbury	C	Town of Bethel
3402	Margerie Lake Reservoir Dam	Margerie Reservoir Brook, Danbury	C	City of Danbury
3405	East Lake Reservoir Dam	East Lake Brook, Danbury	C	City of Danbury
3414	West Lake Reservoir Dam	Boggs Pond Brook, Danbury	C	

Chestnut Ridge Dam

The Chestnut Ridge Dam (aka Chestnut Hill Reservoir Dam) is a Class C dam located at the northern end of Chestnut Ridge Lake (aka Chestnut Ridge Reservoir) and impounds a storage volume of 290 acre-feet from a contributing watershed of 0.38 square miles. The earthen dam was constructed in 1910 and is 30 feet in height and 250 feet in length. There is no emergency spillway, and no intake structures or outlet structures. It is owned by the Town of Bethel and used to impound a reservoir for water supply. According to the Town this dam is in good condition. The reservoir discharges to an unnamed watercourse that flows northward to Sympaug Brook under Long Meadow Lane, Nashville Road and State Route 53. Although a formal dam failure analysis has not yet been prepared for this dam, it is anticipated that failure of this structure would cause significant flooding downstream along its outlet stream and Sympaug Brook, with the potential for homes to be affected in the vicinity of Nashville Road.

East Lake Dam

The East Lake Reservoir Dam is a Class C dam located in Danbury. The dam is owned by the City of Danbury, and used to impound a 75-acre reservoir for public water supply. The watershed to the dam is 1.49 square miles and the structure provides a maximum storage capacity of 1,400 acre-feet. The earthen dam is 36 feet high and 550 feet long. The most recent CT DEEP inspection identified the structure as being in "fair" condition. A 2009 Emergency Operation Plan is on file at the CT DEEP for the East Lake Dam and the Padanaram Reservoir Dam located just downstream. The Plan identifies the Danbury Water Department as the responsible party for maintaining a routine inspection program of the structures. The "Superintendent of Public Utilities" is responsible for notifying emergency operations personnel in the event of heavy rainfall in excess of six inches in 24 hours, when reservoirs are at spillway level, or hazardous conditions develop at the dam. The Town of Bethel Fire Department, Police Department, and First Selectman will be notified in the event of dam emergency.

The 2009 EOP also includes a dam breach analysis and Limits of Potential Flooding for failure of the East Lake Dam with the water level at Probable Maximum Flood (PMF). Failure of the dam would cause the water levels along East Lake Brook to increase from 11 to 16 feet above normal high-water surface elevations, with a failure discharge of 59,800 cfs. Floodwaters would cross the Still River and cause backwater conditions upstream to inundate portions of or all of multiple roadways in Bethel as indicated in Table 3-2.

Table 3-2: Streets Potentially Impacted in Bethel from Failure of the East Lake Dam

Almar Drive	Grandview Terrace	Oven Rock Road
Beech Street	Grassy Plain Terrace	Paul Street
Benson Road	Greenwood Avenue	Plain Street
Bethpage Drive	Griswold Street	Reservoir Street
Blackman Avenue	Herney Street	Saxon Road
Cherry Lane	High Street	School Street
Diamond Avenue	Hudson Street	Sharon Court
Division Street	Juniper Road	Simeon Road
Durant Avenue	Keeler Avenue	South Street
Fairchild Drive	Laura Lane	Taylor Avenue
Farnum Hill	Library Place	Tremont Avenue
Fleetwood Avenue	Lindberg Street	Willow Street

Fleetwood Park Road	Mansfield Street	Wooster Street
Grace Court	Maple Lane	
Grand Street	Oakland Heights	

Eureka Lake Dam

The Town Engineer noted that Phase II Dam Inspection Report was completed by Lenard and Dilaj Engineering in 1980 for the Eureka Lake Dam. This report outlined four houses in Danbury and four houses in Bethel that would be inundated if the dam were to fail. The most likely area to be impacted by the failure of this dam in Bethel would be Reservoir Street, although additional flooding is likely downstream along Bethel Reservoir Brook (Terehaute Brook) and Sympaug Brook. The Bethel Town Engineer noted that evacuation plans are not in the current Town Emergency Operations Plan and that no Emergency Operations Plan or Dam Failure Analysis is currently available for the Eureka Lake Dam. According to the Town, this dam is in good condition.

Margerie Lake Reservoir Dam and Dike

Margerie Lake Reservoir Dam is a compacted earthfill embankment about 760 feet long with a maximum height of 28 feet. It is located at the south end of the reservoir in the city of Danbury. The spillway is reportedly capable of passing the PMF with the water level 1.4 feet below the top of the dam. A compacted earthfill embankment dike is located at the northern end of the reservoir in New Fairfield. The dike is about 1,110 feet long with a maximum height of 16 feet. There is no spillway or low-level outlets at the dike. Both structures were reportedly originally built in the 1930s. The dam and dike are believed to be in good condition. Similar to the East Lake scenario, failure of this dam during the PMF would cause widespread death, property damage, and infrastructure damage in Danbury and Bethel. A complete failure during the PMF would cause relatively minor inundation in the Sympaug Brook corridor upstream into Bethel. Under the worst-case PMF and dam failure scenario, 46 roads in Bethel would be affected including those in Table 3-2.

West Lake Reservoir Dam

A Dam Failure Analysis for the West Lake Reservoir Dam was prepared in 1992 by Roald Haestad, Inc. for the City of Danbury. According to the analysis, West Lake Reservoir Dam consists of a compacted earthfill embankment originally constructed in 1907. The dam is about 850 feet long with a maximum height of about 45 feet above the streambed. The spillway of the dam is capable of safely discharging the PMF with four feet of freeboard. The dam is believed to be in good condition. The PMF itself would cause widespread death, property damage, and infrastructure damage in Danbury. Under the worst-case PMF and dam failure scenario, water levels would overtop all downstream roads with depths ranging from 12 to 25 feet and inundate many houses. Downtown Danbury would experience flood depths ranging from one to 21 feet. Some of the floodwaters would bypass the Still River corridor and cause up over 20 feet of flooding in the Sympaug Brook corridor as well. Over 100 streets and 28 critical facilities would be affected in Danbury and Bethel.

Other Dams

There are several other low hazards dams in Town that are privately owned. These dams are considered a low hazard, and failure would result in minimal damage. Some dams are used to impound water for recreational reason, with others are for agricultural purposes.

Beaver Dams

The Town of Bethel has expressed concern with the impacts of beaver dams in town. Specifically, they have presented challenges around Turkey Pain Road (Route 53) near Sympaug Brook, along the Metro-North railroad line, and northeast of Wooster Street.

This is a typical concern in many Connecticut communities; beaver dam failures have been known to cause damage in the state.

Changes and Improvements

The Town has prepared inundation mapping and EAPs for town-owned high hazard dams, and copies of these have been filed. Also, properties that may be impacted by a dam breach has been incorporated into the emergency alert system, this allows both emergency notification dispersal and outreach.

3.3 HURRICANES AND TROPICAL STORMS

3.3.1 Setting

Several types of hazards may be associated with tropical storms and hurricanes including heavy or tornado winds, heavy rains, and flooding. While only some of the areas of Bethel are susceptible to flooding damage caused by hurricanes, wind damage can occur anywhere in the town.

Hurricanes, therefore, have the potential to affect any area within the Town of Bethel. A hurricane striking Bethel is considered a possible event each year and could cause critical damage to the town and its infrastructure.

3.3.2 Capabilities

Wind loading requirements are addressed through the state building code. The State Building Code has been amended several times in the past two decades. The 2005 Code was amended in 2009, 2011, and 2013. The code was then updated and amended in 2016, with the current code having been updated and effective as of October 1, 2018. The code specifies the design wind speed for construction in all the Connecticut municipalities. Effective October 1, 2018 the design wind speed for the Town of Bethel is 110 mph for a Category 1 event, 120 mph for a category 2, and 125 mph for a Category 3, 4 or 5 hurricane event.

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

Parts of tall and older trees may fall during heavy wind events, potentially damaging structures, utility lines, and vehicles. The Town has worked to maintain a good relationship with Eversource Energy, the local electric utility, especially in regard to tree maintenance concerns. Eversource provides tree trimming and removal services along rights-of-way. The Bethel Public Works Department appointed tree warden works with residents to encourage trimming and maintenance on their properties, and also works to identify areas that require trimming. In the past, the tree trimming and maintenance work is contracted out from an annual budget of upwards of \$70,000.

The Town requires that new development must include underground utilities in certain zones including the Planned Residential Development zone and the Educational Park Zone. These regulations are effective in reducing vulnerability for new developments. Town staff also encourage new utility installations in other types of developments be placed underground.

Actions Completed and New Capabilities

Bethel continues to maintain its capabilities for mitigating and responding to hurricane and tropical storm risks.

The Town has upgraded backup power at the High School, and acquired two portable generators, increasing power outage resilience. Bethel has also established an Energy Conservation Commission tasked with exploring opportunities to implement energy efficiency improvements and conservation measures at municipal and educational buildings.

3.3.3 Vulnerabilities and Risk Assessment

The Town of Bethel is vulnerable to hurricane damage from wind and flooding and from any tornadoes accompanying the storm. In fact, most of the damage to the town from historical tropical cyclones has been due to the effects of wind.

In general, as the residents and businesses of the state of Connecticut become more dependent on the internet and mobile communications, the impact of hurricanes on commerce will continue to increase. A major hurricane has the potential of causing complete disruption of power and communications for up to several weeks, rendering electronic devices and those that rely on utility towers and lines inoperative.

Debris such as signs, roofing material, and small items left outside become flying missiles in hurricanes. Extensive damage to trees, towers, aboveground and underground utility lines (from uprooted trees or failed infrastructure), and fallen poles cause considerable disruption for residents. Streets may be flooded or blocked by fallen branches, poles, or trees, preventing egress. Downed power lines from heavy winds can also start fires during hurricanes with limited rainfall. While moving all utilities underground would prevent wind damage to this infrastructure, this activity is too cost-prohibitive for the community.

Town of Bethel staff are uncertain whether any Town-owned critical facilities have wind-mitigation measures installed to specifically reduce the effects of wind. Thus, it is believed that nearly all of the critical facilities in the town are as likely to be damaged by hurricane-force winds as any other. Many of the Town's older structures, including Town Hall, may not meet current building codes with respect to wind and therefore may be more susceptible to wind damage, and structures with older roofs may also be more susceptible to wind damage. Newer critical facilities are more likely to meet more stringent building code requirements and are therefore considered to be the most resistant to wind damage even if they are not specifically wind resistant.

The town of Bethel's housing stock consists of historic buildings greater than 50 and sometimes 100 years old, relatively younger buildings built before 1990 when the building code changed to address wind damage, and relatively recent buildings that utilize the new code changes. Since most of the existing housing stock in the town predates the recent code changes, many structures are highly susceptible to roof and window damage from high winds. Hurricane-force winds can easily destroy poorly constructed buildings and mobile homes. There are currently no mobile home parks in Bethel.

As the town of Bethel is not affected by storm surge, hurricane sheltering needs have not been calculated by the U.S. Army Corps of Engineers for the town. The Town determines sheltering need based upon areas damaged or needing to be evacuated within the town. Under limited emergency conditions, a high percentage of evacuees will seek shelter with friends or relatives rather than go to established shelters. In the case of a major (Category Three or above) hurricane, it is likely that the Town will depend on state and federal aid to assist sheltering displaced populations until normalcy is restored.

3.4 SUMMER STORMS AND TORNADOES

3.4.1 **Setting**

Heavy wind (including tornadoes and downbursts), lightning, heavy rain, hail, and flash floods are the primary hazards associated with summer storms. Like hurricanes and winter storms, summer storms and tornadoes have the potential to affect any area within the Town of Bethel. Furthermore, because these types of storms and the hazards that result (flash flooding, wind, hail, and lightning) might have limited geographic extent, it is possible for a summer storm to harm one area within the town without harming another. The entire Town of Bethel is therefore susceptible to summer storms (including heavy rain, flash flooding, wind, hail, and lightning) and tornadoes.

Based on the historic record, it is considered highly likely that a summer storm that includes lightning will impact the Town of Bethel each year although lightning strikes have a limited effect. Strong winds and hail are considered likely to occur during such storms but also generally have limited effects. A tornado is considered a possible event in Litchfield County each year that could cause significant damage to a small area.

3.4.2 **Capabilities**

Warning is the primary method of existing mitigation for tornadoes and thunderstorm-related hazards. The NOAA National Weather Service (NWS) issues watches and warnings when severe weather is likely to develop or has developed. Emergency management personnel have specific actions they take under different NWS watches and warnings to prepare for summer storms and tornado impacts.

Municipal responsibilities relative to summer storm and tornado mitigation and preparedness include:

- Developing and disseminating emergency public information and instructions concerning tornado, thunderstorm wind, lightning, and hail safety, especially guidance regarding in-home protection and evacuation procedures and locations of public shelters;
 - Designating appropriate shelter space in the community that could potentially withstand lightning and tornado impact;
 - Periodically testing and exercising tornado response plans; and
 - Putting emergency personnel on standby at tornado "watch" stage.
 - Utilizing the Everbridge emergency notification system to send warnings into potentially affected areas.

These protocols are considered effective for mitigating wind and summer storm-related damage in the town of Bethel. While additional funding could be utilized to strengthen the current level of mitigation, such funding is not currently considered cost-effective for the current level of vulnerability.

Actions Completed and New Capabilities

Bethel continues to maintain its capabilities for mitigating and responding to summer storm and tornado risks.

3.4.3 Vulnerabilities and Risk Assessment

The entire Town of Bethel is at relatively equal risk for experiencing damage from summer storms and tornadoes.

According to the 2019 State Natural Hazard Mitigation Plan Update, Fairfield County has a high risk of tornado activity based on historical occurrences. Therefore, by virtue of its location in Litchfield County, the Town of Bethel has moderate to high potential to experience tornado damage. In general, thunderstorms and hailstorms in Connecticut are more frequent in the western and northern parts of the state and less frequent in the southern and eastern parts. Thunderstorms are expected to impact Bethel around 20 days each year. The majority of these events do not cause any measurable damage. Although lightning is usually associated with thunderstorms, it can occur on almost any day. The likelihood of lightning strikes in the Bethel area is very high during any given thunderstorm although no one area of the town is at higher risk of lightning strikes. The risk of at least one hailstorm occurring in Bethel is considered moderate in any given year.

Most thunderstorm damage is caused by straight-line winds exceeding 100 mph. Straight-line winds occur as the first gust of a thunderstorm or from a downburst from a thunderstorm and have no associated rotation. The risk of downbursts occurring during such storms and damaging the Town of Bethel is believed to be low for any given year. All areas of the town are susceptible to damage from high winds although more building damage is expected in the town center while more tree damage is expected in the less densely populated areas.

Secondary damage from falling branches and trees is more common than direct wind damage to structures. Heavy winds can take down trees near power lines, leading to the start and spread of fires.

NOAA states that climate change has the potential to increase the frequency and intensity of tornadoes, so it is possible that the pattern of occurrence in Connecticut could change in the future.

August 2020 the State experienced several severe storms and tornado events. On August 2, 2020 four tornadoes touched down in Litchfield county. Then, on August 27 severe storms traveled across the state resulting in extensive tree damage and tornadic activity in the Greater New Haven area. Power was out as a result of both events and there was widespread damage with some areas more impacted than others.

Changes and Improvements

There have been no significant changes to Bethel's Summer Storm and Tornado vulnerability and risk profile.

3.5 WINTER STORMS AND NOR'EASTERS

3.5.1 Setting

Winter events and the hazards that result (wind, snow, and ice) have widespread geographic extents, and have the potential to affect any area of the Town of Bethel. Due to its variable elevation, the Town can have higher amounts of snow in the outskirts of the town than in the town center. In general, winter storms are considered highly likely to occur each year (although major storms are less frequent), and the hazards that result (nor'easter winds, snow, and blizzard conditions) can potentially have a significant effect over a large area of the town.

Most winter weather events occur between December and March. Winter weather may include snow, sleet, freezing rain, and cold temperatures. Most deaths from winter storms are indirectly related to the storm, such as from traffic accidents on icy roads and hypothermia from prolonged exposure to cold. Damage to trees and tree limbs and the resultant downing of utility cables are a common effect of these types of events. Secondary effects include loss of power and heat, and flooding as a result of snowmelt.

3.5.2 Capabilities

Programs that are specific to winter storms are generally those related to preparing plows and sand and salt trucks, tree trimming to protect power lines, and other associated snow removal and response preparations. Other programs are aimed at warning residents about potential winter hazards.

The amended Connecticut Building Code specifies that a pressure of 30 pounds per square foot (psf) be used as the base "ground snow load" for computing snow loading for different types of roofs. The International Building code specifies the same pressure for habitable attics and sleeping areas, and specifies a minimum pressure of 35 psf for all other areas.

In Bethel, Public Works has an annual budget allotment for plowing town roads. In addition, an allocation is made to hire contractors to plow school parking lots. The Building Official and the Public Works Department are available to assist town departments with snow removal and structural assessments of buildings, as occurred after the heavy snowfalls in January 2011.

Prior to a winter weather event, Town staff ensure that all warning/notification and communications systems are ready and ensure that appropriate equipment and supplies, especially snow removal equipment, are in place and in good working order. In some known problem areas, pre-storm treatment is applied to roadways to reduce the accumulation of snow. The Town also prepares for the possible evacuation and sheltering of some populations that could be impacted by the upcoming storm (especially the elderly and special needs persons). During emergencies, a plow vehicle can be temporarily rerouted to clear the route ahead of an emergency vehicle.

Overall, these programs are considered effective at mitigating the effects of winter storms. While additional budget could support these programs, the amount of experience that local personnel have in managing winter storm events makes it unlikely that a significant additional benefit could be achieved with additional funding.

Actions Completed and New Capabilities

Bethel continues to maintain its capabilities for mitigating and responding to winter storm risks.

3.5.3 Vulnerabilities and Risk Assessment

The entire Town of Bethel is at relatively equal risk for experiencing damage from winter storms although some areas (such as icing trouble spots and neighborhoods with a high concentration of flat roofs) are more susceptible. Many damages are relatively site specific and occur to private property, while repairs for power outages are often widespread.

Based on the historic record, Connecticut experiences at least one major nor'easter every four years, along with a variety of minor and moderate snow and ice storms that occur nearly every winter. According to the 2019 Connecticut Natural Hazard Mitigation Plan Update, Connecticut residents can expect at least two or more severe winter weather events per season, including heavy snowstorms, potential blizzards, nor'easters, and potential ice storms.

After a storm, snow piled on the sides of roadways can inhibit sight lines and reflect a blinding amount of sunlight. When coupled with slippery road conditions, poor sightlines and heavy glare create dangerous driving conditions. Stranded motorists, especially senior and/or handicapped citizens, are at particularly high risk of injury or death from exposure during a blizzard. The elderly population in Bethel, in particular, is susceptible to the impacts created by winter storms due to resource needs (heat, electricity loss, safe access to food, etc.).

The structures and utilities in the town of Bethel are vulnerable to a variety of winter storm damage. Tree limbs and some building structures may not be suited to withstand high wind and snow loads. Ice can damage or collapse power lines, render steep gradients impassable for motorists, undermine foundations, and cause "flood" damage from freezing water pipes in basements. Drifting snow can occur after large storms, but the effects are generally mitigated through municipal plowing efforts. For example, the vicinity of Bluejay Orchards on Plumtrees Road has been known to develop snow drifts as it is a topographical high point with little tree cover on either side of the road. Town staff indicate that the snow drifts are managed through additional plowing.

Icing causes difficult driving conditions throughout the hillier sections of the town, such as the very steep Hickok Avenue. The Town's protocol of pretreating roads has been helpful in controlling ice in these problem areas. In addition, many of the historical icing problems in Bethel have been eliminated through drainage system improvements.

Similar to the discussion for hurricanes and summer storms in the previous sections, no critical facilities are believed to be more susceptible to winter storm damage than any other. Some critical facilities are more susceptible than others to flooding damage due to winter storms.

According to the 2019 Connecticut Natural Hazard Mitigation Plan Update, recent climate change studies predict a less frequent, but potentially more intense snowstorms with heavier, denser snow. Also, it is predicted that the number of snowstorms experienced may decrease, with an increase in ice storms; so ultimately a shift in precipitation type.

3.6 WILDFIRES AND DROUGHT

3.6.1 Setting

The ensuing discussion about wildfires is generally focused on the undeveloped wooded and shrubby areas of Bethel, along with low-density suburban/rural type development found at the margins of these areas known as the wildland interface. Structural fires in higher-density areas of the community are not considered.

The town of Bethel is generally considered a low-risk area for wildfires. Wildfires are of particular concern in outlying areas without public water service and other areas with poor access for fire-fighting equipment. Such areas in Bethel are limited as presented on Figure 3-2. Hazards associated with wildfires include property damage and loss of habitat. Wildfires are considered a likely event each year but when one occurs it is generally contained to a small range with limited damage to non-forested areas

In addition, Bethel, and Fairfield County overall, has experienced drought challenges over recent years. The U.S. Drought Monitor (USDM), which has been monitoring nationwide drought conditions since 2000, estimates that over the past two decades Connecticut experienced its longest drought of 46 weeks beginning June 21, 2016 and lasting until May 2, 2017. It was also estimated that the most intense period of this extended drought occurred the week of November 15, 2016, where approximately 44.5% of Connecticut lands were impacted. Figure 3-1 depicts the various drought conditions in Fairfield County since 2000, where the warmer colors represent more advanced drought stages.

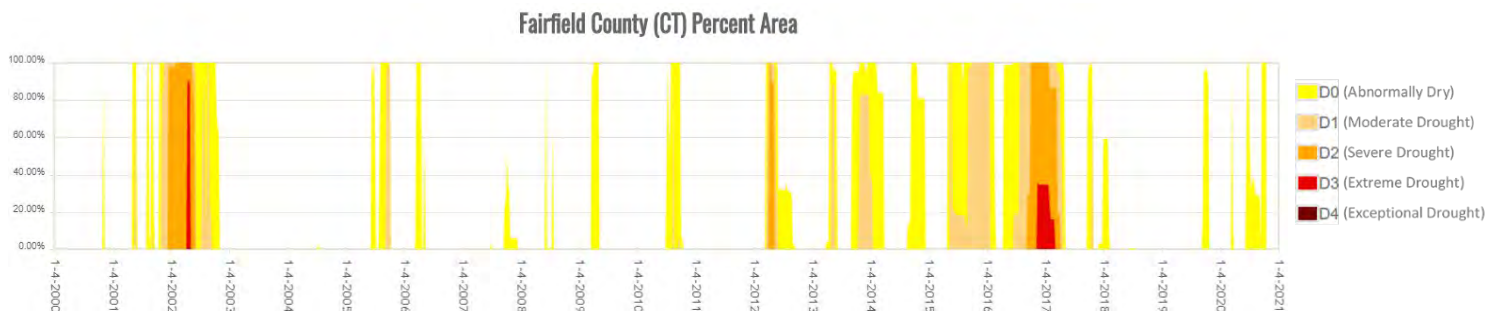


Figure 3-1: USDM Drought Time Series for Fairfield County

The 2019 Connecticut Natural Hazard Mitigation Plan assumes that the State of Connecticut has a medium probability of future drought events. This assumption is based on climate change projections anticipating hotter and wetter conditions in the near future. Climate forecasts often suggest that while precipitation may increase, the overall pattern will generally be higher intensity storms, with longer than average dry periods between events. The State Plan also identifies that Fairfield County accounts for roughly 7.34% of the state's total number of farms, with a market value of over \$34 million in product sold from these farms.

3.6.2 Capabilities

Regulations regarding fire protection are outlined in the Subdivision Regulations. Section I (2) requires subdivisions that are connected to public water supply to have fire hydrants installed. Section 5.5 and Section 5.7 of the Zoning Regulations also require Planned Residential Development Zone and Educational Park Zone developments to be served by a public water supply capable of handling fire demands either through fire hydrants or water storage tanks. The Fire Marshall reviews new developments for fire protection requirements and provides recommendations to the Planning and Zoning Commission. Public water service is provided throughout much of the town, so only a dozen 10,000-gallon cisterns (in developments of three or more homes) and two dry hydrants have been installed in developments located in outlying areas where public water service is unavailable.

Unlike the west coast of the United States where the fires are allowed to burn toward development and then stopped, the Bethel Fire Department goes to the fires whenever possible. This proactive approach is believed to be effective for controlling wildfires. The Fire Department has some water storage capability in its tanker trucks, but primarily relies on the municipal water system to fight fires throughout the community whenever possible.

The Town of Bethel has an all-terrain vehicle to assist with fighting fires in outlying areas. The Town also has mutual aid agreements with all its neighbors, and works with the Connecticut DEEP regarding fire protection on state-owned lands. Fire protection needs and potential problem areas are reviewed at least annually. Finally, the DEEP Forestry Division uses rainfall data from a variety of sources to compile forest fire probability forecasts. This allows the DEEP and the Town to monitor the drier areas of the state to be prepared for forest fire conditions. Overall, the level of preparedness in Bethel is considered suitable for the level of wildfire risk in the community.

Actions Completed and New Capabilities

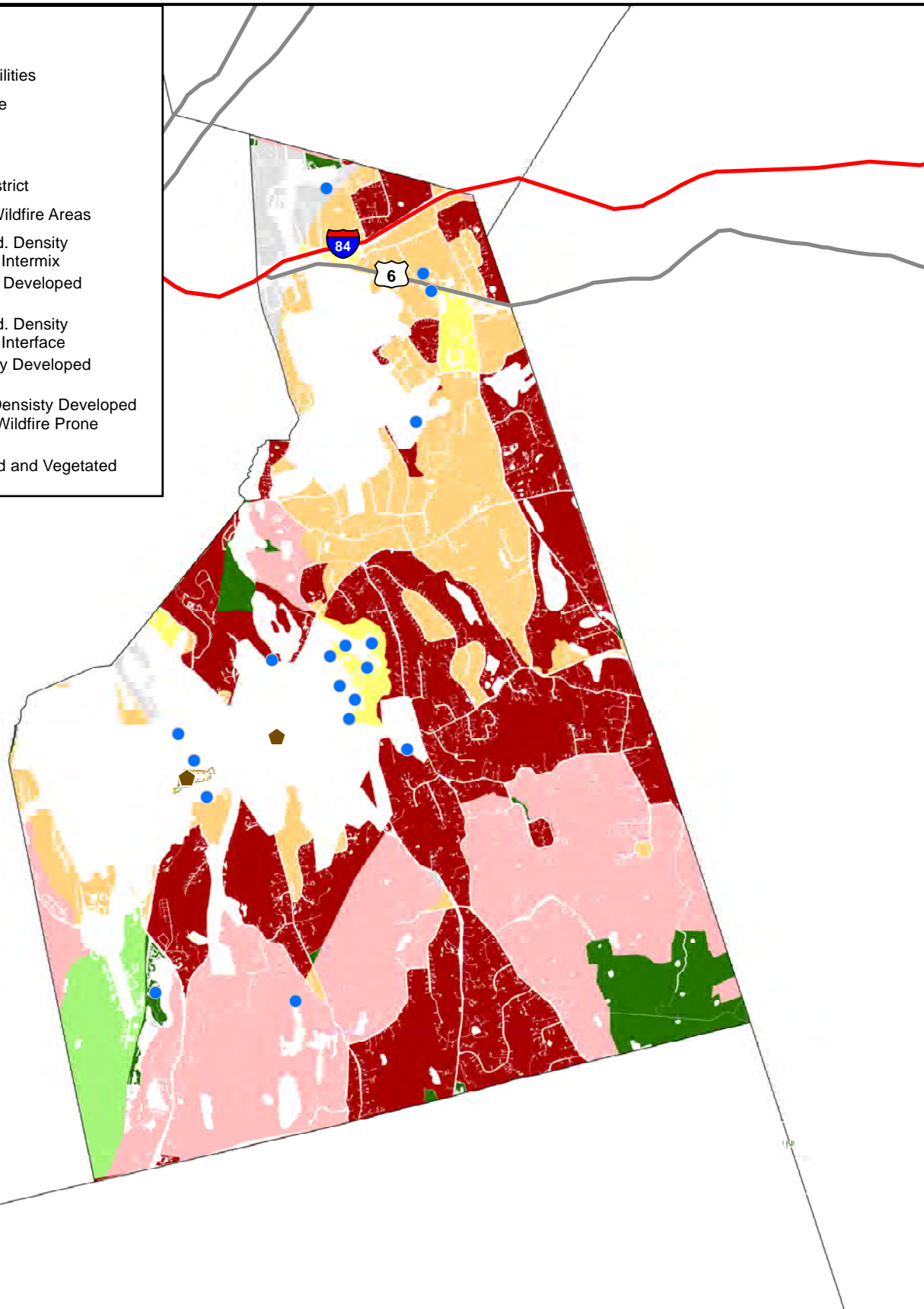
Huntington State Park access has increased with the development of the trail system. While Bald Rock Pak remains undeveloped, there are mutual aid agreements in place with surrounding fire departments and CT DEEP wildland firefighting personnel. These agreements will be able to provide ATVs and additional support and capacity.

3.6.3 Vulnerabilities and Risk Assessment

According to the Connecticut DEEP, the actual forest fire risk in Connecticut is low due to several factors. First, the overall incidence of forest fires is very low. According to the 2019 State Hazard Mitigation Plan, an average of 109 fires per year occurred in Connecticut from 2013 to 2017, which is less than one per municipality per year. Secondly, as the wildfire/forest fire prone areas become fragmented due to development, the local fire departments have increased access to those neighborhoods for firefighting equipment. Third, the problematic interface areas such as driveways too narrow to permit emergency vehicles are site specific. Finally, trained firefighters at the local and state level are readily available to fight fires in the state, and inter-municipal cooperation on such instances is common.

Legend

- Critical Facilities
- ◆ Cultural Site
- Interstate
- US Route
- Cultural District
- Low Risk Wildfire Areas
- High & Med. Density Developed Intermix
- Low Density Developed Intermix
- High & Med. Density Developed Interface
- Low Density Developed Interface
- Very Low Density Developed and some Wildfire Prone Vegetated
- Uninhabited and Vegetated



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MACBROOM**
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 203.271.1773
 WWW.MMINC.COM

Wildland-Urban Interface: Wildfire Risk Areas

WestCOG Hazard Mitigation Plan
 Town of Bethel

NPS: Cultural Resources
 Wildland-Urban Interface:USFA



0 2,000 4,000
 Feet

SCALE 1" = 4,757'
 DATE 11/13/2020
 PROJ. NO. 3101-22

FIG. 3-2

As suggested by the historic record presented in, most wildfires in Connecticut are relatively small. In the drought year of 1999, the average wildfire burned five acres in comparison to the two most extreme wildfires recorded since 1986 that burned 300 acres each. Given the availability of firefighting water in the town – including the use of nearby water bodies – and the historic record, it is believed that the average size of a wildfire in a drought year would be less than one acre, although the extreme value of five acres is likely applicable to the town.

The town had identified weaknesses in fire-fighting capacity, which some aspects have been addressed. Both the Bald Rock area and Huntington State Park were a concern as there was no viable access. While access has improved, and mutual aid agreements are in place, these are still forested areas at risk of wildfire.

Wildfires are more common in rural areas than in developed areas as most fires in populated areas are quickly noticed and contained. The likelihood of a severe wildfire developing is lessened by the vast network of water features in the state, which create natural breaks likely to stop the spread of a fire. During long periods of drought, these natural features may dry up, increasing the vulnerability of the state to wildfires.

The most common causes of wildfires are arson, lightning strikes, and fires started from downed trees hitting electrical lines. Thus, wildfires have the potential to occur anywhere and at any time in both undeveloped and lightly developed areas. The extensive forests and fields covering the state are prime locations for a wildfire. In many areas, structures and subdivisions are built abutting forest borders, creating areas of particular vulnerability.

Changes and Improvements

Access to Huntington State Park has been improved, allowing for easier firefighting access, and mutual aid agreements have been developed to provide additional equipment and capacity during a fire.

3.7 EARTHQUAKES AND LANDSLIDES

3.7.1 Setting

The entire Town of Bethel is susceptible to earthquake damage. However, even though earthquake damage has the potential to occur anywhere both in the town and in the northeastern United States, the effects may be felt differently in some areas based on the type of geology. In general, earthquakes are considered a hazard that may possibly occur but that may cause significant effects to a large area of the town.

3.7.2 Capabilities

The Connecticut Building Codes include design criteria for buildings specific to each municipality as adopted by the Building Officials and Code Administrators (BOCA). These include the seismic coefficients for building design in the Town of Bethel. The Town has adopted these codes for new construction, and they are enforced by the Building Official. Due to the infrequent nature of damaging earthquakes, land use policies in the Town do not directly address earthquake hazards. However, various documents do indirectly discuss areas susceptible to earthquake damage and regulations that help to minimize potential earthquake damage.

- ❑ **Zoning Regulations:** Section 5.06 outlines soil erosion and sediment control regulations. Section 7.02.03 outlines application requirements and states that applicants shall provide the location of natural features including but not limited to, rock outcroppings, slopes in excess of 15%, soil types, and forested areas on the lot.
- ❑ **Subdivision Regulations.** Section 2.2.9 requires that soil erosion and sediment control plans be developed for proposed projects.
- ❑ **Plan of Conservation and Development.** The 2012 plan recommends reviewing the definition of steep slopes and limiting residential development on steep slopes.

Actions Completed and New Capabilities

Bethel prevents development in areas at risk from landslides, such as at the bottoms or tops of steep slopes, through its site plan review process.

3.7.3 Vulnerabilities and Risk Assessment

Some areas in Bethel are underlain by sand and gravel; structures in these areas are at increased risk from earthquakes due to amplification of seismic energy and/or collapse. The best mitigation for future development in areas of sandy material may be application of the most stringent building codes or possibly the prohibition of new construction. However, many of these areas occur in floodplains associated with the various streams and rivers in Bethel, so they are already regulated. The areas that are not at increased risk during an earthquake due to unstable soils are the areas underlain by glacial till, which includes most of the town.

Areas of steep slopes can collapse during an earthquake, creating landslides. Seismic activity can also break utility lines such as water mains, electric and telephone lines, and stormwater management systems. Damage to utility lines can lead to fires, especially in electric and gas mains. Dam failure can also pose a significant threat to developed areas during an earthquake.

4.0 MITIGATION STRATEGIES AND ACTIONS

4.1 Goals and Objectives

Municipal goals and objectives have been made consistent regionally and are presented in the Multi-Jurisdictional Plan document.

4.2 Status of Mitigation Strategies and Actions from Previous HMP

The table below lists the mitigation actions developed in the previous HMP and the status of each. Actions to be carried forward are noted as such. Actions that have been institutionalized as capabilities are not carried forward.

#	Description	Responsible Party	Status	Notes
1	Incorporate the identified strategies of this HMP into local planning activities	FS, LC	Complete	Hazard Mitigation was incorporated into the most recent POCD update. Generally, this integration is a capability.
2	Obtain appropriate supplies and equipment including a generator to outfit the high school as the primary shelter	EMD, FS	Complete	Action was completed in September 2019.
3	Obtain emergency generators that may be used to provide standby power to other critical facilities per the Town's list	EMD, FS	Complete	All facilities in need of backup generators are appropriately equipped. The Town has also acquired two 5k portable generators. Town has determined that additional backup power is not needed.
4	Install microwave link for the Police Department at the Town's communication tower to reduce reliance on phone lines and cellular service	EMD, FS	Complete	Installed in October of 2018
5	Require a minimum freeboard of one foot for all new development or substantial improvements in SFHAs	PZC	Carry Forward	Floodplain regulations have not yet been updated due to funding and staffing limitations. Carry forward.
6	Adopt regulations to mitigate or reduce peak flows leaving a development site	PZC	Carry Forward	This strategy has been incorporated into the Town's Stormwater Management Plan and POCD, but has not yet been completed. Carry forward
7	Establish a Conservation Commission to oversee stream buffers in accordance with the POCD	BOS	Carry Forward	This strategy has been incorporated into the Town's POCD, but has not yet been completed. Carry forward
8	Provide outreach to owners of RLPs regarding the potential availability of grant funding to mitigate future flooding damage	LU	Carry Forward with Revisions	Action has not yet been completed due to funding and staff limitations. A new action related to educating RLP owners is carried forward.

#	Description	Responsible Party	Status	Notes
9	Pursue grants to mitigate RLPs with permission of property owners	LU	Capability	Town has the ability to pursue grants as appropriate. This is a capability. A new action related to RLP properties is carried forward.
10	Identify properties within SFHAs and encourage those property owners to purchase flood insurance and complete elevation certificates	LU	Carry Forward with Revisions	Bethel has developed an online GIS viewer that includes SFHAs. Information about flood insurance is typically provided through banks and real-estate agents. Town will replace this action with one to identify RLPs and other properties within SFHAs, and send an annual mailer reminding them of risks and available resources.
11	Require the use of the FEMA Elevation Certificate to formally record elevations for compliance with the Zoning Regulations	PZC	Capability	This is a capability
12	Construct a new Police Station facility outside of the SFHA and relocate EOC and animal shelter to this facility	BOS	Complete	A new police station was constructed in October 2018. The EOC and animal shelter have been relocated to this facility.
13	Convert the existing Police Station property to open space such as a park or recreational area	BOS, LU	Carry Forward with Revisions	This action is under consideration. It will be carried forward and revised to fit a phased approach, with the first step being completion of a feasibility study for conversion of the old Police Station to open recreational space.
14	Pursue open space connections along Sympaug Brook and East Swamp Brook in accordance with the POCD	LU, BOS	Capability	Bethel has robust local capabilities with regard to open space preservation, including detailed goals within the POCD, the active Bethel Land Trust, and municipal acquisition capabilities.
15	Encourage Connecticut DOT to mitigate flooding along Bethel Reservoir Brook (a.k.a. Terehaute Brook) at Route 53	FS	Drop	Town collaborates with CT DOT on road and drainage improvements, but does not believe this type of action is appropriate for its municipal HMP.
16	Perform a formal study to identify areas of concern requiring stream maintenance and to prioritize stream improvement projects	LU	Carry Forward	Action has not yet been completed due to funding limitations. Carry forward.
17	Pursue funding to mitigate poor drainage flooding and improve conveyance in the downtown area along Chestnut Brook and its tributary drainage systems	BOS, PW	Carry Forward	Town has not yet succeeded in securing funding. Action is carried forward.

#	Description	Responsible Party	Status	Notes
18	Study and enact potential mitigation solutions to poor drainage flooding and overbank flooding along East Swamp Brook and Bethel Reservoir Brook	BOS, PW	Carry Forward	Action has not yet been completed due to funding limitations. Carry forward.
19	Recheck the conveyance capacity of all drainage structures using more recent rainfall return periods	PW	Carry Forward with Revisions	Town does not believe this action is the best approach to improving capacities; instead, more recent rainfall return period data will be reviewed for construction of <u>new or upgraded</u> drainage structures.
20	Utilize updated conveyance data to prioritize and implement projects to mitigate poor drainage flooding	PW	Drop	Town does not believe this action is the best approach to improving capacities; instead, more recent rainfall return period data will be reviewed for construction of <u>new or upgraded</u> drainage structures (see previous action).
21	Update the Zoning Regulations to require underground utilities for all new buildings regardless of zone	PZC	Drop	Town has concluded that current regulations (underground utilities required only in zones EP and PRD) are sufficient.
22	Encourage the use of structural techniques related to wind damage mitigation in new structures	LU	Capability	Wind mitigation standards are included in the State Building Code, enforced locally.
23	Require the use of structural mitigation techniques to harden new municipal critical facilities	PZC	Capability	Structural mitigation standards for critical facilities are included in the State Building Code, enforced locally. The new Police Department was constructed using these techniques.
24	Consider locations where a micro-grid could be installed	LU	Carry Forward with Revisions	Town has established an Energy Commission. This action is revised to call for the Energy Commission to develop a set of recommendations for improving energy resiliency at critical facilities and areas in town.
25	Pursue funding to place utilities underground along Wolf Pits Road	BOS, PW	Carry Forward with Revisions	Town has not yet succeeded in securing funding. Action will be carried forward but revised to call for coordination with Eversource on identifying the best approach to improving resiliency of the power lines along Wolf Pits Road.
26	Conduct outreach to residents in the Far Horizons Drive and Apple Tree Road area regarding lightning safety and proper grounding of structures	EMD, BD	Drop	Town no longer believes this action is necessary.
27	Evaluate critical facilities for acceptable snow loading and develop a response plan to clear roofs when necessary	BD, PW	Drop	Town believes its snow clearing capabilities are sufficient.

#	Description	Responsible Party	Status	Notes
28	Enact regulations preventing new residential development in areas prone to collapse such as at the bottom of steep slopes	PZC	Complete	This action is completed through site plan reviews.
29	Ensure that municipal departments have adequate backup facilities in case earthquake damage occurs to municipal buildings	EMD	Carry Forward with Revisions	Town has identified ability to operate remotely, in the event facilities are inoperable or unreachable, as a priority over developing backup facilities. Action is revised to call for developing automated IT system backups to the cloud and enabling remote access and operations.
30	Prepare inundation mapping and EAPs for Town-owned high hazard dams	PW	Complete	Action has been completed.
31	File copies of EAPs/EOPs for dams whose failure may potentially affect areas of Bethel in a central location for reference	EMD	Complete	Action has been completed.
32	Utilize inundation mapping to identify properties that may be affected and conduct outreach to ensure contact information is in Everbridge system	EMD, LU	Complete	Town has performed outreach to all residents regarding Everbridge system, including those in dam failure areas.
33	Enact a Flood and Erosion Control Board in order to be eligible for funding to repair municipally-owned dams	BOS	Carry Forward	Town has not yet completed this action due to funding and staff limitations.
34	Identify and implement projects to increase fire-fighting access to the Bald Rock area and Huntington State Park	EMD, FS	Complete	Huntington State Park access has been improved with trails. Bald Rock access is still limited, but mutual aid agreements have been made with surrounding Fire Departments and with CT DEEP wildland firefighting personnel. Action is considered complete.

4.3 Prioritization of Strategies and Actions

The STAPLEE method, described in the Multi-Jurisdictional document, was used to score mitigation activities. The STAPLEE matrix in Appendix A provides the total scores. Actions have been further prioritized based on implementation cost, project urgency, and municipal and public input. The strategies below are presented in priority order, with qualitative priority levels listed for each.

4.4 Mitigation Strategies and Actions Implementation Table

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Action BTL-01	
Provide information on the Town website about CT DEEP training and information around small business chemical management for hazard resilience.	
Lead	EM, BOS
Cost	\$0 - \$25,000
Funding	Operating Budget, CT DEEP
Timeframe	2021
Priority	High

Action BTL-02	
Use the CT Toxics Users and Climate Resilience Map to identify toxic users located in hazard zones within your community. Contact those users to inform them about the CT DEEP small business chemical management initiative.	
Lead	EM, BOS
Cost	\$0 - \$25,000
Funding	Operating Budget, CT DEEP
Timeframe	2021
Priority	High

Action BTL-03	
Host a CT DEEP presentation for municipal staff and local businesses about business chemical management for hazard resilience.	
Lead	EM, BOS
Cost	\$0 - \$25,000
Funding	Operating Budget, CT DEEP
Timeframe	2021
Priority	High

Action BTL-04	
Register as a Sustainable CT community and make progress with the hazard mitigation goals associated with registration.	
Lead	BOS
Cost	\$0 - \$25,000
Funding	Operating Budget
Timeframe	2021
Priority	High

Action BTL-05	
Collaborate with CIRCA on the "Resilient Connecticut" project	
Lead	BOS
Cost	\$0 - \$25,000
Funding	Operating Budget
Timeframe	2022
Priority	Med

Action BTL-06	
Enact a Flood and Erosion Control Board in order to be eligible for funding to repair municipally-owned dams	
Lead	BOS
Cost	\$0 - \$25,000
Funding	Operating Budget
Timeframe	2022
Priority	Med

Action BTL-07	
Establish a Conservation Commission to oversee stream buffers in accordance with the POCD	
Lead	BOS
Cost	\$0 - \$25,000
Funding	Operating Budget, FEMA Grant
Timeframe	2022
Priority	Med

Action BTL-08	
Coordinate with Eversource on identifying the best approach to improving resiliency of the power lines along Wolf Pits Road.	
Lead	BOS, PW
Cost	\$0 - \$25,000
Funding	Operating Budget
Timeframe	2023
Priority	Low

Action BTL-09	
Revise floodplain zoning regulations to reflect the new State Building Code requirements for one foot of freeboard for construction in the 1% annual-chance flood zone.	
Lead	PZC
Cost	\$0 - \$25,000
Funding	Operating Budget
Timeframe	2023
Priority	Low

Action BTL-10	
Compare local floodplain regulations with Revised State Model Flood Regulations to identify any remaining opportunities for improvement	
Lead	Planning
Cost	\$0 - \$25,000
Funding	Operating Budget
Timeframe	2023
Priority	Low

Action BTL-11	
Require consideration of the most recent Northeast Regional Climate Center rainfall statistics (precip.eas.cornell.edu) when developing alternatives for culvert and bridge replacement designs and sizes.	
Lead	PW
Cost	\$0 - \$25,000
Funding	Operating Budget
Timeframe	2023
Priority	Low

Action BTL-12	
Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.	
Lead	EM, BOS
Cost	\$0 - \$25,000
Funding	Operating Budget, FEMA Grant
Timeframe	2023
Priority	Low

Action BTL-13	
Adopt regulations to mitigate or reduce peak flows leaving a development site (as discussed in the Stormwater Management Plan and POCD)	
Lead	PZC
Cost	\$0 - \$25,000
Funding	Operating Budget, FEMA Grant
Timeframe	2023
Priority	Low

Action BTL-14	
Develop a comprehensive plan and funding budget to enable an aggressive tree cutting operation by the Town of Bethel DPW (including through local contracts with tree cutting companies) for those trees identified as being in need of removal by the Tree Warden based on age, size, and condition.	
Lead	DPW
Cost	\$25,000 - \$50,000
Funding	Operating Budget, FEMA Grant, CT DEMHS, CT DEEP, Other Grant
Timeframe	2023
Priority	High

Action BTL-15	
Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (flood zones, wildfire hazard zones, steep slopes) to identify historic resources at risk and support the preparation of resiliency plans across the state.	
Lead	Planning
Cost	\$25,000 - \$50,000
Funding	CT SHPO
Timeframe	2024
Priority	Med

Action BTL-16	
Develop automated IT system backups to the cloud and enable remote access and operations.	
Lead	EMD
Cost	\$25,000 - \$50,000
Funding	Operating Budget
Timeframe	2024
Priority	Med

Action BTL-17	
Complete a feasibility study for conversion of the old Police Station to open recreational space.	
Lead	BOS, LU
Cost	\$25,000 - \$50,000
Funding	Capital Improvement Plan, FEMA Grant
Timeframe	2024
Priority	Med

Action BTL-18	
Instruct the Town's Energy Conservation Commission to develop a set of recommendations for improving energy resiliency at critical facilities and areas in town.	
Lead	LU
Cost	\$25,000 - \$50,000
Funding	Operating Budget
Timeframe	2024
Priority	Low

Action BTL-19	
Identify and create a database of owners of all properties located within SFHA and all repetitive loss properties. Work with CT DEEP to validate and/or correct the RL list and update the mitigation status of each listed property.	
Lead	LU
Cost	\$25,000 - \$50,000
Funding	FEMA Grant
Timeframe	2024
Priority	Low

Action BTL-20	
Annually conduct an emergency operations exercise for a local terrorism, sabotage, or mass casualty event.	
Lead	EMD
Cost	\$25,000 - \$50,000
Funding	Operating Budget
Timeframe	2024
Priority	Low

Action BTL-21	
Perform a formal study to identify areas of concern requiring stream maintenance and to prioritize stream improvement projects	
Lead	LU
Cost	\$50,000 - \$100,000
Funding	Operating Budget, Grant
Timeframe	2025
Priority	Low

Action BTL-22	
Pursue funding to mitigate poor drainage flooding and improve conveyance in the downtown area along Chestnut Brook and its tributary drainage systems	
Lead	BOS, PW
Cost	\$100,000 - \$500,000
Funding	Capital Improvement Plan, FEMA Grant, Other Grant
Timeframe	2026
Priority	Med

Action BTL-23	
Study and determine potential mitigation solutions to poor drainage flooding and overbank flooding along East Swamp Brook and Bethel Reservoir Brook	
Lead	BOS, PW
Cost	\$100,000 - \$500,000
Funding	Capital Improvement Plan, FEMA Grant, Other Grant
Timeframe	2026
Priority	Med

APPENDIX A

Appendix A: STAPLEE Matrix

#	Action Description	Regional Theme	Lead Department	Cost Estimate	Potential Funding Sources	Timeframe for Completion	Weighted STAPLEE Criteria																Total STAPLEE Score
							Benefits								Costs								
							Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental			
#	Action	Theme	Lead	Cost	Funding	Time	S	T	A	P	L	E	E2	S3	T4	A5	P6	L7	E8	E9	Score		
BTL-01	Provide information on the Town website about CT DEEP training and information around small business chemical management for hazard resilience.	CT DEEP Small Business Chem	EM, BOS	\$0 - \$25,000	Operating Budget, CT DEEP	2021	1	1	1	0	1	1	1	0	0	0	0	0	0	0	8		
BTL-02	Use the CT Toxics Users and Climate Resilience Map to identify toxic users located in hazard zones within your community. Contact those users to inform them about the CT DEEP small business chemical management initiative.	CT DEEP Small Business Chem	EM, BOS	\$0 - \$25,000	Operating Budget, CT DEEP	2021	1	1	1	0	1	1	1	0	0	0	0	0	0	0	8		
BTL-03	Host a CT DEEP presentation for municipal staff and local businesses about business chemical management for hazard resilience.	CT DEEP Small Business Chem	EM, BOS	\$0 - \$25,000	Operating Budget, CT DEEP	2021	1	1	1	0	1	1	1	0	0	0	0	0	0	0	8		
BTL-04	Register as a Sustainable CT community and make progress with the hazard mitigation goals associated with registration.	Sustainable CT	BOS	\$0 - \$25,000	Operating Budget	2021	1	1	1	1	0	1	1	0	0	0	0	0	0	0	8		
BTL-05	Develop a comprehensive plan and funding budget to enable an aggressive tree cutting operation by the Town of Bethel DPW (including through local contracts with tree cutting companies) for those trees identified as being in need of removal by the Tree Warden based on age, size, and condition.	Tree Management	DPW	\$25,000 - \$50,000	Operating Budget, FEMA Grant, CT DEMHS, CT DEEP, Other Grant	2023	1	1	1	1	1	1	0	0	0	0	0	0	0	0	8		
BTL-06	Collaborate with CIRCA on the "Resilient Connecticut" project	ResilientCT	BOS	\$0 - \$25,000	Operating Budget	2022	1	1	1	0	0	1	1	0	0	0	0	0	0	0	7		
BTL-07	Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (flood zones, wildfire hazard zones, steep slopes) to identify historic resources at risk and support the preparation of resiliency plans across the state.	SHPO	Planning	\$25,000 - \$50,000	CT SHPO	2024	1	1	1	1	0	1	0	0	0	0	0	0	0	0	7		
BTL-08	Enact a Flood and Erosion Control Board in order to be eligible for funding to repair municipally-owned dams	Municipal Capacities	BOS	\$0 - \$25,000	Operating Budget	2022	0	0	1	1	1	1	1	0	0	0	0	0	0	0	6		
BTL-09	Establish a Conservation Commission to oversee stream buffers in accordance with the POCD	Municipal Capacities	BOS	\$0 - \$25,000	Operating Budget, FEMA Grant	2022	1	1	0	0	1	1	1	0	0	-1	0	0	0	0	6		
BTL-10	Develop automated IT system backups to the cloud and enable remote access and operations.	Municipal Capacities	EMD	\$25,000 - \$50,000	Operating Budget	2024	0	1	1	0	1	1	0	0	0	0	0	0	0	0	6		
BTL-11	Complete a feasibility study for conversion of the old Police Station to open recreational space.	Open Space	BOS, LU	\$25,000 - \$50,000	Improvement Plan, FEMA Grant	2024	1	1	0	1	1	0	1	0	0	0	0	0	0	0	6		
BTL-12	Pursue funding to mitigate poor drainage flooding and improve conveyance in the downtown area along Chestnut Brook and its tributary drainage systems	Drainage	BOS, PW	\$100,000 - \$500,000	Improvement Plan, FEMA Grant, Other Grant	2026	1	1	0	1	1	1	1	0	0	0	0	0	-1	0	6		
BTL-13	Study and determine potential mitigation solutions to poor drainage flooding and overbank flooding along East Swamp Brook and Bethel Reservoir Brook	Drainage	BOS, PW	\$100,000 - \$500,000	Improvement Plan, FEMA Grant, Other Grant	2026	1	1	0	1	1	1	1	0	0	0	0	0	-1	0	6		
BTL-14	Coordinate with Eversource on identifying the best approach to improving resiliency of the power lines along Wolf Pits Road.	Energy Resiliency & Backup Power	BOS, PW	\$0 - \$25,000	Operating Budget	2023	1	1	1	1	1	1	0	0	-1	-1	0	0	0	0	5		
BTL-15	Revise floodplain zoning regulations to reflect the new State Building Code requirements for one foot of freeboard for construction in the 1% annual-chance flood zone.	Floodplain Management Regulations	PZC	\$0 - \$25,000	Operating Budget	2023	0	1	1	0	1	1	0	0	0	0	-1	0	0	0	5		
BTL-16	Compare local floodplain regulations with Revised State Model Flood Regulations to identify any remaining opportunities for improvement	Floodplain Management Regulations	Planning	\$0 - \$25,000	Operating Budget	2023	0	1	1	0	1	1	0	0	0	0	-1	0	0	0	5		

#	Action Description	Regional Theme	Lead Department	Cost Estimate	Potential Funding Sources	Timeframe for Completion	Weighted STAPLEE Criteria														Total STAPLEE Score
							Benefits							Costs							
							Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	
BTL-17	Require consideration of the most recent Northeast Regional Climate Center rainfall statistics (precip.eas.cornell.edu) when developing alternatives for culvert and bridge replacement designs and sizes.	NRCC	PW	\$0 - \$25,000	Operating Budget	2023	0	1	0	0	0	1	1	0	0	-1	0	0	0	0	4
BTL-18	Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.	RLPs	EM, BOS	\$0 - \$25,000	Operating Budget, FEMA Grant	2023	0	1	1	0	1	1	0	0	0	-1	0	0	0	0	5
BTL-19	Adopt regulations to mitigate or reduce peak flows leaving a development site (as discussed in the Stormwater Management Plan and POCD)	Drainage	PZC	\$0 - \$25,000	Operating Budget, FEMA Grant	2023	0	1	1	1	1	1	1	0	0	0	-1	0	-1	0	5
BTL-20	Instruct the Town's Energy Conservation Commission to develop a set of recommendations for improving energy resiliency at critical facilities and areas in town.	Energy Resiliency & Backup Power	LU	\$25,000 - \$50,000	Operating Budget	2024	1	1	1	1	1	1	0	0	-1	-1	0	0	0	0	5
BTL-21	Identify and create a database of owners of all properties located within SFHA and all repetitive loss properties. Work with CT DEEP to validate and/or correct the RL list and update the mitigation status of each listed property.	RLPs	LU	\$25,000 - \$50,000	FEMA Grant	2024	0	0	1	0	1	1	0	0	0	0	0	0	0	0	4
BTL-22	Annually conduct an emergency operations exercise for a local terrorism, sabotage, or mass casualty event.	Terrorism & Mass Casualty	EMD	\$25,000 - \$50,000	Operating Budget	2024	1	1	1	1	1	0	0	0	0	-1	0	0	0	0	5
BTL-23	Perform a formal study to identify areas of concern requiring stream maintenance and to prioritize stream improvement projects	Flood Study	LU	\$50,000 - \$100,000	Operating Budget, Grant	2025	0	1	1	1	1	1	0	0	-1	0	0	0	0	0	5

APPENDIX B

Appendix B: SVI Summary

Town of Bethel

Climate Vulnerability Assessment

A Component of Sustainable CT Action 5.4

The Town of Bethel, for this Climate Vulnerability Assessment (CVA) is considered a suburban inland town, resulting in various climate change vulnerabilities. Inland flooding, extreme heat, and winter storms may impact the community the most as many issues have been identified.

Hazards

Inland Flooding

With FEMA flood zones in town along several streams, such as along the Sympaug Brook and the East Swamp Brook, there is continuously concern for riverine flooding. The numerous streams in town pose a flood risk to adjacent properties, whether it is a larger storm event or a short intense rainstorm. With precipitation expected to increase due to climate change, flooding events may occur more frequently. Overall, flooding may continue, or become a larger issue with future shifts in precipitation.

Winter Storms

Bethel is largely residential with commercial properties along the western routes in town. Suburban communities are often impacted by strong winter storms in several ways; power outages from downed trees, accessibility issues, and icing concerns. Anticipated shifts in winter precipitation may bring more freezing rain events, which can result in an increase of downed trees during a winter storm event. Downed trees can result in power outage, and lack of emergency access and egress.

Drought and Extreme Temperatures

Much of the town relies on private wells for drinking water, with the exception of a larger system in the western half of town, and a smaller system in the northern area of town. Therefore, impacts to water supply may be an issue to the town as temperatures rise in the future, resulting in isolated issues with water scarcity. With increased temperatures, and high pumping levels, private wells may be impacted during times of drought.

In addition to private wells, many Suburban communities have high levels of agricultural activity, whether it be crop production or livestock, these operations are heavily water dependent for healthy growing and revenue generation.

When considering these impacts from climate change, the primary vulnerabilities for the town of Greenwich include:

- Private well owners
- Emergency access
- Agricultural operations

Secondary impacts

Economic Impacts

With areas vulnerable to flooding and winter storm events, the town faces an economic challenge of addressing the flooding concerns and increasing snow and debris removal capacity. There is also a potential economic impact to local businesses during flooding events, and heavy winter storms. Businesses may incur expenses related to flood mitigation or clean-up efforts, or experience loss of income if there is no site access during a storm.

Winter storm snow removal or icing also presents financial responsibility to the town by way of roadway treatment. As precipitation events may increase during winter months, the town may seek to increase sand or salt stockpiles to account for increased icing events.

Private property owners who rely on private drinking water wells may also be impacted economically during droughts or periods of extreme heat. With increasing heat, typically comes increased water demand. This demand would be placed upon local aquifers, potentially resulting in the need for new well construction, or deepening of an existing well.

The many impacts of climate change can result in economic impacts to many citizens, business owners, and municipal budgets as the impacts can be felt on a town level, down to building level.

Social Impacts

To identify social impacts to the town, the Center for Disease Control and Prevention (CDC) Social Vulnerability Index (SVI) was used to identify any vulnerable populations within the town. This index was developed to supplement a community's natural hazard preparation actions. To evaluate social vulnerability, the CDC incorporates 15 factors (Fig. 1) into the overall calculation under the categories, or themes, of: socioeconomic status, household composition and disability, minority status and language, and housing type and transportation. These themes and their ranking are based on census statistics. By evaluating these factors and determining a level of social vulnerability, a community can identify specific needs for before, during, and after an event. Such needs may include sheltering capacity, evacuation routes, or to decide how many emergency personnel may be required to respond after an event.

Each municipalities' census tracts were ranked for overall vulnerability, and theme vulnerability, in comparison to other Connecticut municipalities. This rank, 0 to 1, is based on the percentile rank among all tracts within the State of Connecticut. A value closer to 0 indicates a lower vulnerability, while a value closer to 1 indicates a higher vulnerability. Table 1 presents the overall vulnerability and theme rankings for Bethel.

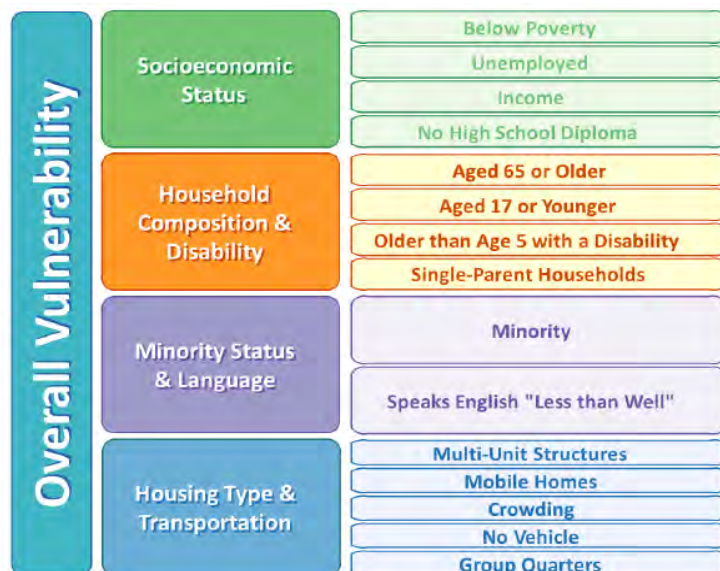


Figure 1: The CDC SVI Index Factors. Graphic: svi.cdc.com

Table 1: Bethel SVI Factor Rankings

	Overall SVI	Socioeconomic	Household Composition & Disability	Minority Status & Language	Housing Type & Transportation
BETHEL	.27	.32	.24	.39	.28

The Town of Bethel is considered to have a low to moderate level of vulnerability, with their most vulnerable population being minorities and those who speak English “less than well”. These vulnerable populations are located within the western most tract of Bethel, which is the shared border between the City of Danbury. In addition, the town has vulnerable populations based on socioeconomic status, and housing type and transportation; socioeconomic status appears to be evenly distributed throughout the town, while populations vulnerable due to housing type and transportation are greater in the two western tracts.

These populations may be vulnerable to impacts from drought, flooding and storm events based on the geographic concentrations.

Public Health Considerations

Of the primary vulnerabilities identified, drought and flooding can potentially have public health repercussions. During hot summer months, or drought, if private wells were to be impacted, certain populations may find themselves without adequate drinking water supply, resulting in health problems. Also, when considering the environmental shifts occurring during drought periods, drinking water contamination may become an issue as aquifers become stressed due to excessive pumping.

Food scarcity is another consideration when discussing the impacts of drought and extreme temperatures. Agricultural operations that are impacted by water shortages may find that crop or livestock yields are below average, ultimately resulting in food scarcity concerns. Depending on the size of an operation, the impacts can be on a small or large scale.

Flooding also presents the concern of pollution into nearby water bodies as commercialized and impervious areas drain, they collect pollutants and excess sediment. Depending upon the drainage areas, this runoff can have environmental impacts in associated ecosystems, or public health impacts if water bodies are used for recreational activities.

Vulnerable Populations

The SVI identified the presence of certain populations within the town that may be more vulnerable to climate change hazards. Communities, including Bethel, should pay special attention to elderly or disabled populations, linguistically challenged populations, and those that may need evacuation assistance due to lack of transportation. In addition to the SVI populations identified, the Connecticut Department of Public Health (DPH)¹ has identified at least two assisted living facilities and one convalescent home in Bethel.

¹ <https://www.elicense.ct.gov/Lookup/LicenseLookup.aspx>

Some populations often need additional time for hazard response, so evacuation or preparation, and may find it more challenging to recover due to financial constraints or health concerns. These populations should be considered more vulnerable for the reasons that emergency response and preparation may be more challenging, health issues may be of higher concern, and language barriers may exist when working to communicate with the community on risks, response, and recovery efforts.

In addition to the populations, it is important to identify the facilities that can provide different types of assistance to the populations, and others, during or after an event. These facilities, and their proximity to flood zones, can be found in Figure 2-4.