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

Municipal Annex
for
Brookfield, CT

100 Pocono Road
Brookfield, CT 06804
November 2021

Prepared for:
WESTERN CONNECTICUT
COUNCIL OF GOVERNMENTS
1 Riverside Road
Sandy Hook, CT 06482
475-323-2060
www.westcog.org

MMI #3101-22

Prepared by:
MILONE & MACBROOM, INC.
99 Realty Drive
Cheshire, Connecticut 06410
(203) 271-1773
www.mminc.com

MILONE & MACBROOM
ENGINEERING | PLANNING | LANDSCAPE ARCHITECTURE | ENVIRONMENTAL SCIENCE

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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 Brookfield 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 1778, the Town of Brookfield is located in northern Fairfield County and home to a population of 16,452 (2010 U.S. Census). Brookfield is bordered by the municipalities of New Milford and Bridgewater to the north, Newtown to the east, Danbury and Bethel to the south, and to the west New Fairfield. Refer to Figure 2-1 for a map showing the regional location of Brookfield within the WestCOG region.

Brookfield is located in the southern foothills of the Berkshire Mountains. The broad central Still River Valley is a defining feature of the town's topography. The town is characterized by higher elevations away from the town center which drain into the Still River corridor. The Still River flows north cutting through the center of town into southern New Milford before it eventually joins the Housatonic River. The two largest lakes in Connecticut border the Town of Brookfield. Candlewood Lake to the west was formed by a hydroelectric dam south of the Rocky River and Lake Lillinonah to the east, was formed by Shepaug Dam on the Housatonic River. The highest elevation in Brookfield is about 730 feet in the east central part of town, east of Route 25. The low point is just under 200 feet along the easternmost point of Lake Lillinonah. The varying terrain of Brookfield 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	27.6%
Turf & Grass	13.8%
Other Grasses	1.5%
Agricultural Field	1.9%
Deciduous Forest	42.5%
Coniferous Forest	5.7%
Water	3.9%
Non-Forested Wetland	0.3%
Forested Wetland	1.7%
Tidal Wetland	0.0%
Barren Land	1.0%
Utility Corridor	0.2%

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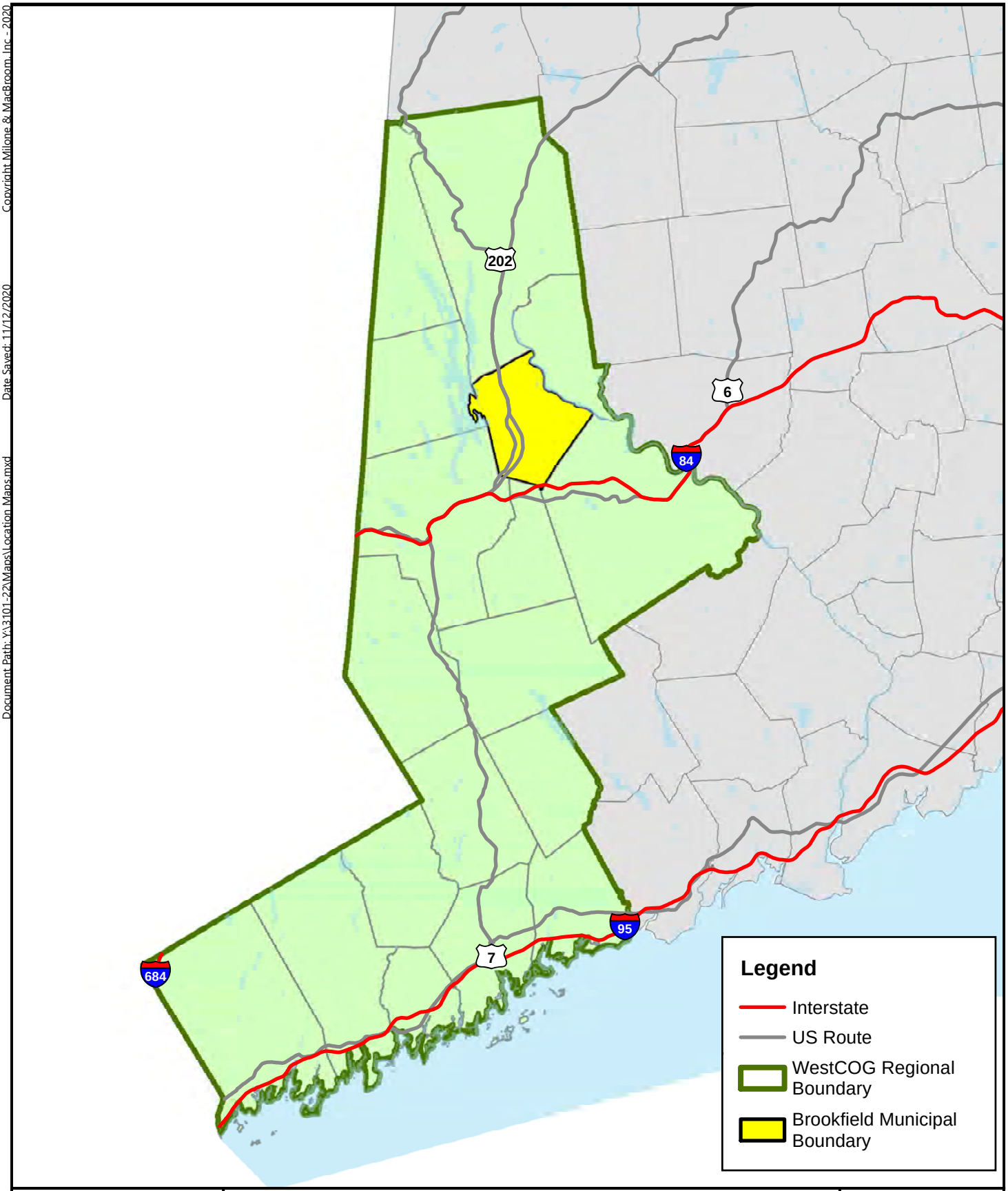

MILONE & MACBROOM
99 REALTY DRIVE
CHESHIRE, CT 06410
203.271.1773
WWW.MMINC.COM

Regional Location of Brookfield

WestCOG Hazard Mitigation Plan
Town of Brookfield

N

0 40,000 80,000
Feet

SCALE 1 " = 82,167 '
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FIG. 2-1

2.1.2 Land Use

Brookfield is a suburban town that contains a busy commercial corridor along Federal Road (U.S. Route 202) and residential neighborhoods throughout the town.

According to the town's 2015 Plan of Conservation and Development (POCD) 6,590 acres or 53.7% of Brookfield's Total land area is currently occupied by residential development (from 5,865 acres or 45% in 2002). Historically, low-density single-family residential uses have been scattered throughout a variety of neighborhoods in the town. Multi-family units are moderate-density developments in small scale projects located in the core of the town adjacent to commercial and civic uses. Table 2-2 present 2015 land use data as provided in the 2015 POCD.

Table 2-2: 2015 Land Use by Area

Use	Acres	Number of Parcels	Percent of Developed Land	Percent of Total Land
Residential	**6,590.74**	**5061**	**53.7%**	**48.8%**
Single Family	6,494.55	5012	-	-
Multi-Family	96.19	49	-	-
Business	**649.95**	**251**	**5.3%**	**4.8%**
Retail/Service/Office	361.80	144	-	-
Mixed Use	38.14	32	-	-
Industrial	250.01	75	-	-
Public & Institutional Uses	**326.01**	**59**	**2.7%**	**2.4%**
Public	222.72	19	-	-
Private	103.29	40	-	-
Public Land and Open Space	**3,299.28**	**168**	**26.9%**	**24.4%**
Dedicated Open Space	**2,374.65**	**121**	**19.3%**	**17.6%**
TOB Open Space	1,875.33	75		
Land Trust Open Space	322.23	12		
Conserved Land/Private Open Space	177.09	34		
Managed Open Space	**924.63**	**47**	**7.5%**	**6.9%**
State of CT Lands	683.77	17		
Managed Land	99.84	14		
PL490 Lands	141.02	16		
Other	**1,414.18**	**22**	**11.5%**	**10.5%**
Utility Land	536.32	18		
Transportation	73	1		
Water	804.86	3		
Vacant	**1,217.54**	**488**		
Residential Land	852.51	414		
Commercial Zones - total	147.44	25		
Industrial Zones - total	184.75	33		
Unbuildable land	32.84	16		
Developed/Committed	**12,280.16**		**100%**	**91%**
Vacant/Undeveloped		**1,217.51**		**9%**
Total Land Area	**13,497.70**			

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

For many years a small parcel of land that was part of New Fairfield was separated from the rest of New Fairfield by Candlewood Lake. In 1961, this land was annexed from New Fairfield to Brookfield and it is now called Candlewood Shores and Arrowhead Point. This area is one of the most densely developed portions of Brookfield.

Many of the remaining historic structures in the town have been preserved. In 1991 the Brookfield Center was inducted into the National Register of Historic Places. The district represents the original settlement of the Town of Brookfield and contains a total of 67 structures, residential, religious, and municipal, over a 43-acre area.

2.1.3 Climate and Climate Change

Current Climate Conditions

Over the course of the year, the temperature in Brookfield typically varies from 18°F to 82°F and is rarely below 3°F or above 89°F. The warm season lasts from May 29 to September 15, 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 1 to March 10, with an average daily high temperature below 44°F. The coldest day of the year is January 29, with an average low of 18°F and high of 34°F.

Precipitation falls throughout the year in Brookfield. The wetter season lasts from April 9 to August 20, with a greater than 30% chance of a given day being a wet day. The chance of a wet day peaks at 37% on May 29. The smallest chance of a wet day is 22% on January 29.

The most rain falls during the 31 days centered around June 4, with an average total accumulation of 4.0 inches. The least rain falls around January 24, with an average total accumulation of 1.6 inches.

The snowy period of the year lasts from October 30 to April 14, 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 25, 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 CO_2 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 Brookfield as 3.36 inches.

The NOAA Atlas 14, released on September 30, 2015 puts the 24-hour rainfall amount for a 50% annual-chance annual storm in Brookfield at 3.51 inches.

These precipitation amounts, and more details, are summarized in Table 2-3, below.

Table 2-3: 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	3.36	6.29	8.90
NOAA Atlas 14	3.51	6.78	8.71

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 Brookfield can expect the 24-hour rainfall amount for a 50% annual-chance storm to be around 3.6 to 3.8 inches or greater.

Impervious surfaces and infrastructure in town have increased over time as well, leading to increasing runoff and peak discharge values.

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

Brookfield is divided among five sub-regional watersheds as shown in Table 2-4. The majority of the sub-regional basins drain into the Still River and then to the Housatonic River. All of the water that passes through Brookfield eventually empties into Long Island Sound.

Table 2-4: Sub-Regional Drainage Basins

Drainage Basin	Overall Sub-regional Area (sq. mi)	Area within Town (sq. mi)	Area within Town (acres)	Percent of Town
Still River	63.44	8.17	5,230.94	40.12%
Housatonic River	623.53	6.70	4,291.40	32.91%
Pond Brook	13.90	3.58	2,293.19	17.59%
Candlewood Lake	27.68	1.87	1,200.08	9.20%
Limekiln Brook	8.76	0.03	21.08	0.16%
Total	n/a	20.37	13,036	100.0%

Source: Connecticut Department of Energy & Environmental Protection GIS Data

Still River

The Still River is a 25.4-mile tributary to the Housatonic River. Its headwaters originate from Farringtons Pond at the New York border with Danbury. It enters a concrete aqueduct near downtown Danbury, then turns north and becomes a more conventional river as it cuts through Brookfield and southern New Milford before joining the Housatonic river. The Still River sub-regional basin drains about one third of Brookfield.

Housatonic River

The Housatonic River flows 134 miles from Pittsfield, Massachusetts to Long Island Sound, draining 1,948 square miles. The river flows down the east side of Brookfield, forming the border with Bridgewater. The Housatonic River sub-regional drainage basin covers 33% of the town. The main channel of the Housatonic is lined on both sides with 1% annual chance storm floodplains and 0.2% annual chance floodplains.

Pond Brook

With an area of around 14 square miles, the Pond Brook drainage basin includes several tributaries flowing south-southeast from Brookfield. Approximately, 17.5% of Brookfield are within the Pond Brook sub-regional drainage basin.

Candlewood Lake

At 5,400 acres, Candlewood Lake is the largest lake in Connecticut. The reservoir was constructed to support power generation at the Rocky River power station in New Milford. The Candlewood Lake watershed comprises 9.2% of the town's land area. The lake is impounded in Danbury by the Lake Candlewood Dam, a Class C dam near Danbury-Candlewood Park located off Hayestown Road, and is impounded by several dams lying in other municipalities as well. There is a delineated 1% annual chance floodplain surrounding the lake without elevations defined (FEMA zone A).

Limekiln Brook

The Limekiln Brook's sub-regional drainage basin covers 21 acres of southern Brookfield and has a total drainage area of just under nine square miles. This sub-regional drainage basin meets the Still River in Newtown just after it flows under Route 84. *This sub-regional drainage basin should not be confused with the similarly named stream associated with the Meadowbrook Manor neighborhood located in the Still River sub-regional drainage basin, Lime Kiln Brook*

2.2 Society, Culture, and Government

2.2.1 Population and Demographic Setting

According to the 2010 U.S. Census, Brookfield had a population of 16,452, with 810 persons per square mile. According to the 2018 American Community Survey five-year estimates, Brookfield's population between 2013 and 2018 was approximately 17,013. The Connecticut State Data Center predicts that population in Brookfield will decrease in the future, with the population in 2040 projected to be 14,513.

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

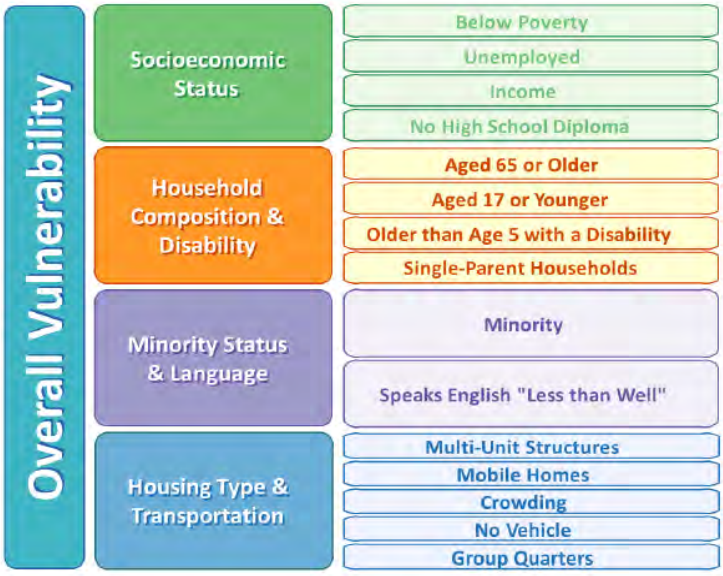

Figure 2-2: The CDC SVI Index Factors. Graphic: svi.cdc.com

The Town of Brookfield is considered to have a low to moderate level of vulnerability, with their most vulnerable social aspect being household composition and disability, followed by minority

and linguistically challenged populations. Vulnerable age groups and disabled populations are identified in the western tract of the town, while minority populations and those that speak English "less than well", are concentrated in the northwestern tract of Brookfield. Appendix B explores the SVI for Brookfield in more depth, including maps showing overall vulnerability, and theme vulnerability.

2.2.2 Development Trends

In the 1700s Brookfield was an area of farmland, forests and streams. As early as 1732, there was industry along the Still River, and the area became known as the Iron Works District. Still standing today is the grist mill, now the Brookfield Craft Center, and the remains of the Iron Works Aqueduct Company. The Connecticut Light and Power Company built the first hydroelectric plant in America at Rocky River, just north of New Milford. By 1928, the plant was finished, and Candlewood Lake was formed on land from Danbury, New Fairfield, Brookfield, and Sherman.

Brookfield has been transforming from a colonial New England town to a local shopping and consumer goods destination with low-to-moderate commercial uses since the 1980s. The area surrounding Candlewood Lake has seen increase in residential growth and volume of summer traffic. Today commercial and residential development is growing in Brookfield, as compared to other communities in Connecticut. The Federal Road (U.S. Route 202) corridor is the economic engine of Brookfield since it is the location of most existing commercial uses and the primary area for accommodating intensive development in the future. The proximity of Brookfield to the Route 7 corridor and Interstate 84 has helped promote economic development.

The Town Center District (referred to as the TCD district in the Town's zoning regulations), formerly called "Four Corners," is a community landmark at the historic junction of State Routes 7 and 25. Since an extension to highway Route 7 opened in 2010, traffic through the TCD has dropped dramatically. The Town has seized this change as an opportunity, and has begun focusing development efforts in this area. This development is guided by the "Four Corners Plan." Moving forward, the TCD is expected to continue developing with commercial and residential land uses. Recent developments in this area include Brookfield Village and Laurel Hill Apartments.

Brookfield has potential for transit-oriented development (TOD) if the Danbury commuter line is extended northward through the town. This could include some limited multi-family and mixed-use development. Depending on the location of a new passenger rail station, the TOD could overlap with the TCD.

Most of the outlying parts of the town will remain at lower residential densities, and subdivisions are typically small. According to town officials, there have not been many recent open space acquisitions, although some conservation easements have been secured in recent years, which included steep slopes.

Overall, development in Brookfield tends to be outside of flood zones and other areas of natural hazard risk. Therefore, community vulnerabilities have not been increasing as development continues. Care will be taken to ensure that TCD and TOD-related projects remain outside flood zones.

2.2.3 Governmental Structure

The Town of Brookfield has 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. Town departments provide municipal services and day-to-day administration. Many commissions and departments play a role in hazard mitigation, including the Planning Commission, Zoning Commission, Conservation Commission, Inland Wetlands Commission, the Building Official, the Land Use Department, the Fire Department, Emergency Management, and the Public Works Department.

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 Brookfield are concentrated within the Brookfield Center Historic District.

The district contains 67 sites including the old town hall, the Congregational Church of Brookfield, Saint Joseph Church & Elementary School, Center Elementary School, the former general store, St. Paul's Episcopal Church, and the 1907 gymnasium building of the Curtis School for Boys. Brookfield historic resources also include the Martin Kellogg House, Laurel Hill Cemetery, Merwin Brook Cemetery, the Brookfield Craft Center, an historic Iron Furnaces site, a highway tunnel, and the Railroad Station. 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. See Figure 2-3 for a map of historic resources in Brookfield.

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

Hazard	Count
Dam Failure	2
Earthquake	126
Flooding	
1% Annual	0
0.2% Annual	2
Hurricane/Tropical Storm	126
Thunderstorm	126
Tornado	126
Winter Storm	126
Wildfire	92

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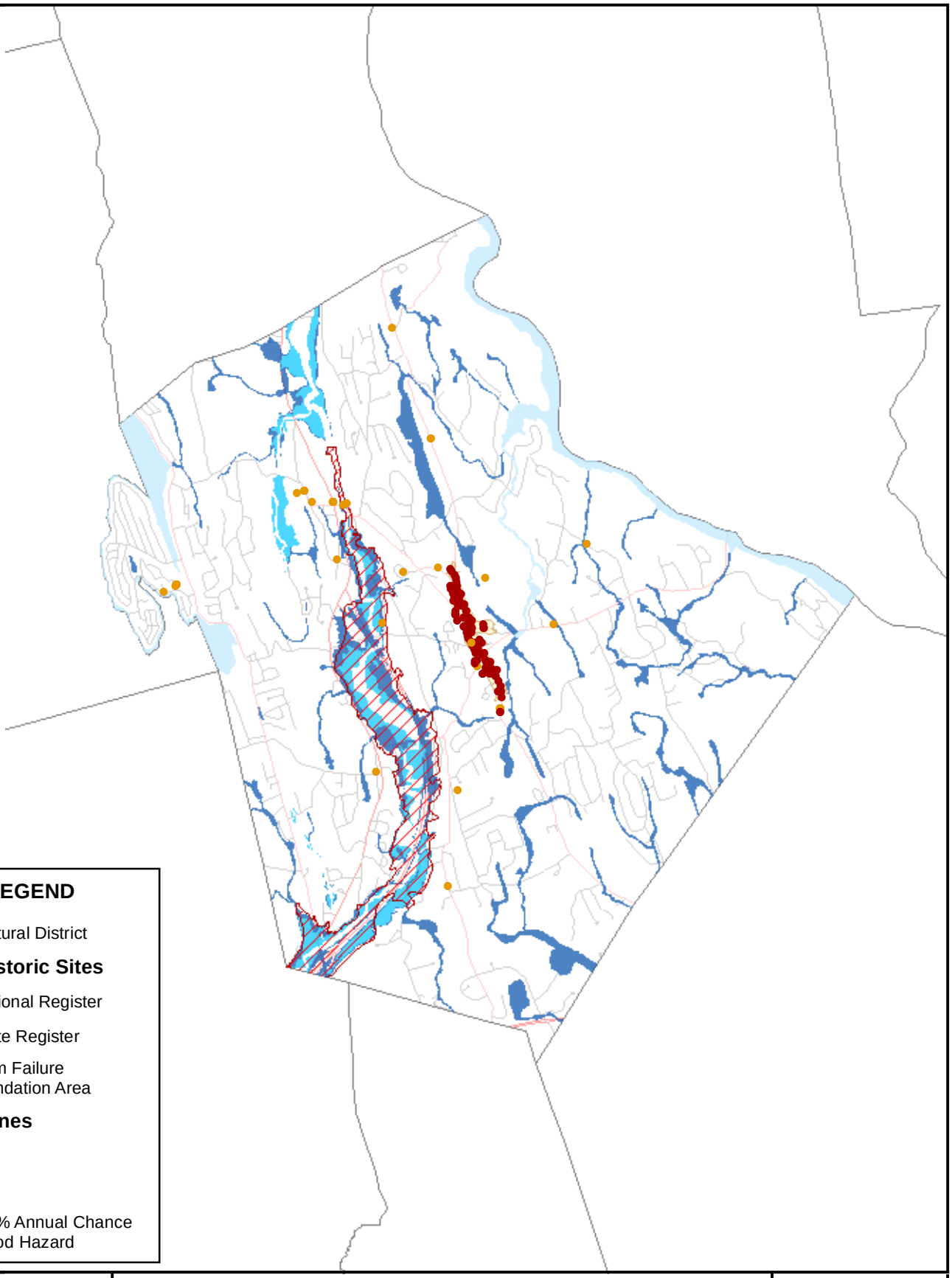

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Historic Resources with Flood Zones and Dam Failure Inundation Areas

WestCOG Hazard Mitigation Plan

Town of Brookfield

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

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FIG. 2-3

The following historic resources in Brookfield have been specifically identified as being potentially at risk from natural hazards:

- Merwin Brook Cemetery – located at the southern end of the Gurski Farm Open Space property, near Merwin Brook and Obtuse Hill Road. The state has established an easement on the site. The Town is not aware of any recent flooding impacting the site.
- Brookfield Craft Center, Inc. – located at 286 Whisconier Road, the historic building is adjacent to the Still River (it is a historic mill building).

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.

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

Major transportation routes in Brookfield are Route 7 and Route 202. These two routes merge in the southwestern part of town, about a mile before their junction with Interstate 84, which passes through the southern tip of Brookfield, but does not have any exits within Town. Another significant transportation route is Route 25; like Route 7 and Route 202, this route travels predominantly north-south through Brookfield. Route 133 is the main east-west route through town.

Brookfield does not have any public transportation services in town, but is close to the Danbury Railroad Station and bus station.

2.3.2 Utilities

Aquarion Water Company owns and operates eight public water systems in Town; the largest being the Brookfield Main System serving the central corridor along Federal Road from New Milford to Danbury, Silvermine Road, and north of Silvermine Road on Route 25. The remaining water systems are to the east and west of Federal Road and serve primarily residential areas.

Residents and businesses use oil, propane, or natural gas for heat. Natural gas is available via a pipeline along Federal Road from Eversource. Sewer service is provided by the Brookfield WPCA. Sewer system capacity has more than doubled since 2008.

2.4 Planning and Regulatory Capabilities

2.4.1 Review of Existing Local Plans

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

- **Plan of Conservation and Development (POCD):** Brookfield's most recent POCD was adopted in 2015. It does not explicitly address natural hazard concerns within the community, or include strategies that will mitigate risks from those hazards as the community continues to develop. This will be an action to pursue during development of the next POCD Update.
- **Stormwater Management:** Brookfield 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). The Town also maintains a Water Pollution Control Plan, last updated in 2014.
- **Capital Improvement Plan (CIP):** Brookfield 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:** Brookfield 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):** Brookfield's EOP is reviewed annually and updated as needed. Dam failure Emergency Action Plans (EAPs) for dams with failure inundation zones that may impact Brookfield, 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:** Brookfield does not maintain a stand-alone Open Space Plan; instead, open space planning is incorporated into the community's POCD.

2.4.2 Review of Regulatory Structures

Brookfield 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:** Brookfield enforces the Connecticut State Building Code locally.
- **Zoning Regulations:** Most recently updated in December 2018.
- **Inland Wetlands and Watercourses Regulations:** Most recently updated in December 2012.
- **Subdivision Regulations:** Most recently updated in November 2007. Include provisions promoting control of stormwater runoff, installation of firefighting water sources, construction of adequate emergency access and egress, and burial of utilities.

2.5 Emergency Services, Critical Facilities, Sheltering, and Evacuation

The Town considers its police, fire, and governmental facilities to be critical since these are needed to ensure that emergencies are addressed while day-to-day management of Brookfield continues. The Town also considers various infrastructure and facilities (such as water and sewer pump stations) to be critical facilities, as well as facilities housing higher-risk individuals (such as elderly individuals or children) and large populations. Table 2-6, Table 2-7, and Figure 2-4 identify all of these critical facilities.

Table 2-6: Critical Facilities

Facility	Address or Location	Type	Emergency Power	Shelter	In 1% Floodplain
Brookfield Volunteer Fire Co.	92 Pocono Road	Emergency Response	✓		
Brookfield Volunteer Fire Department, Candlewood Co.	18 Bay View Drive	Emergency Response	✓		
Brookfield Ambulance Facility	4 Obtuse Hill Rd / Rt 133	Emergency Response			
Brookfield Town Hall & Brookfield Senior Center	100 Pocono Road	Emergency Response Community Building			
Brookfield Police Department	63 Silvermine Road	EOC	✓		
Brookfield High School	45 Longmeadow Hill Rd	Primary Shelter	✓	✓	
Huckleberry Hill Elementary School	100 Candlewood Lake Rd	Proposed Secondary Shelter		❖	
Brookfield YMCA	2 Huckleberry Hill Rd	Emergency Assist. (Showers)			
Brookfield Public Works Garage	81 Gray's Bridge Road	Emergency Support	✓		✓
Sewer Pump Stations	Various Locations	Critical Facility			
Water Pump Stations	Various Locations	Critical Facility			
Water Tank	Not Mapped	Critical Facility			
Department of Parks and Recreation	162 Whisconier Road	Emergency Support			
Brookfield Library	182 Whisconier Road	Community Building			
Whisconier Middle School	17 West Whisconier Road	School			
Center Elementary School	8 Obtuse Hill Road	School			
Algonquin Gas Facility	78 High Meadow Lane	HazMat			
Brooks Quarry	3 Brooks Quarry Road	Elderly Housing			
Assisted Living	246 Federal Road	Assisted Living			
Assisted Living & Memory Care Facility	291 Federal Road	Assisted Living			
Brookfield School Age Program	100 Candlewood Lake Rd	Day Care			
Christian Life Academy	133 Junction Road	Day Care			
Country Kid's Club	94 Old State Road	Day Care			
Country Kids Play Farm	107 Old State Road	Day Care			

Facility	Address or Location	Type	Emergency Power	Shelter	In 1% Floodplain
Greenknoll Children's Center	2 Huckleberry Hill Road	Day Care			
The Goddard School	1 Production Drive	Day Care			
Kid's Castle Learning Center	777 Federal Road	Day Care			
Montessori Community Center	21 West Whisconier	Day Care			
Prince of Peace	179 Junction Road	Day Care			

❖ *A Huckleberry Hill Elementary School reconstruction project is expected to take place by 2022. As part of this project, the school will become secondary shelter with backup power.*

Table 2-7: High Population Centers

Facility	Location
Brookfield Hills Condominium	Vail Road
Cedarbrook Condominium	Whisconier Road
High Meadows Condominium	Route 133
Lake Lillinonah Shores	Hearthstone Drive
Ledgewood Condominium	Route 133
Mill River Condominium	Federal Road
Newbury Crossing	Silvermine Road
Newbury Village	Federal Road
Oak Meadows	Federal Road
Orchard Place Apts	Orchard Street
Riverview Condominium	Federal Road
Rollingwood Condominium	Federal Road
Sandy Lane Village	Sandy lane
Silvermine Manor	Silvermine Road
Stony Hill Village	Stony Hill Road
Town Brooke Commons	Nabby Road
Whisconier Village	Whisconier Road
Woodcreek Village	Prange Road

The primary identified emergency shelter in Brookfield is the Brookfield High School on Long Meadow Hill Road. This facility has a backup generator. The Brookfield YMCA is used as a comfort station and provides showers; the town would like to obtain standby power for this facility. The Town plans to renovate the Huckleberry Hill School, and to include elements (such as standby power) that will allow it to serve as a secondary shelter on the west side of town.

Critical Utilities

Sewer pumping stations throughout Brookfield are considered to be critical facilities. The station that collects all sanitary wastewater and pumps it to Danbury is the most essential. Some of these have access to standby power, and the sewer commission has a few portable generators. The town would like to obtain additional standby power for these facilities. Water pumping stations and the water tank are also considered critical facilities.

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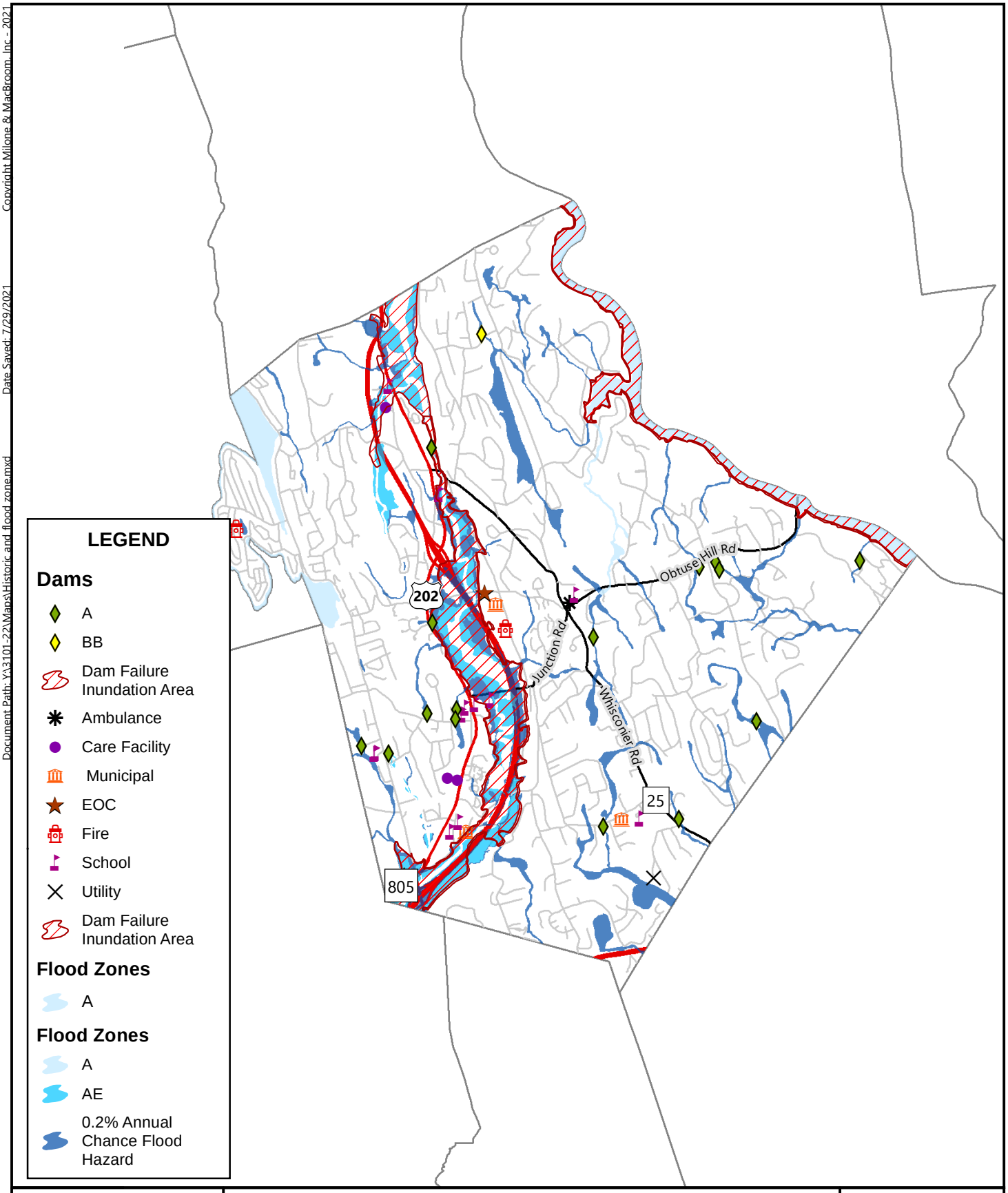


MILONE & MACBROOM
99 REALTY DRIVE
CHESHIRE, CT 06410
203.271.1773
WWW.MMINC.COM

Critical Facilities with Flood Zones and Dam Failure Inundation Areas

WestCOG Hazard Mitigation Plan

Town of Brookfield

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

N

0 2,500 5,000 Feet

SCALE 1 " = 5,805 '

DATE 7/29/2021

PROJ. NO. 3101-22

FIG. 2-4

Emergency Response Facilities

The Police Department and Emergency Services coordinates emergency preparedness in the Town of Brookfield. The Town's Emergency Operations Center (EOC), including its Emergency Communications Center, is located the Brookfield Police Department. Brookfield is located in the Connecticut Department of Emergency Services and Public Protection (DESPP) Region 5, consisting of 43 towns in western Connecticut.

The Town's Public Works Department performs tree and shrub removal and trimming on Town-owned lands and rights-of-way. During emergencies and following storms, the Public Works Department, in conjunction with the Parks Department, responds to calls related to downed trees.

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).

Emergency Communication Capabilities

The Brookfield Police Department uses an Emergency Reverse 911 system to send out emergency communications to town residents. The Town also participates in the state's "CT Alert" notification system, through which the state is able to direct geographically specific emergency notification telephone calls into affected areas.

Brookfield has additionally newly established the CodeRED system. This is an opt-in system, allowing residents to sign up to receive a broad range of urgent or emergency communications. The CodeRED system is able to send communications by voice call, text, and email.

The local radio station, WLAD is also utilized for notifications purposes and the town utilizes the services of Charter Communications to post emergency information on cable channel 21. During disasters, the Town's operating procedure is to send out a daily email to residents providing updates on the disaster, and information on sheltering or evacuations. The Town uses its Facebook page to inform the public during disaster events as well. Finally, the Board of Education maintains an email blast system for notifications that may include natural hazards.

Information about natural hazards and hazard preparedness are posted on the Town Website through the Fire Marshal and Health Department pages.

Hazardous Materials

Three natural gas companies have facilities and pipelines in Brookfield: Algonquin Gas Transmission, LLC; Iroquois Gas Transmission System, and Eversource. The companies regularly host liaison meetings with emergency responders to keep everyone up to date on procedures and facilities.

Changes to Emergency Services since the Previous HMP

The following changes and improvement to Brookfield's emergency service capabilities have been made since adoption of the previous HMP:

- A new generator was installed at the Brookfield High School in 2019
- A new assisted living and memory care facility at 291 Federal Road was under construction in 2020 at the time of plan development
- The Brookfield Department of Parks and Recreation at 162 Whisconier Road was added to the critical facilities list. This department assists with disaster response in some cases by cutting trees and clearing roads and trails. The department assisted with cleanup following the 2018 macroburst.
- The Brookfield Library at 182 Whisconier Road was added to the critical facilities list
- The Algonquin Gas Transmission Company facility at 78 High Meadow Lane was added to the critical facilities list.
- The Town acquired a CodeRED Emergency Alert System subscription and has been encouraging residents to sign up.
- At the Public Works Garage, the Town removed underground fuel tanks, and installed new tanks above ground on a concrete bed, so that the tanks are above the 1% annual chance flood elevation.
- The Public Works and Police Departments have acquired additional barricades to enable them to block flooded streets during flood events.

3.0 HAZARD ASSESSMENT

3.1 FLOODING (COASTAL, INLAND, AND ICE JAMS)

3.1.1 Setting

The potential for flooding exists across Brookfield, with the majority of major flooding occurring along established SFHAs. The areas impacted by overflow of river systems are generally limited to river corridors and floodplains. Indirect flooding that occurs outside floodplains and localized nuisance flooding along tributaries are also common 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 Brookfield is considered likely for any given year, with flood damage potentially having significant effects during extreme events.

A regulatory floodplain with AE designation has been mapped along the Still River and the Housatonic River. 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. Portions of the Housatonic River and its tributaries distribute these traits. Floodplain and floodway designations have also been established along the Still River. Refer to Figure 2-4 for the areas of Brookfield susceptible to flooding based on FEMA flood zones.

In general, potential flooding problems in Brookfield are concentrated along the Still River. The highest risk areas along the Still River include Lower Federal Road, Dean Road and Sand Cut Road. Town officials have noted that washouts of railroad tracks have occurred at Vail Road, near Sunset Hill Road. Minor flooding problems are widespread throughout Brookfield. However, periodic extreme events along defined floodplains often result in damage to insured structures.

The most common damage is to infrastructure and occurs due to flash flooding. Significant precipitation during thunderstorms will occasionally produce localized flooding for brief time periods (about 15 minutes or so) on Brookfield roads, but beyond being a temporary inconvenience the Town has not found this to be a significant problem.

3.1.2 Capabilities

The Town primarily attempts to mitigate future flood damage and flood hazards by restricting building activities in floodprone areas. This process is carried out through both the Planning and Zoning and the Inland Wetlands Commissions. All watercourses are to be encroached minimally or not at all to maintain the existing flood-carrying capacity. These regulations rely primarily on the FEMA-defined 1% annual chance flood elevations to determine flood areas.

Floodplain Management, NFIP and CRS

The Town has consistently participated in the NFIP since September 30, 1982 and intends to continue participation in the NFIP. SFHAs in Brookfield are delineated on a Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS). The FIS and FIRMs for the town were most recently revised in 2010.

The NFIP administrator for the Town oversees the enforcement of NFIP regulations. The degree of flood protection established by the variety of regulations in the Town meets the minimum reasonable for regulatory purposes under the NFIP. The Town is not enrolled in the Community

Rating System (CRS) program. Freeboard is not required for residential structures by Brookfield zoning regulations, but is required by the State Building Code.

The Town's Planning and Zoning Commission uses the 1% annual chance flood lines from the FIRM delineated by FEMA to determine floodplain areas. Site plan standards require that all proposals be consistent with the need to minimize flood damage, that public facilities and utilities be located and constructed to minimize flood damage, and that adequate drainage is provided.

Ordinances, Regulations, and Plans

Regulations, codes, and ordinances that apply to flood hazard mitigation in conjunction with and in addition to NFIP regulations are listed below, with examples of sections and content with specific relevance to flood mitigation.

- ***Code of the Town of Brookfield***: includes a floodplain management chapter with the goals of minimizing losses due to flood conditions in the floodway and flood-fringe areas.

- ***Zoning Regulations***:
  - Section 242-503: regulations for *Floodplain Districts:* codifies NFIP regulations
  - Section 242-503(B)(1): permit must be obtained before construction or development in a special flood hazard area
  - Sections 242-503 (c) and (d): permitted uses in floodways and floodplains
  - Section 242-503(h): outlines provisions for flood hazard reduction, provides standards for special flood hazards areas
  - Section 242-503(h)(a)(1): elevate lowest floor, including basement, to or above the base flood elevation new construction and substantial improvements
  - Section 242-503(h)(a)(2): elevate or dry- or wet-floodproof lowest floor, including basement, to a level one foot (1') above the base flood elevation for new construction and substantial improvements of nonresidential structures

- ***Wetlands and Watercourse Regulations***:
  - Section 220-3 *Definitions*: Regulations apply to any area within two hundred feet of the mean waterline of Candlewood Lake, the Still River, or Lake Lillinonah, within one hundred feet of such waterline of any other watercourse or within seventy-five feet of any wetlands. Clearing, grubbing, filling, grading, paving, excavating, construction, depositing or removal of material and discharging of storm water in those areas is a regulated activity:
  - Section 220-5 *Permitted Uses as of Right and Non-Regulated Uses:* no residential homes shall be permitted "as of right" in wetlands and watercourses

- ***Subdivision Regulations:***
  - Subdivision proposals must be consistent with the need to minimize flood damage.
  - Proposals must have public utilities and facilities such as sewer, gas, electrical and water systems located and constructed to minimize flood damage.
  - Proposals must provide adequate drainage to reduce exposure to flood hazards

- Base flood elevation data shall be provided for all subdivision proposals greater than five acres or fifty lots in Zone A

- ***Plan of Conservation and Development:***
  - Support the Conservation Commission in their role as coordinating conservation and preservation of natural resources in Brookfield.
  - Continue to protect watercourses, waterbodies, wetlands, floodplains, vernal pools, groundwater, and other important water resources.
  - Continue to protect water quality and water resources in Brookfield by:
    - regularly reviewing aquifer protection zone regulations
    - requiring replacement of underground residential fuel storage tanks that are more than 20 years old before sale of a property
    - maintaining upland review areas adjacent to wetlands and watercourses
    - consider ways to limit development impacts in sensitive watershed areas
    - continue efforts to reduce pollution from septic systems, salt storage areas, storm drainage systems, soil erosion, and other non-point sources, including examining the amount of impervious surface allowed
    - Require periodic cleaning of storm basins that drain to Candlewood Lake, Lake Lillinonah, wetlands, watercourses, and other areas

Drainage and Street Flooding

The Town Department of Public Works (DPW) is in charge of the maintenance of the town's drainage systems and performs clearing of bridges and culverts and other maintenance as needed. Brookfield maintains a paving program with catch basin and drainage replacements, but up-sizing is not automatically done. The town has a catch basin cleanout program; every basin in Town is inspected on a yearly basis, and cleaned as needed. The Town owns its own equipment to run this program, and recently purchased a vacuum truck to aid in this process.

There are areas of street flooding throughout the town, and these are addressed by the Public Works Department as necessary. Drainage complaints are routed to the DPW through an online work-order system. The Town uses these reports to identify potential problems and plan for maintenance and upgrades. The DPW reported that complaints are usually isolated to one or two properties, rather than widespread flooding.

Public Information

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. A flood gauge on the Still River in Brookfield helps town officials watch for flooding conditions and respond accordingly.

The Departments of Fire and Emergency Services are responsible for monitoring local flood warnings.

Actions Completed and New Capabilities

The Town has created a constructed-wetlands retrofit along the Still River and the Still River Greenway, which is designed to collect stormwater from the Brookfield Town Hall and Police

Station properties and filter it through the wetlands before it reaches the river. This project was completed with a grant through NWCD and CT DEEP. The project is also used as an educational tool for future development along the river.

Brookfield has completed an evaluation of floodprone properties along the Still River Corridor, and developed a list of priority mitigation measures and locations. The top-priority location identified through that evaluation was Meadowbrook manor. In 2016, the town successfully implemented a conveyance and drainage improvement project at Meadowbrook Manor. The project used $1.3 million in FEMA funding, as well as a local match, to install a new stormwater drainage system with increased capacity to reduce flooding from Lime Kiln Brook.

The Town has developed a town-wide catch basin cleanout program, and purchased a vacuum truck to enable this program.

The Town plans to service or replace three culverts (the Town notes that these are effectively small bridges) in the near future. The culverts will be evaluated and replaced in-kind unless there is evidence to indicate upsizing is necessary. These culverts are located on:

- W. Whisconier Road
- Hop Brook Road
- Hidden Brook Drive

Town staff are also interested in exploring opportunities to receive training around flood mitigation. Actions they are considering include:

- Attending conferences and trainings offered by the Connecticut Association of Flood Managers (https://ctfloods.org/)
- Participating in any flood mitigation trainings offered by CT DEEP
- Enrolling in trainings and courses offered through the FEMA Emergency Management Institute (https://training.fema.gov/emi.aspx)

3.1.3 Vulnerabilities and Risk Assessment

Repetitive Loss Properties

Three repetitive loss properties (RLPs) are located in the Town of Brookfield; two are residential and one is commercial. Each property is located along the Still River.

Table 3-1: Repetitive Loss Properties

Type	Flooding Source	Mapped Floodplain
Commercial	Still River	1% Annual Chance
Residential (1)	Still River	1% Annual Chance
Residential (2)	Still River	1% Annual Chance

Critical Facilities

The Public Works Garage is located on Gray's Bridge Road, within the 1% annual chance floodplain. While this building is not known to have experienced serious flooding damage in recent years, it is at risk to flooding and the town is interested in pursuing mitigation measures for the site. The Town has elevated fuel tanks on the site above the floodplain, and is currently

working with the Housatonic Valley Association on a grant application through the Long Island Sound Futures Fund to create a buffer and mitigation area along the Still River, between the river and the Public Works facility.

Over the long term, the Town is interested in relocation of the Public Works Garage.

At-Risk Areas

Brookfield has reported flooding to be a concern at the following locations:

- In the Still River Corridor
- At the Candlewood Plaza Shopping Center
- At properties on Hollow Oak Lane
- On Merwin Brook Road

Still River

Three areas of the Still River corridor experience the worst flooding: Lower Federal Road, Sand Cut Road, and Dean Road. The Dean Road area includes commercial and residential buildings that are subject to flooding. Federal Road at the Town Center is the area of most concern. Tree debris blocking culverts and bridges are believed to be a problem along the corridor; trees have fallen into the river near the Greenway bridge in the past, creating concern about flooding from backed-up water. Because the Still River cuts through the center of town, flooding could impair east-west accessibility. The town does have a few north-south routes, but these are minor arterial roads that do not have a large carrying capacity.

West Brook and East Brook

The Candlewood Plaza off of Federal Road suffers repeated flooding due to its proximity to West Brook and East Brook. Flooding has also historically occurred along Hollow Oak Lane from a tributary of West Brook. Brookfield is interested in mitigating flooding in this area.

Lime Kiln Brook

Meadowbrook Manor has historically been a key area of flood concern in Brookfield. In 2016, the town successfully implemented a conveyance and drainage improvement project using FEMA funding to increase capacities and reduce flooding.

Changes and Improvements

The Meadowbrook Manor drainage improvement project has successfully mitigated some of the flood risk in that neighborhood

The fuel tanks at the Public Works Garage have been elevated above the floodplain.

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 very unlikely in any given year.

3.2.2 Capabilities

Dam failure inundation areas are included in the CT Alert emergency notification system contact database. First Light has developed inundation maps in case of failure of the Rocky River Development – these maps have been digitized and incorporated into CTAlert. The Town has the EAP for the Rocky River Development available at the Police Department and with the Emergency Management Director; the EAP is also incorporated into the Town's EOP.

An EAP for the Candlewood Lake Dam was prepared in 2004 by Northeast Utilities Service Company for First Light Power. The plan addresses the requirements of FERC Project No. 2576 and includes Candlewood Lake Dam, Lake Candlewood Dike #2, North Lanesville Dike and Middle Lanesville Dike on Candlewood Lake. The EAP contains a Dam Breach Analysis for the main dam and dikes, and Inundation Maps for a "sunny day" failure and failure under 100-year flood conditions.

The EAP describes the thorough maintenance and monitoring schedule for all structures. This includes continuous staffing at the Rocky River Station; weekly inspections of the dikes; monthly weir and piezometer readings; and annual inspections by FERC representatives. Water levels in Candlewood Lake are monitored continuously by a signal transmitted via an underground cable. Tailrace levels in the Housatonic River are also monitored continuously via a mounted staff gage. Monitors have also been installed at weirs downstream of the Danbury Dike, Middle Lanesville Dike, the Main Dam, and the Canal Dike.

The EAP specifies that representatives of the Rocky River Project are responsible for notifying Brookfield government officials in the event of an emergency.

Actions Completed and New Capabilities

Brookfield's dam failure mitigation capabilities have improved since adoption of the previous plan through increased dam monitoring and dam safety enforcement capabilities at the state level, as well as the digitization and inclusion of dam failure inundation areas into the CTAlert system.

3.2.3 Vulnerabilities and Risk Assessment

As of 2020, there were 17 DEEP-inventoried dams within the Town of Brookfield; this is one less than in 2013, as CT Dam #1814 (No Name) has been removed from the list. These dams are shown in Figure 2-4. None of these dams are considered high or significant hazard (Class B or C). As shown in Table 3-2, the high hazard dams located on Candlewood Lake in New Milford and

Danbury present the highest potential for damage in Brookfield should failure occur because portions of Brookfield are downstream of these dams.

Table 3-2: High Hazard Dams with Potential to Affect the Town of Brookfield

#	Name	Location	Class	Owner
3404	Candlewood Lake South Dam	Candlewood Lake, Danbury	C	First Light Power Resources
9602	Candlewood Lake Dam #2	Candlewood Lake, Rocky River, New Milford	B	First Light Power Resources
9639	North Lanesville Dike	Candlewood Lake, New Milford	C	First Light Power Resources
9640	Middle Lanesville Dike	Candlewood Lake, New Milford	C	First Light Power Resources

Failure of the high hazard dams on Candlewood Lake in New Milford and Danbury could affect Brookfield. The Rocky River Development consists of a series of dams used to impound water for hydroelectric power generation. It is a seasonal pumped storage facility located along the Housatonic River in New Milford. The powerhouse is located seven miles downstream of the Bulls Bridge Dam in New Milford. The structures are owned by First Light Power.

The main dam (Candlewood Lake Dam #9602) crosses the Rocky River approximately one mile upstream of its confluence with the Housatonic River and impounds Candlewood Lake. It is an earth-filled structure with a 952-foot-long core wall and a maximum height of 107 feet. This is the upper reservoir of the development and has a surface area of 5,610 acres at normal maximum water levels with a contributing watershed of 40.4 square miles. Candlewood Lake has a maximum storage volume of 577,000 acre-feet. The Canal Dike is an earthen embankment about 2500 feet in length, and 72 feet height, forming the north bank of the power canal to the intake structure. Three Lanesville Dikes were constructed at low points along the middle of the eastern shoreline of Candlewood Lake.

The 2004 EAP for the Candlewood Lake Dam, prepared by Northeast Utilities Service Company for First Light Power, contains a Dam Breach Analysis for the main dam and dikes, and Inundation Maps for a "sunny day" failure and failure under 100-year flood conditions. Failure of the New Milford dams and dikes would result in a flood wave that would enter Brookfield from the north. Floodwaters would increase water surface elevations in Lake Lillinonah and the Housatonic River. The primary affected roadways would be the Route 133 crossing of the Housatonic River.

Failure of the Danbury dam would result in a flood wave that would enter Brookfield from the southwest. Floodwaters would cause Still River to jump its banks and inundate portions of roadways that are adjacent to the water course. These roadways include Route 7, White Turkey Road, Candlewood Lake Road, Route 202, Gray's Bridge Road and Old Gray's Bridge Road, Commerce Drive, Del Mar Drive, Route 133, Silvermine Road, Dean Road, Pocono Road, and Station Road.

Changes and Improvements

Brookfield continues to be at low risk from dam failure. One dam has been removed from the CT DEEP list, presumably because it has been removed or determined to not be present.

3.3 HURRICANES AND TROPICAL STORMS

3.3.1 Setting

A hurricane striking Brookfield is considered a possible event each year and could cause critical damage to the town and its infrastructure. Wind damage from a hurricane can occur anywhere in the town, and heavy rainfall may cause riverine and urban flooding.

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. The American Society of Civil Engineers recommends that new buildings be designed to withstand this peak three-second gust.

Tropical Storm Isaias in August of 2020 caused widespread wind damage across the State. In Brookfield, several roads were closed by downed trees and power lines, including Route 25, Stony hill Road, and North Mountain Road. Many residents and businesses lost power.

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 ultimate design wind speed or the Town of Brookfield 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. The Town website provides links to the State Building Inspector and State Building Codes so that developers are able to find design standards for wind.

The Town has a robust tree maintenance program, with a sufficiently large annual budget for it to maintain right-of-way trees. The tree warden focuses on identifying dead and dying trees and hazardous branches, and those hazards are then removed. The Town also works very closely with Eversource, which maintains trees along power lines.

Utilities must be placed underground in new developments; this capability is considered proactive to prevent damage from wind and falling trees.

Actions Completed and New Capabilities

Coordination with the Town's electric utility, Eversource, has improved since the previous HMP (Connecticut Lights & Power was the utility at the time). The State of Connecticut has updated its State Building Code; new construction that adheres to this new code is expected to be more resilient to hurricane winds.

3.3.3 Vulnerabilities and Risk Assessment

Most of the damage to the town from historical tropical cyclones has been due to the effects of flooding. Areas of known and potential flooding problems are discussed in Section 3.1.

Most of the housing stock in town predates recent building code changes, and so may be susceptible to roof and window damage from high winds. The primary risk associated with

tropical storm winds is the downing of trees and limbs, leading to power outages and blocked roads.

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. During extended power outages, it is believed that only 10% to 20% of the affected population of the town will relocate while most will stay in their homes until power is restored. 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.

Changes and Improvements

Brookfield has improved its tree maintenance capabilities, reducing the vulnerability of the town's electric grid and roads system to high wind events.

3.4 SUMMER STORMS AND TORNADOES

3.4.1 Setting

Summer storms and tornadoes have the potential to affect any area within the Town of Brookfield. 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.

Based on the historic record, it is considered highly likely that a summer storm that includes lightning will impact the Town of Brookfield 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 Fairfield County each year that could cause significant damage to a small area.

The most significant recent natural disaster to impact Brookfield was a macroburst that struck on May 15, 2018. A description from CT DEMHS of the event's impact in Brookfield is presented below:

> *A macroburst powering winds of an estimated 110 miles per hour tore into Brookfield at approximately 5 pm on May 15, knocking out power to more than 90% of the town's 17,000 residents, businesses, schools, and other public buildings. Most of the town's streets and parks were instantly impassable because of downed trees and power lines. Virtually every road in town had trees and power lines down. We estimate 7,000 trees fell and another 1,000 were seriously damaged, with hanging limbs threatening to fall. The town's preliminary damage assessment is $3,783,000 (not including personal property).*

3.4.2 Capabilities

The Town's capabilities regarding mitigation of high wind events are described in Section 3.3.2.

Warning is the primary method of existing mitigation for tornadoes and thunderstorm-related hazards. The NOAA National Weather Service issues watches and warnings when severe weather is likely to develop or has developed, respectively. Brookfield's emergency communication capabilities are described in Section 2.5.

Actions Completed and New Capabilities

Brookfield's tree trimming and maintenance capabilities, its coordination with the local electric utility, and its emergency communication capabilities, have all been improved since adoption of the previous HMP.

3.4.3 Vulnerabilities and Risk Assessment

The entire Town of Brookfield is at relatively equal risk for experiencing damage from summer storms and tornadoes. Based on the historic record, a few summer storms and tornadoes have resulted in costly damages to the town. Most damages are relatively site specific and occur to private property (and therefore are paid for by private insurance). For municipal property, the Town budget for tree removal and minor repairs is generally adequate to handle summer storm damage.

A number of major wind events striking Brookfield in recent years have raised awareness regarding the damage that such storms can cause. These include a strong windstorm in May 2011 and the macroburst of May 2018.

Brookfield has moderate to high potential to experience tornado damage. In addition, 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.

Thunderstorms are expected to impact Brookfield 20 to 30 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 Brookfield 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 Brookfield is considered moderate in any given year.

The risk of downbursts occurring during such storms and damaging the Town of Brookfield is believed to be low for any given year, although the Town has been struck by straight-line winds spawned by summer storms twice in the last decade. 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. Town personnel note that strong thunderstorms will cause power lines to fall all over the town. Most downed power lines in Brookfield are detected quickly, and any associated fires are quickly extinguished. Such fires can be extremely dangerous during the summer months during dry and drought conditions. It is important to have adequate water supply for fire protection to ensure the necessary level of safety is maintained.

Wind risks are higher along Long Meadow Hill Road and Mist Hill Drive, because the elevations are higher. Wind shear can be a problem in these areas.

The Town of Brookfield reports that the typical cost for the town to respond to downed branches and wires from a localized severe thunderstorm can approach $100,000. This is based on labor costs of approximately $30,000, equipment costs of $30,000 to $35,000, debris management (chipping, log removal) of $25,000, and police costs of $10,000 or more.

Changes and Improvements

Brookfield has improved its tree maintenance capabilities, reducing the vulnerability of the town's electric grid and roads system to high wind events.

3.5 WINTER STORMS AND NOR'EASTERS

3.5.1 Setting

The entire Town of Brookfield is susceptible to winter storms and, due to its variable elevation, 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.

3.5.2 Capabilities

Prior to a winter weather event, the Town ensures that all warning/notification and communications systems are ready and ensures that appropriate equipment and supplies, especially snow removal equipment, are in place and in good working order. In some known problem areas, prestorm 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).

The Town has robust road-clearing capabilities with regard to snow events. The Town uses treated salt to treat the roads, has 14 trucks (standard plows and salters), and has sufficient staff to clear its 100 miles of local roads without needing outside assistance. There are no specific problem areas in Town. CTDOT plows all State roads and Interstates. Town plowing is typically ahead of CT DOT plowing. Priority is given to plowing egresses to critical facilities. Homeowners, private associations, and businesses are responsible for plowing their own driveways and roads.

Following a significant snow event, Town procedure is for the building inspector to visit each critical facility to evaluate the soundness of the roof, and to determine whether snow clearing is needed. When necessary, the Town hires contractors to help with snow removal. The Board of Education is responsible for school roofs.

The Town website provides links to the State Building Inspector and State Building Codes so that developers are able to find design standards for mitigating icing, insulating pipes, and retrofits for flat-roofed buildings.

Town has determined that there are no specific areas that are difficult to access during winter storm events.

Actions Completed and New Capabilities

In 2017 and 2018 the Town worked with WestCOG on developing a local snow action plan, which included an update of road clearing routes and the salt distribution plan. This was part of the regional winter maintenance practices initiative led by WestCOG. Reports produced as part of that initiative are:

- Winter Maintenance Practices Baseline Assessment Report, November 2017. Prepared for WestCOG by Axiomatic, LLC
- Winter Maintenance Practices Guide, September 2018. Prepared for WestCOG by Axiomatic, LLC

3.5.3 Vulnerabilities and Risk Assessment

The entire Town of Brookfield 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. The public assistance reimbursement from Winter Storm Alfred was $1.2 million, proving that winter storms can be very costly. However, many damages are relatively site specific and occur to private property (and therefore are paid for by private insurance) while repairs for power outages are often widespread and difficult to quantify to any one municipality.

For municipal property, the Town budget for tree removal and minor repairs is generally adequate to handle winter storm damage although the plowing budget is often depleted. In particular, the heavy snowfalls associated with the winter of 2010-2011 drained the Town's plowing budget and raised a high level of awareness of the danger that heavy snow poses to roofs.

The structures and utilities in Brookfield 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.

The elderly population in Brookfield is particularly susceptible to the impacts created by winter storms due to resource needs (heat, electricity loss, safe access to food, etc.).

Elbow Hill Road and North Mountain Road are steep and have many turns. Snow accident risks are greater on these roads. North Obtuse and Obtuse Road have similar risks. Icing also causes difficult driving conditions throughout the hillier sections of the town. However, the Town's standard of presalting has been helpful in controlling ice in these problem areas.

Changes and Improvements

Brookfield has improved its tree maintenance capabilities, reducing the vulnerability of the town's electric grid and roads system to severe snow events. Its recently-developed local snow action plan also reduces the vulnerability of its roads system.

3.6 WILDFIRES AND DROUGHT

3.6.1 Setting

The Town of Brookfield is generally considered a high-risk area for small wildfires but a low risk area for large 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 Brookfield are limited to the east and west sides of town. Hazards associated with wildfires include property damage and loss of habitat.

In addition, Brookfield, 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.

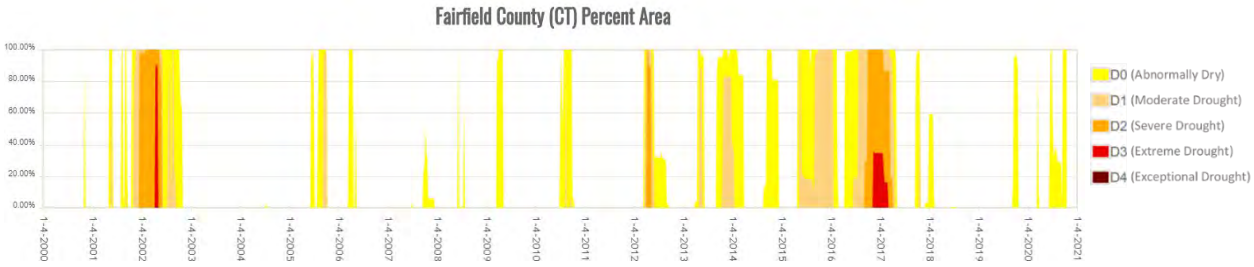


Figure 3-1: USDM Drought Time Series for Fairfield County

The 2019 Connecticut Natural Hazard Mitigation Plan assumes that the State of Connecticut has a medium probably 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 in Brookfield are outlined in the *Subdivision Regulations:*

- Section 234-01: subdivision plans must be submitted to the Fire Department Water Source Committee for review of fire tanks and emergency access.
- Section 234-402(2): provides language that must be included in fire tank easements and deeds.
- Section 234-402(9): all multi-family dwellings shall be protected by pressurized fire hydrants, as approved by the Water Source Committee of the Brookfield Fire Department. Whenever possible, for all single-family housing subdivisions of four lots, to ten lots will be required that the property owner/subdivider shall install a 30,000 gallon in ground,

nonmetallic fire suppression tank. For subdivisions of eleven lots or more, one additional 30,000-gallon tank shall be required for every ten lots, or part thereof.
- Section 234-505(b): dead end streets with cul-de-sacs shall not exceed 1,500 feet in length, unless an alternate means of access for emergency vehicles is provided which is acceptable to the Planning Commission and the Water Source Committee.
- Section 234-601: requires the installation of fire tanks before a building permit is issued.

The town's Fire Department has mutual aid agreements and two vehicles that can fight fires off-road. They also have a pumper boat on Candlewood Lake and other watercraft-based equipment for additional support.

Expansion of public water service is an ongoing effort supported by the Town. Thousands of feet of water main have been installed over the last ten years, and the Aquarion Water Company has taken over smaller systems, improving reliability and efficiency. The Fire Department coordinates with this expansion. The public water system along Federal Road has been completed and the corridor now has improved fire protection. Outlying areas are served by almost 50 dry hydrants, some with fire ponds.

Any new development is reviewed for availability of firefighting water. The Town requires the installation of fire protection water in new developments where municipal water service is unavailable, and sprinkler systems where access is limited for fire apparatus.

The Town implements the state Open Burning Program locally. Information on open burning is available on the Town website. Police take note of open burning on patrols.

Actions Completed and New Capabilities

The Town expects that upcoming water main extension projects will take place on Candlewood Lake Road from Nabby Road to the Huckleberry Hill Elementary School, and on Vale Road.

Information on Open Burning has been added to the Town website.

3.6.3 Vulnerabilities and Risk Assessment

Brookfield experiences minor brush fires on a seasonal basis (summer), but the fire department is able to handle such events, and none have caused notable damage in recent years. Wildfire Risk Areas are mapped in Figure 3-2.

In the drought year of 1999, the average wildfire in Connecticut 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 Brookfield, including the use of nearby water bodies, it is believed that this average value for a drought year and the extreme value are applicable to the town as well.

Brookfield officials have indicated that the two high pressure natural gas lines in town are a concern, due to the potential for fires if the pipe is damaged. The Iroquois line includes a compression station and a meter station. The Algonquin line includes a meter station. Both lines include 50-inch pipes.

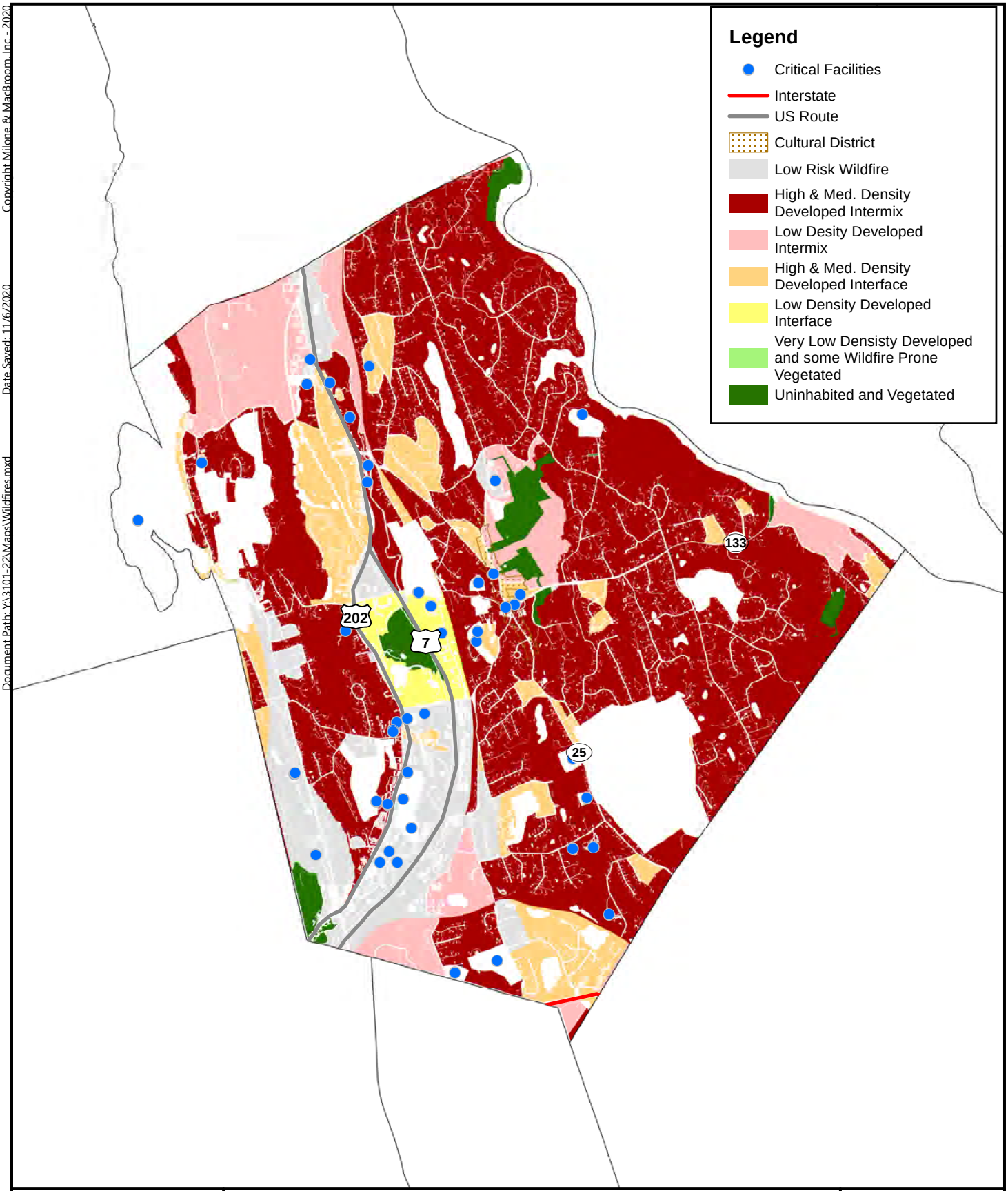
According to the Town of Brookfield, the total cost to fight wildfires in any given year is $10,000 to $15,000 (equipment and labor) depending on the size and scope of the event.

Changes and Improvements

The town's vulnerability to wildfires continues to be low.

Date Saved: 11/6/2020

Document Path: Y:\3101-22\Maps\Wildfires.mxd



MILONE & MACBROOM
99 REALTY DRIVE
CHESHIRE, CT 06410
203.271.1773
WWW.MMINC.COM

Wildland-Urban Interface: Wildfire Risk Areas

WestCOG Hazard Mitigation Plan
Town of Brookfield

NPS: Cultural Resources
Wildland-Urban Interface:USFA

N

0 2,500 5,000
Feet

SCALE 1 " = 5,148 '
DATE 11/13/2020
PROJ. NO. 3101-22

FIG. 3-2

3.7 EARTHQUAKES AND LANDSLIDES

3.7.1 Setting

The entire Town of Brookfield 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 Town has adopted the state building 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.

- Subdivision Regulations:
  - Encourage the conservation of existing undeveloped land by preserving water bodies, wetlands, watercourses, major stands of trees, steep slopes, ridge lines, significant geological features and other areas of environmental value.
  - Require that soil erosion and sediment control plans be developed for proposed projects.

- Plan of Conservation and Development:
  - Recommends the protection of resources by continuing to discourage building and road development on steep slopes.
- Zoning
  - The town has a height restriction of 42 feet, which may help reduce earthquake damage risks.

Actions Completed and New Capabilities

Brookfield continues to have appropriate capabilities for mitigating earthquake events.

3.7.3 Vulnerabilities and Risk Assessment

Some areas in Brookfield are underlain by sand and gravel, particularly within the Still River and Housatonic River sub-regional basins, and in the vicinity of Lime Kiln Brook. Structures in these areas are at increased risk from earthquakes due to amplification of seismic energy and/or collapse. Most of the Town is underlain by glacial till, and is therefore not at increased risk during an earthquake due to unstable soils.

A series of earthquake probability maps was generated using the 2009 interactive web-based mapping tools hosted by the USGS. These maps were used to determine the probability of an earthquake of greater than magnitude 5.0 or greater than magnitude 6.0 damaging the Town of Brookfield. Results are presented in Table 3-3 below.

Table 3-3: Probability of a Damaging Earthquake in the Vicinity of Brookfield

Time Frame (Years)	Probability of the Occurrence of an Earthquake Event > Magnitude 5.0	Probability of the Occurrence of an Earthquake Event > Magnitude 6.0
50	2% to 3%	< 1%
100	4% to 6%	1% to 2%
250	10% to 12%	2% to 3%
350	12% to 15%	3% to 4%

Changes and Improvements

The town's vulnerability to earthquakes continues to be low.

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	*Status*	*Notes*
1	Pursue funding to acquire backup generators for the YMCA, Huckleberry Hill School and sewer pumping stations	**Carry Forward with Revisions**	*YMCA: action not yet completed* *Reconstruction of Huckleberry Hill School planned; school will be made a secondary shelter, backup power installed.* *Action will be split into three separate actions & carried forward to completion*
2	Pursue funding to increase the capacity of the generator at the high school	**Complete**	*Brand new generator installed in 2019.*
3	Develop a plan to designate a shelter on the west side of town. Determine the feasibility of renovating the Huckleberry Hill School for this use	**Complete**	*Renovation of Huckleberry Hill School has been determined to be feasible, and will take place in the next couple of years. This action (developing a plan to designate a shelter) is considered complete, and a separate action to actually complete the renovation is carried forward.*
4	Utilize the CT Alert emergency notification system to its fullest capabilities	**Capability**	*Brookfield participates in the state's CT Alert notification system. It also uses an Emergency Reverse 911 system and the opt-in CodeRED system. During disaster events the Town updates residents by email and social media posts daily. If necessary, the Town can access email lists from the public schools.*
5	Encourage residents to purchase and use NOAA weather radios with alarm features	**Drop**	*Brookfield urges residents to sign up for CT Alert and CodeRED through links on the website and other communications. The Emergency Preparedness page on the Town Website encourages acquisition of a battery powered radio. Because the public has so many communication platforms, the Town does not think it necessary to encourage the purchase of NOAA weather radios, specifically.*
6	Disseminate informational pamphlets regarding natural hazards to public locations	**Drop**	*The Town has information about emergency preparedness on the Town website, through the Fire Marshal page. Storm and flood preparedness information is available through the Health Department page.* *The town does not believe that dissemination of informational pamphlets about natural hazards is necessary.*
7	Review potential evacuation routes to ensure timely migration of people seeking shelter in all areas of town.	**Complete**	*The Town is confident in its evacuation routes. Evacuation routes are not labeled, but the Town is able to use cones and signs to direct traffic as needed. Roads are inspected on an annual basis for safety, helping ensure evacuation routes remain in good condition.*

#	Description	*Status*	*Notes*
8	Ensure that emergency information is available through several different media, such as newspaper, radio, internet and phone.	**Capability**	*Emergency information is available by email, on the Town website, through social media outlets, through CT Alert, and by voice message, text, and email using CodeRED.*
9	Add pages to the town website dedicated to citizen education and preparation for hazard events	**Complete**	*The Town has information about emergency preparedness on the Town website, through the Fire Marshal page. Storm and flood preparedness information is available through the Health Department page.*
10	Consider requiring new buildings constructed in floodprone areas to be protected to the highest recorded flood level regardless of being within a defined SFHA.	**Drop**	*The Town requires 3rd-party-engineer review of new permits in flood zones, usually through wetlands and occasionally through zoning. Town requires wetland development be limited to uses that will not increase flood risk, such as parking lots, and requires inclusion of runoff retention systems. This specific action is not deemed necessary.*
11	Develop a town-wide catch basin cleanout program to reduce flood impacts due to drainage issues.	**Complete**	*Town has developed a town-wide catch basin cleanout program; every basin in Town is inspected on a yearly basis, and cleaned as needed. The Town purchased a vacuum truck to aid in this process.*
12	Require developers to demonstrate whether detention or retention of stormwater is the best option for reducing peak flows downstream of a project and provide a design for the appropriate alternative.	**Capability**	*The Town requires this, and works with developers to ensure appropriate detention or retention is constructed. The Town has worked with the Northwest Conservation District on several larger projects, and continues to do so. The Town has created a constructed wetland retrofit along the Still River and the Still River Greenway, which is designed to collect stormwater from the Brookfield Town Hall and Police Station properties and filter it through the wetlands before it reaches the river. This project was completed with a grant through NWCD and CT DEEP. The project is also used as an educational tool for future development along the river.*
13	Evaluate floodprone properties along the Still River Corridor, specifically in the vicinity of Dean Road, Federal Road and Sand Cut Road to determine potential flood damage reduction methods.	**Partially Complete** **Carry Forward with Revisions**	*Evaluation has been completed, and a list of priority mitigation measures and locations identified. Meadowbrook Manor was the top priority of that evaluation; the neighborhood mitigation project that was performed came out of that evaluation. Other mitigation measures identified in the evaluation have not yet been pursued. Action is completed, and new actions will be added to this plan to address specific measures identified in the evaluation.*
14	Consider flood mitigation methods at the Public Works Garage, such as berm construction and/or floodproofing to reduce flood risk.	**Carry Forward with Revisions**	*The Town removed underground fuel tanks, and installed new tanks above ground on a concrete bed, so that the tanks are above the 1% annual chance flood elevation. The Town is also working with the Housatonic Valley Association on a grant application through the Long Island Sound Futures Fund to create a buffer and mitigation area along the Still River, between the river and the Public Works facility. The Town is interested in pursuing additional mitigation measures for this site.*

#	Description	*Status*	*Notes*
15	Consider relocating the Public Works Garage to eliminate flood risk.	**Carry Forward with Revisions**	*Town has considered this action, but has not been able to identify a location with adequate space for the facility. Pursuing this action would require purchase of a significant piece private land.* *Relocation of the PW Garage continues to be listed on the Town 10-year Capital Improvement Plan. The Town will continue to monitor opportunities. This action is carried forward, but will be revised to identify smaller steps that are achievable in the next five years.*
16	Encourage property owners to purchase flood insurance under the NFIP.	**Drop**	*Town does not have any specific initiatives to encourage purchase of flood insurance, but assists property owners as needed. More proactive measures are not considered necessary.*
17	Provide technical assistance to the Candlewood Plaza occupants to pursue floodproofing that will make them more resilient.	**Drop**	*The Town worked with occupants of Candlewood Plaza to remove a beaver dam on the Westbrook River located behind the Plaza. The Plaza recently renovated its stormwater detention system. Additionally, the Plaza is in the process of constructing a new bank building, which will have its own stormwater detention system.* *The Town does not believe it is necessary to proactively provide technical assistance to each occupant, though it will offer assistance if approached.*
18	Consider enrolling in the Community Rating System	**Carry Forward**	*Town has not yet enrolled in the CRS but continues to be interested.*
19	Compile a checklist that cross-references the bylaws, regulations, and codes related to flood damage prevention that may be applicable to a proposed project and make this list available to potential applicants.	**Drop**	*Applications for new construction first goes through the Inland Wetlands Commission, and then to Land Use for approval. If any bylaws, regulations, or codes related to flood damage prevention are not met or appropriately addressed, they are able to inform the applicant.* *The Town has a list of activities that are not permitted within the Brookfield Aquifer Protection Zone, which covers a much larger area than the CT DEEP Aquifer Protection Zone and runs along most of Federal Road and the Still River (including the Town Center District, where development is focused).* *The Town does not believe a checklist is necessary.*
20	Provide outreach regarding home elevation and relocation, flood barriers, dry floodproofing, wet floodproofing, and other home improvement techniques (Section 3.6.2) to private homeowners and businesses with flooding problems.	**Drop**	*The Town enforces the State Building Code, which has some requirements with regard to flood mitigation. Outreach is occurring through the local administration of the State Building Code, and additional outreach is not needed.*
21	Ensure that the appropriate municipal personnel are trained in flood damage prevention methods.	**Carry Forward with Revisions**	*The DPW Director keeps up to date with regard to training, specifically with regards to stormwater management. The Wetlands Enforcement Officer stays up to date with regard to wetlands trainings.* *This action is revised to be more specific and is carried forward.*

#	Description	Status	Notes
22	Selectively pursue conservation recommendations listed in the Plan of Conservation and Development and other studies and documents.	**Capability**	*Conservation Commission oversees pursuit of conservation recommendations. One example is the acquisition of the Eriksen Farm Open Space parcel in 2009. Another example is the acquisition and conservation of open space as part of the Still River Greenway.*
23	Continue to regulate development in protected and sensitive areas, including steep slopes, wetlands, and floodplains.	**Capability**	*This is a capability*
24	Pursue acquisition of additional municipal open space in SHFAs and set it aside for greenways, parks, etc.	**Capability**	*Acquisition is part of POCD; this is a capability.*
25	Develop a plan to selectively remove debris from the Still River to prevent obstructions of bridges and culverts.	**Carry Forward with Revisions**	*The Land Use Department has partnered with a volunteer group to clean out debris in the past. Since the 2018 macroburst, debris has accumulated again. There is particular concern near the Greenway bridge: trees fell from a CT DOT property into the river, creating concern about flooding from backed-up water. Carry Forward with Revision*
26	Conduct drainage improvements within the Meadow Brook Manor neighborhood.	**Complete**	*Project has been completed. Town installed 40- to 60-inch pipes below the neighborhood to convey a waterway and mitigate the potential flooding from a 100-year precipitation event. Project was completed with support from a FEMA grant.*
27	Review culvert conveyances based on existing hydrology and Northeast Regional Climate Center guidance.	**Drop**	*The Town does not believe it is necessary to apply this action to all culverts, and believes it appropriately addresses culvert conveyances on a case-by-case basis.*
28	Ensure adequate barricades are available to block flooded streets in floodprone areas	**Complete**	*Police department and Public Works have a good supply.*
29	Provide town wide tree limb inspection and maintenance programs to ensure that the potential for downed power lines is diminished.	**Capability**	*This is a capability. The tree warden and assistant tree warden regularly inspect tree and limb risks along Town rights-of-way. The Town has sufficiently budgeted for tree maintenance, and has a crew ready to respond to specific needs.*
30	Continue requiring the location of utilities underground in new developments or during redevelopment whenever possible.	**Capability**	*This is required.*

#	Description	*Status*	*Notes*
31	Encourage the use of structural techniques related to mitigation of wind damage in new residential and commercial structures to protect new buildings to a standard greater than the minimum building code requirements. Require such improvements for new municipal critical facilities.	**Drop**	*The Town enforces state code. They do not believe it is necessary to enforce to a higher code.*
32	Work with the *Eversource* liaison to ensure a more pro-active approach to tree trimming in Brookfield	**Capability**	*Town communicates with Eversource on a regular basis, and has a strong, ongoing relationship. Eversource has been very aggressive with tree trimming in response to the damage from the macroburst in 2018.*
33	Work with *Eversource* to determine the feasibility of placing non-conducting steel cables above power lines to protect them from falling branches and trees.	**Capability**	*Eversource has been doing this.*
34	The Building Department should provide literature regarding appropriate design standards for wind.	**Capability**	*Links to the State Building Inspector and State Building Codes are available on the Town website. This is considered to be sufficient.*
35	Develop a plan to prioritize snow removal from the roof of critical facilities and other municipal buildings each winter. Ensure adequate funding is available in the Town budget for this purpose.	**Capability**	*Town procedure is for building inspector to visit each critical facility after each storm to evaluate. When needed the Town hires contractors to help with snow removal. Board of Education is responsible for school roofs.*
36	Consider posting the snow plowing routes in Town buildings each winter to increase public awareness.	**Drop**	*In 2017 and 2018 the Town worked with WestCOG on developing a local snow action plan, which included an update of road clearing routes and the salt distribution plan.* *Town does not believe that posting plowing routes is necessary or helpful.* *Action is dropped.*
37	Emergency personnel should continue to identify areas that are difficult to access during winter storm events and devise contingency plans to access such areas during emergencies.	**Capability**	*Town has determined that there are no specific areas that are difficult to access during winter storm events.*
38	Develop a plan to reduce accident risks along steep roads such as Elbow Hill Road, North Mountain Road, North Obtuse Road and Obtuse Road. Consider the use of snow fencing or vegetative buffers.	**Carry Forward with Revisions**	*Action has not yet been taken on this strategy. Town would like to carry this action forward to explore possible solutions, such as installation of guardrails, or public education campaigns.* *The Town notes that vegetation presents a visibility problem in some of these locations, and does not wish to pursue planting vegetative buffers.*

#	Description	*Status*	*Notes*
39	The Building Department should provide literature regarding appropriate design standards for mitigating icing, insulating pipes, and retrofits for flat-roofed buildings such as heating coils.	**Capability**	*Links to the State Building Inspector and State Building Codes are available on the Town website. This is considered to be sufficient.*
40	Consider preventing new residential development in areas prone to collapse.	**Drop**	*Town regulates development on slopes, and believes that is sufficient.*
41	Ensure that municipal departments have adequate backup facilities in case earthquake damage occurs to municipal buildings.	**Carry Forward with Revisions**	*Brookfield is currently improving its capabilities with regards to remote operations because the COVID-19 pandemic has resulted in a loss of access to municipal buildings. The Town has been in the process of providing workspaces at homes and allowing remote access to computer files.* *Action is revised to focus on remote work and remote file access capabilities.*
42	The town may consider bracing systems and assets inside critical facilities. This could help protect IT systems, important records and files.	**Drop**	*Town has completed a full backup of all systems on the cloud. Town clerk records have been digitized back to 1972, before that still paper. Land Use files– hard copies in vault, everything else also in viewpoint.* *Town replaced the Town Hall roof in 2017. The repair included replacement of rotting rafters as well as the roof.*
43	Include dam failure inundation areas in the CT Alert emergency notification system contact database	**Capability**	*First Light has developed inundation maps for the Rocky River Development in case of dam failure – digitized and noted in CT Alert.*
44	Provide technical assistance to private dam owners regarding effective maintenance strategies	**Drop**	*Town does not believe this action is necessary, as the State has been addressing this*
45	File EOP's/EAP's with town departments and emergency personnel	**Complete**	*Town has the EAP for the Rocky River Development at the Police Department and with the Emergency Management Director. The EAP is incorporated into the Town's EOP.*
46	Support the expansion of public water service (provided by Aquarion Water Company) in Brookfield.	**Complete and Capability**	*Expansion of public water service is an ongoing effort supported by the Town. Thousands of feet of water main have been installed over the last ten years, and the Aquarion Water Company has taken over smaller systems, improving reliability and efficiency.* *The Town expects that upcoming water main extension projects will take place on Candlewood Lake Road from Nabby Road to the Huckleberry Hill Elementary School, and on Vale Road.*
47	The Town should continue to require the installation of fire protection water in new developments where municipal water service is unavailable, and sprinkler systems where access is limited for fire apparatus.	**Capability**	*Latest subdivision was required to have inground storage tanks*

#	Description	Status	Notes
48	The Fire Departments should coordinate with the Water Company to identify areas where fire-fighting capacity may be limited due to lack of water pressure or storage. Deficiencies should be addressed as they are identified, and funding allows.	**Capability**	*Expansion of public water service is an ongoing effort supported by the Town, and the Fire Department has been coordinating with this expansion (see action 46). Any new development is reviewed for availability of firefighting water.*
49	Coordinate with the local natural gas company to ensure that procedures are in place to address fires associated with potential pipeline failures.	**Capability**	*The three local natural gas companies are Algonquin, Iroquois, and Eversource. The companies regularly host liaison meetings with emergency responders so everyone is up to date on procedures and facilities.*
50	Provide outreach programs on how to properly manage burning and campfires on private property.	**Capability**	*This action is addressed by state statute regarding open burning policies. Information is available on the Town website.*
51	Revise and enhance the town's website concerning local regulatory requirements concerning Open Burning.	**Complete**	*Information on open burning is available on the Town website.*
52	Patrol Town-owned open space and parks to prevent unauthorized campfires.	**Capability**	*Police take note of open burning on patrols.*

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 BKD-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 BKD-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 BKD-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 BKD-04	
Take one of the following actions that will mitigate natural hazard risks while also meeting Sustainable CT objectives: - Disseminate a toolkit for pre-disaster business preparedness. - Revise regulations to promote Low Impact Development. - Include the goals of this Hazard Mitigation Plan, and at least three other sustainability concepts, in your next POCD update.	
Lead	BOS
Cost	$0 - $25,000
Funding	Operating Budget, Sustainable CT Community Match Fund
Timeframe	2021
Priority	High

Action BKD-05	
Install an additional generator at the Police Department that will be capable of powering the entire building, with the capacity for future expansion.	
Lead	EM, DPW, PD
Cost	$50,000 - $100,000
Funding	Capital Improvement Plan, FEMA Grant
Timeframe	2022
Priority	High

Action BKD-06	
Coordinate with CT SHPO to conduct outreach to owners of historic properties to educate them on methods of retrofitting historic properties to be more hazard-resilient while maintaining historic character.	
Lead	Planning
Cost	$0 - $25,000
Funding	Operating Budget
Timeframe	2022
Priority	Med

Action BKD-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.	
Lead	Planning
Cost	$25,000 - $50,000
Funding	CT SHPO
Timeframe	2024
Priority	Med

Action BKD-08	
Create a buffer and mitigation area along the Still River between the river and the Public Works facility.	
Lead	DPW
Cost	$50,000 - $100,000
Funding	Capital Improvement Plan, FEMA Grant
Timeframe	2025
Priority	Med

Action BKD-09	
Acquire an emergency generator for the YMCA Building	
Lead	EMS
Cost	$100,000 - $500,000
Funding	Capital Improvement Plan, FEMA Grant, Other Grant
Timeframe	2025
Priority	Med

Action BKD-10	
Acquire an emergency generator for the Town's Sewer Pumping Stations	
Lead	EMS, WPCA
Cost	$100,000 - $500,000
Funding	Capital Improvement Plan, FEMA Grant, Other Grant
Timeframe	2025
Priority	Med

Action BKD-11	
Conduct feasibility study and pursue flood mitigation options for homes along Hollow Oak Lane	
Lead	DPW
Cost	$25,000 - $50,000
Funding	Capital Improvement Plan, FEMA Grant, Other Grant
Timeframe	2025
Priority	Med

Action BKD-12	
Ensure that the appropriate municipal personnel are trained in flood damage prevention methods by becoming a Connecticut Association of Flood Managers member, and/or by attending DEEP, FEMA-deployed, or CAFM trainings.	
Lead	BOS, P&Z
Cost	$0 - $25,000
Funding	Operating Budget
Timeframe	2022
Priority	Low

Action BKD-13	
Improve capabilities for remote work and off-site municipal operations in case municipal facilities are inaccessible.	
Lead	BOS
Cost	$25,000 - $50,000
Funding	Operating Budget
Timeframe	2024
Priority	Low

Action BKD-14	
Develop a plan to reduce accident risks along steep roads such as Elbow Hill Road, North Mountain Road, North Obtuse Road and Obtuse Road. Consider the use of guardrails or public education campaigns.	
Lead	DPW, EMS
Cost	$25,000 - $50,000
Funding	Operating Budget, Grant
Timeframe	2024
Priority	Low

Action BKD-15	
Enroll in the Community Rating System	
Lead	BOS
Cost	$50,000 - $100,000
Funding	Capital Improvement Plan, FEMA Grant
Timeframe	2025
Priority	Low

Action BKD-16	
Evaluate floodprone properties along the Still River Corridor in the vicinity of Dean Road, Federal Road, and Sand Cut Road to determine potential flood damage reduction methods.	
Lead	BOS, EMS
Cost	$50,000 - $100,000
Funding	Operating Budget, Grant
Timeframe	2025
Priority	Low

Action BKD-17	
Complete at least one priority mitigation measure along the Still River Corridor as identified in the Still River Corridor Flood Mitigation Evaluation	
Lead	DPW
Cost	$100,000 - $500,000
Funding	Capital Improvement Plan, FEMA Grant, Other Grant
Timeframe	2026
Priority	Low

Action BKD-18	
Develop secondary emergency shelter at the Huckleberry Hill School during reconstruction, including installation of a backup generator.	
Lead	EMS, BOE
Cost	More than $500,000
Funding	Capital Improvement Plan, FEMA Grant, Other Grant
Timeframe	2026
Priority	Low

Action BKD-19	
Work with CTDOT to develop debris management protocols along the Still River near the Greenway Bridge on CT DOT property.	
Lead	DPW, BOS
Cost	$0 - $25,000
Funding	Operating Budget
Timeframe	2023
Priority	Low

Action BKD-20	
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 BKD-21	
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 BKD-22	
Identify feasible locations for relocation of the Public Works Garage.	
Lead	DPW
Cost	$0 - $25,000
Funding	Operating Budget, Grant
Timeframe	2023
Priority	Low

Action BKD-23	
Work with CT DEEP to validate and/or correct the RL list and update the mitigation status of each listed property.	
Lead	Planning
Cost	$25,000 - $50,000
Funding	FEMA Grant
Timeframe	2024
Priority	Low

Action BKD-24	
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 BKD-25	
Complete water main extension projects on Candlewood Lake Road from Nabby Road to the Huckleberry Hill Elementary School, and on Vale Road.	
Lead	BOS
Cost	$100,000 - $500,000
Funding	Capital Improvement Plan, Other Grant
Timeframe	2026
Priority	Low

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	
BKD-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
BKD-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
BKD-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
BKD-04	Take one of the following actions that will mitigate natural hazard risks while also meeting Sustainable CT objectives: - Disseminate a toolkit for pre-disaster business preparedness. - Revise regulations to promote Low Impact Development. - Include the goals of this Hazard Mitigation Plan, and at least three other sustainability concepts, in your next POCD update.	Sustainable CT	BOS	$0 - $25,000	Operating Budget, Sustainable CT Community Match Fund	2021	1	1	1	1	0	1	1	0	0	0	0	0	0	0	8
BKD-05	Install an additional generator at the Police Department that will be capable of powering the entire building, with the capacity for future expansion.	Energy Resiliency & Backup Power	EM, DPW, PD	$50,000 - $100,000	Capital Improvement Plan, FEMA Grant	2022	1	1	1	1	1	1	0	0	0	0	0	0	0	0	8
BKD-06	Coordinate with CT SHPO to conduct outreach to owners of historic properties to educate them on methods of retrofitting historic properties to be more hazard-resilient while maintaining historic character.	SHPO	Planning	$0 - $25,000	Operating Budget	2022	1	1	1	1	0	1	0	0	0	0	0	0	0	0	7
BKD-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
BKD-08	Create a buffer and mitigation area along the Still River between the river and the Public Works facility.	Open Space	DPW	$50,000 - $100,000	Capital Improvement Plan, FEMA Grant	2025	1	1	1	1	1	1	1	0	0	0	0	0	-1	0	7
BKD-09	Acquire an emergency generator for the YMCA Building	Energy Resiliency & Backup Power	EMS	$100,000 - $500,000	Capital Improvement Plan, FEMA Grant, Other Grant	2025	1	1	1	0	1	1	0	0	0	0	0	0	0	0	7
BKD-10	Acquire an emergency generator for the Town's Sewer Pumping Stations	Energy Resiliency & Backup Power	EMS, WPCA	$100,000 - $500,000	Capital Improvement Plan, FEMA Grant, Other Grant	2025	1	1	1	0	1	1	0	0	0	0	0	0	0	0	7
BKD-11	Conduct feasibility study and pursue flood mitigation options for homes along Hollow Oak Lane	Flood Study	DPW	$25,000 - $50,000	Capital Improvement Plan, FEMA Grant, Other Grant	2025	1	0	1	1	1	1	1	0	0	-1	0	0	0	0	6
BKD-12	Ensure that the appropriate municipal personnel are trained in flood damage prevention methods by becoming a Connecticut Association of Flood Managers member, and/or by attending DEEP, FEMA-deployed, or CAFM trainings.	Municipal Capacities	BOS, P&Z	$0 - $25,000	Operating Budget	2022	0	1	1	1	1	0	1	0	0	0	0	0	0	0	6
BKD-13	Improve capabilities for remote work and off-site municipal operations in case municipal facilities are inaccessible.	Municipal Capacities	BOS	$25,000 - $50,000	Operating Budget	2024	0	1	1	0	1	1	0	0	0	0	0	0	0	0	6
BKD-14	Develop a plan to reduce accident risks along steep roads such as Elbow Hill Road, North Mountain Road, North Obtuse Road and Obtuse Road. Consider the use of guardrails or public education campaigns.	Roadways	DPW, EMS	$25,000 - $50,000	Operating Budget, Grant	2024	1	1	1	1	1	1	0	0	-1	0	0	0	0	0	6

#	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	
BKD-15	Enroll in the Community Rating System	CRS	BOS	$50,000 - $100,000	Capital Improvement Plan, FEMA Grant	2025	1	1	0	1	1	1	0	0	0	-1	0	0	0	0	6
BKD-16	Evaluate floodprone properties along the Still River Corridor in the vicinity of Dean Road, Federal Road, and Sand Cut Road to determine potential flood damage reduction methods.	Floodproofing & Elevation	BOS, EMS	$50,000 - $100,000	Operating Budget, Grant	2025	1	1	1	1	1	1	0	0	-1	0	0	0	0	0	6
BKD-17	Complete at least one priority mitigation measure along the Still River Corridor as identified in the Still River Corridor Flood Mitigation Evaluation	Flood Study	DPW	$100,000 - $500,000	Capital Improvement Plan, FEMA Grant, Other Grant	2026	0	1	1	1	1	1	1	0	0	0	0	0	-1	0	6
BKD-18	Develop secondary emergency shelter at the Huckleberry Hill School during reconstruction, including installation of a backup generator.	Emergency Response	EMS, BOE	More than $500,000	Capital Improvement Plan, FEMA Grant, Other Grant	2026	0	1	1	0	1	1	0	0	0	0	0	0	0	0	6
BKD-19	Work with CTDOT to develop debris management protocols along the Still River near the Greenway Bridge on CT DOT property.	Drainage	DPW, BOS	$0 - $25,000	Operating Budget	2023	0	1	1	1	0	1	0	0	0	-1	0	0	0	0	5
BKD-20	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
BKD-21	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
BKD-22	Identify feasible locations for relocation of the Public Works Garage.	Critical Facility Mitigation	DPW	$0 - $25,000	Operating Budget, Grant	2023	0	1	1	1	1	1	0	0	-1	0	0	0	0	0	5
BKD-23	Work with CT DEEP to validate and/or correct the RL list and update the mitigation status of each listed property.	RLPs	Planning	$25,000 - $50,000	FEMA Grant	2024	0	0	1	0	1	1	0	0	0	0	0	0	0	0	4
BKD-24	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
BKD-25	Complete water main extension projects on Candlewood Lake Road from Nabby Road to the Huckleberry Hill Elementary School, and on Vale Road.	Wildfire Fighting Capacity	BOS	$100,000 - $500,000	Capital Improvement Plan, Other Grant	2026	1	0	0	1	1	1	1	0	0	0	0	-1	0	0	5

APPENDIX B

Appendix B: SVI Summary

Town of Brookfield
Climate Vulnerability Assessment
A Component of Sustainable CT Action 5.4

The Town of Brookfield, 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, such as along the Housatonic River and the Still River, there is continuously concern for riverine flooding. The larger rivers, along with the smaller streams in town, pose a flood risk to adjacent properties whether it is a larger storm event, or a short intense rainstorm. At times, these intense rainstorms result in localized flooding throughout the town. In addition, other areas of flooding concern include the Still River corridor, Candlewood Plaza shopping center, Hollow Oak Lane and Merwin Brook Road. 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

Brookfield is largely residential, with commercial corridors along Route 7 and 202, and residential development throughout the remainder of the community. Suburban communities are often impacted by strong winter storms in several ways; power outage 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 outages, 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 few condominium complex and homeowner's association systems, and two other small public systems. Therefore, impacts to water supply may be an issue to the town as temperatures rise in the near 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.

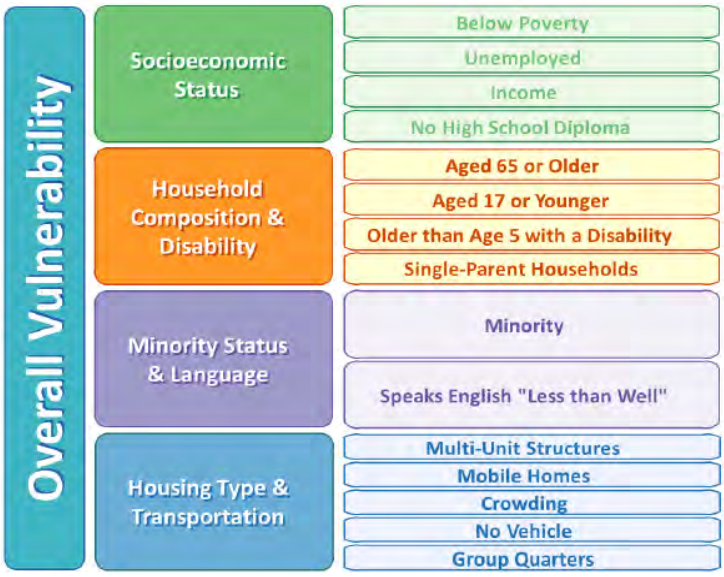


Figure 1: The CDC SVI Index Factors. Graphic: svi.cdc.com

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 Brookfield.

Table 1: Brookfield SVI Factor Rankings

	Overall SVI	Socioeconomic	Household Composition & Disability	Minority Status & Language	Housing Type & Transportation
BROOKFIELD	.26	.27	.50	.37	.22

The Town of Bridgewater is considered to have a low to moderate level of vulnerability, with their most vulnerable social aspect being household composition and disability, followed by minority and linguistically challenged populations. Vulnerable age groups and disabled populations are identified in the western tract of the town, while minority populations and those that speak English "less than well", are concentrated in the northwestern tract of Brookfield.

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 Bridgewater, should pay special attention to elderly or disabled populations, linguistically challenged population, 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 one assisted living facility in Brookfield.

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.

[1] https://www.elicense.ct.gov/Lookup/LicenseLookup.aspx