



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

## Municipal Annex for **Redding**

100 Hill Road  
Redding, CT  
August 2021

*Prepared for:*  
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MMI #3101-22

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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 Redding 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 1767, the Town of Redding is located in northern Fairfield County and home to a population of 9,158 (2010 U.S. Census). Redding is bordered by the municipalities of Danbury and Bethel to the north, Newtown and Easton to the east, Weston and Wilton to the south, and Ridgefield to the west. Refer to Figure 2-1 for a map showing the location of Redding within the region.

Redding is located in the highlands which separate Connecticut's southwestern coastal basins from the Housatonic Valley. Redding is a hill country of high north south ridges, steep sided valleys, and numerous small streams. The highest elevation in Redding is about 830 feet in the northeast part of town. Then the low point of about 290 feet is on the Saugatuck Reservoir along the southern border. The varying terrain of Redding 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 from 2016 satellite imagery to depict statewide land cover. The land cover by percent of total land for Redding can be found in Table 2-1.

**Table 2-1: Land Cover by Area**

Land Cover Class	Percent of Total Land
<b>Developed</b>	12.3%
<b>Turf &amp; Grass</b>	7.4%
<b>Other Grasses</b>	1.1%
<b>Agricultural Field</b>	2.9%
<b>Deciduous Forest</b>	66.4%
<b>Coniferous Forest</b>	3.8%
<b>Water</b>	2.2%
<b>Non-Forested Wetland</b>	0.2%
<b>Forested Wetland</b>	3.4%
<b>Tidal Wetland</b>	0.02%
<b>Barren Land</b>	0.5%
<b>Utility Corridor</b>	0.0%

#### 2.1.2 Land Use

Redding is a rural town characterized by low density population and limited commercial uses. In general, land use in Redding largely consists of preserved open-green space and low-density residential areas. Commercial uses are limited and are concentrated in the southwest portion of Town in the Village of Georgetown. Since the 1750's Redding has had commercial activity on every sizeable stream, but

From the 2008 Town of Redding Plan of Conservation and Development (POCD):

"Town residents lived in the midst of more than 7,440 acres of greenspace - 36% of the Town's area - greatly surpassing the previous Town Plan goal of 25% —forever green."



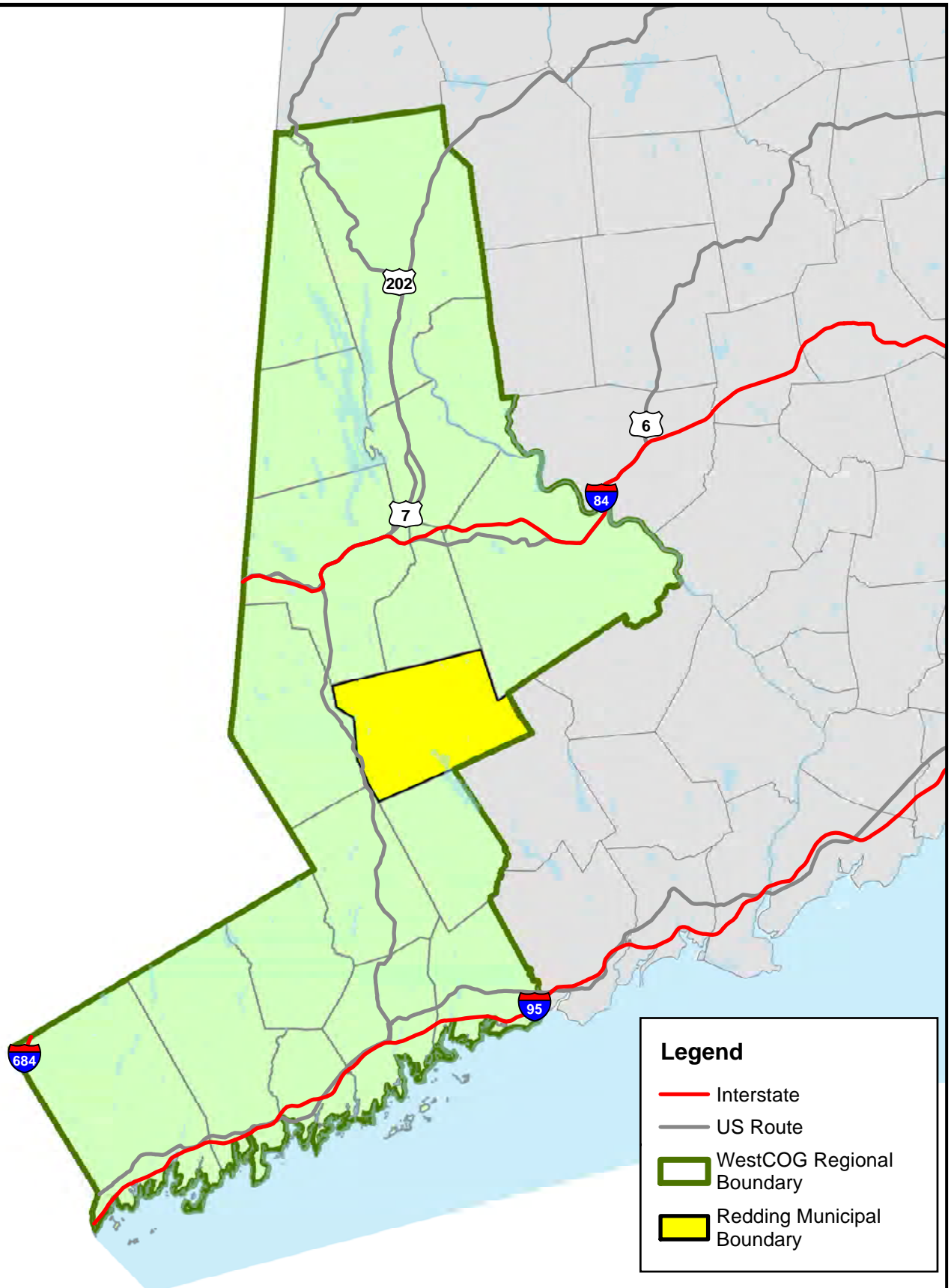
many residents have historically favored the slowing rate of residential growth.

The total land and water area within the Town of Redding is 20,518 acres, predominantly made up of single-family residential neighborhoods and open space. Table 2-2 summarizes the existing land uses by type as shown in the Plan of Conservation and Development. According to this information, approximately 9,548 acres within Redding consist of developed land, while approximately 10,987 acres remain as undeveloped or open water.

**Table 2-2: Redding 2018 Land Use by Area**

<b>Land Use Category</b>	<b>Acres</b>
<b>Residential</b>	
Rural Residential	8,119
Conservation Residential	90
Suburban Residential	33
Village Residential	22
<b>Institutional</b>	
Government	91
Recreation	211
Care-Facility	58
Religious	40
Cemetery	13
<b>Commercial</b>	41
<b>Light Industry</b>	7
<b>Utilities</b>	111
<b>Roads/Transportation</b>	796
<b>Open Space, Public</b>	5,451
<b>Open Space, Private</b>	1,362
<b>Conservation Easements</b>	736
<b>Vacant Uncommitted Private Land</b>	2,951
<b>Total</b>	20,132

*Source: Plan of Conservation and Development (POCD), Town of Redding, 2018*



**Legend**

- Interstate
- US Route
- WestCOG Regional Boundary
- Redding Municipal Boundary

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Regional Location of Redding  
WestCOG Hazard Mitigation Plan  
Town of Redding

N  
0 40,000 80,000  
Feet

SCALE 1" = 82,167'  
DATE 11/12/2020  
3101-22  
PROJ. NO.  
**FIG. 2-1**

## 2.1.3 Climate and Climate Change

### *Current Conditions*

Over the course of the year, the temperature in Redding typically varies from 20°F to 81°F and is rarely below 5°F or above 89°F. The warm season lasts from May 31 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 81°F and low of 64°F. The cold season lasts from December 2 to March 11, with an average daily high temperature below 44°F. The coldest day of the year is January 29, with an average low of 20°F and high of 35°F.

Precipitation falls throughout the year in Redding. The wetter season lasts from April 9 to August 19, with a greater than 29% chance of a given day being a wet day. The chance of a wet day peaks at 36% 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 3, with an average total accumulation of 3.9 inches. The least rain falls around January 30, with an average total accumulation of 1.7 inches.

The snowy period of the year lasts from November 7 to April 11, 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 27, with an average total liquid-equivalent accumulation of 1.0 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<sub>2</sub> 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 Redding as 3.44 inches.

The NOAA Atlas 14, released on September 30, 2015 puts the 24-hour rainfall amount for a 50% annual-chance annual storm in Redding at 3.57 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%
<b>Technical Paper No. 40</b>	3.3	5.7	7.2
<b>NRCC</b>	3.44	6.44	9.10
<b>NOAA Atlas 14</b>	3.57	6.74	8.61

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 Redding can expect the 24-hour rainfall amount for a 50% annual-chance storm to be around 3.7 to 3.9 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

Redding is divided among eight sub-regional watersheds, with the majority of the sub-regional basins draining into the Saugatuck River and then to the Aspetuck River. All of the water that passes through Redding eventually flows 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
<b>Saugatuck River</b>	48.55	15.81	10,119.8	49.42%
<b>Norwalk River</b>	32.54	3.39	2170.74	10.59%
<b>Mill River</b>	24.88	0.05	36.49	0.15%
<b>Aspetuck River</b>	23.05	6.51	4,168.6	20.35%
<b>West Branch Saugatuck River</b>	11.9	0.64	412.37	2%
<b>Sympaug Brook</b>	7.24	0.009	6.01	0.02%
<b>Little River</b>	5.94	5.43	3,479	16.97%
<b>East Swamp Brook</b>	5.11	0.16	103.12	0.5%
<b>Total</b>	<b>n/a</b>	<b>31.99</b>	<b>20,496.13</b>	<b>100.0%</b>

Source: Connecticut Department of Environmental Protection GIS Data

#### *Saugatuck River*

The Saugatuck River drainage basin consists of over 48 square miles of land area covering over ten towns including Danbury, Bethel, Redding, and Ridgefield. The overall river course is south with headwaters beginning in Ridgefield extending into Bethel. The basin takes up a large portion of Redding as the Saugatuck River collects input from several small tributaries along the way as well as other drainages. The river flows all the way to the Connecticut shoreline, draining into Long Island Sound. The river forms the Saugatuck Reservoir, one of Aquarion Water Company's larger public water supplies, in the southern part of Redding.

#### *Aspetuck River*

The headwaters of the Aspetuck River begin in the southern sections of Bethel and Newtown. The river flows south into Redding and Easton. Many small tributaries join the main channel as it continues south, eventually forming the Aspetuck Reservoir. Ballwall Brook is of the larger tributaries that drain into the Aspetuck River, entering just before the reservoir. After the reservoir the river flows through the narrow Pfeiffer Pond and downstream, the Aspetuck converges with the Saugatuck River.

#### *Little River*

The Little River drainage basin occupies the eastern part of Redding between the Saugatuck River and Aspetuck River basins. The river flows south into the Saugatuck Reservoir.

#### *Norwalk River*

The Norwalk River originates in neighboring Ridgefield, just north of Great Pond Road. The river flows southward, parallel to Route 7, along the southwest border of Redding until it converges with the Silvermine River in Norwalk and eventually flows into Norwalk Harbor.

#### *West Branch Saugatuck River*

The West Branch Saugatuck River commences in the southwest corner of Redding between Blueberry Hill Road and Fairview Farm Road and flows in a southerly direction. Just past Godfrey Road, the river begins to parallel Newtown Turnpike as it flows into neighboring Weston. This drainage basin occupies a small portion of southwest Redding.

### *Mill River*

Only a very small portion of the Mill River drainage basin lies within the extreme southeast part of Redding. The Mill River originates in neighboring Easton, just south of Judd Road. The river flows east and then in a southerly direction near Easton Road before entering Easton Reservoir.

### *East Swamp Brook*

Only a very small portion of the East Swamp Brook drainage basin lies within the northeast part of Redding. The headwaters of East Swamp Brook begin adjacent to the Aspetuck River's tributaries but flow in northern orientation. Just into the northeast corner of Redding at Huntington Park, begin the headwaters which flow through Huntington and Lily Ponds. They continue into Wolf Pit Brook and further north merge into East Swamp Brook. The brook then converges with Limekiln Brook at the east border of Bethel and Danbury above Meckauer Park.

### *Sympaug Brook*

Only a very small portion of the Sympaug Brook drainage basin lies within the northern part of Redding. The majority of the Sympaug Brook basin resides in Bethel, with about a quarter of the land area in Danbury. The Redding portion of the drainage basin does not include a watercourse.

## **2.2 Society, Culture, and Government**

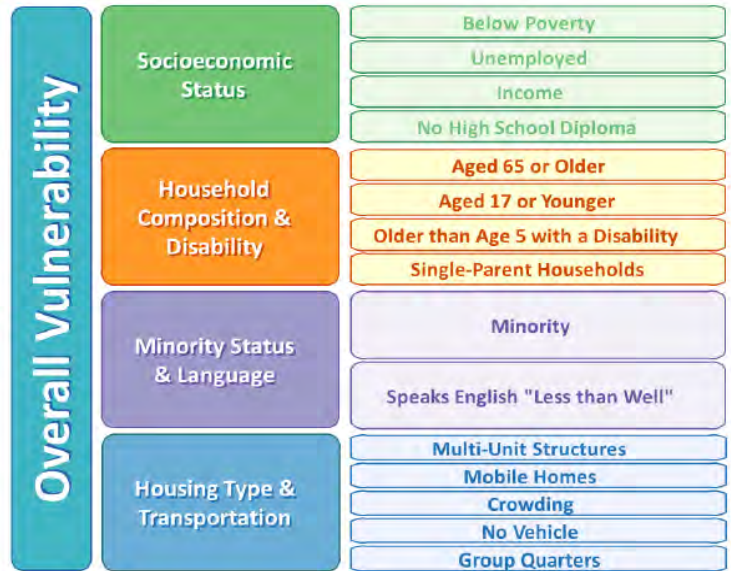
### **2.2.1 Population and Demographic Setting**

According to the 2010 U.S. Census, Redding had a population of 9,158, with 276 persons per square mile. The Census American Community Survey (ACS) 2018 5-year summary estimated the population from 2014 to 2018 to be 9,209. The Connecticut State Data Center predicts that population growth in Redding will increase over the next twelve years. The population in 2025 is projected to be 9,223.

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 Redding. 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 Redding is considered to have a low level of vulnerability, with their most vulnerable social housing type and transporting, followed by household composition and disability. Both vulnerable populations for the town are primarily identified in the western tract, with the eastern half of the town identifying a very small population vulnerable in regard to housing type and transportation. Appendix B explores the SVI for Redding in more depth, including maps showing overall vulnerability, and theme vulnerability.

### 2.2.2 Development Trends

According to the Plan of Conservation and Development, Redding has pioneered a low-impact development concept within its largely rural community, its efforts to conserve open space and minimize adverse development impacts on all water supply watersheds. The Town has an Open Space Manager who helps guide conservation of open space in Town. Town officials believe that economic development has been consistent with the town's Plan of Conservation and Development.

Development and redevelopment in Redding are focused in the Georgetown area. Located in Redding's southwest corner, Georgetown is the main commercial area within the town aside from West Redding (which is addressed below). However, Georgetown is truly a multi-town village extending into adjacent portions of Weston, Wilton and Ridgefield. Georgetown is located along the Norwalk River where a Special Flood Hazard Area (SFHA) and floodway are mapped. Increasing development density in this area will need to be carefully balanced with the flood risk.

The former Gilbert & Bennett Manufacturing Company site in Georgetown continues to be unoccupied. The Town is currently waiting on a court decision on whether to foreclose on the

property, allowing the Town to acquire it. It is expected that the foreclosure will go through, but the decision has been delayed due to COVID-19 closures.

The former Gilbert & Bennett Manufacturing Company site is a brownfield and poses a risk of contamination to the river if flooded. In 2014, the State Bond Commission approved a request from the Georgetown Special Taxing District for \$2 million to replace the Norwalk River flood walls at the Gilbert & Bennett site. This particular wall replacement was completed. This improvement helps keep contaminated soil from eroding downstream. However, remediation of the site remains necessary. The town anticipates that acquisition, remediation, and redevelopment of the site will require significant financial support through grants. This is a National Register historic site. One potential step to any redevelopment following acquisition would be to raise the river walls to further protect the site from flooding.

The efforts to redevelop Georgetown are expected to attract future growth for the Redding and the surrounding towns. Therefore, a collaborative planning effort across town and regional boundaries is being undertaken to ensure the success of the project.

The Branchville section of Ridgefield is located in close proximity to Georgetown. The Branchville Transit-Oriented Development (TOD) area extends into Redding from Ridgefield, and overlaps with the potential TOD area located in Georgetown if a new passenger rail station is developed in Georgetown. While a new train station has been constructed in Branchville, one has not yet been designed for Georgetown. Nevertheless, the close proximity of two TOD areas in southwest Redding – both located along the Norwalk River – means that the Town will need to carefully regulate development.

Existing commercial development is also found along Route 7 north of Georgetown and in the West Redding area. The POCD recommends the Town draw on West Redding's existing infrastructure and transportation resources and existing commercial uses in a creative way for potential "smart growth" development including transit-oriented projects. The realignment of the rail crossing in West Redding could be a catalyst for such improvements. Overall, however, significant new development is not anticipated in these areas.

With most of Redding remaining quite rural coupled with the focus on compact development in Georgetown, Branchville, and West Redding, the overall character of vulnerabilities to natural hazards in Redding will not change. Risks to the community will not increase as long as redevelopment is carefully regulated.

### **2.2.3 Governmental Structure**

The Town of Redding is governed by a Selectman-Town Meeting form of government. Day-to-day administration and legislative authority of the town is performed by a board of selectman composed of three elected persons. Executive authority is vested to the First Selectman who serves as the chief executive.

In addition to the Board of Selectmen and the Town Meeting, there are boards, commissions and committees providing input and direction to Town administrators. Also, Town departments provide municipal services and day-to-day administration. Many of these commissions and



departments play a role in hazard mitigation, including the Board of Education, Conservation & Inland Wetland Commission, Planning Commission, Zoning Department, the Fire Departments, Emergency Medical Services, and the Highway Department. It should be noted that the three fire departments are independent districts and not a part of the municipal government.

Drainage complaints are primarily routed through the Highway Department. Occasionally the Police Department receives these complaints as well. The complaints are usually received via phone, fax, mail, or email and are recorded in a logbook. The complaints are investigated as necessary until remediation surrounding the individual complaint is concluded.

## 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

The Town of Redding includes numerous historic sites and two local historic districts.

The Redding Center Historic District encompasses approximately 55 acres around Lonetown Road (Route 107), Cross Highway, and Hill Road. Near the geographic center of Town, it consists of 39 contributing resources, including the original Town Hall, the Congregational Church, and the cemetery. This area is not located in a flood zone and has no specific natural hazard risks.

The Georgetown Historic District, along the Norwalk River, is roughly bounded by Route 7, Route 107, and the Ridgefield town line on the north. It contains 123 contributing buildings and sites, including the Gilbert and Bennett Manufacturing Company site as well as four churches, two schools, and a post office (now vacant). The railroad of the Danbury-Norwalk Line runs through the center of the district roughly following the path of the Norwalk River. Sections of the Georgetown Historic District are located in the Norwalk River's 1% Annual Chance Flood zone; the former Gilbert & Bennett Manufacturing Company site in particular is at risk of flooding.

See Figure 2-3 for a map of historic resources in the community.

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

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

Hazard	Count
Dam Failure	0
Earthquake	12
Flooding	-
1% Annual	0
0.2% Annual	1
Hurricane/Tropical Storm	12
Sea Level Rise	0
Thunderstorm	12
Tornado	12
Winter Storm	12
Wildfire	3

Note that the table above does not reflect the flood risks reported by Town personnel.


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.


**LEGEND**

 National Park Service Cultural Site


 Cultural District


**SHPO Historic Sites**


 National Register

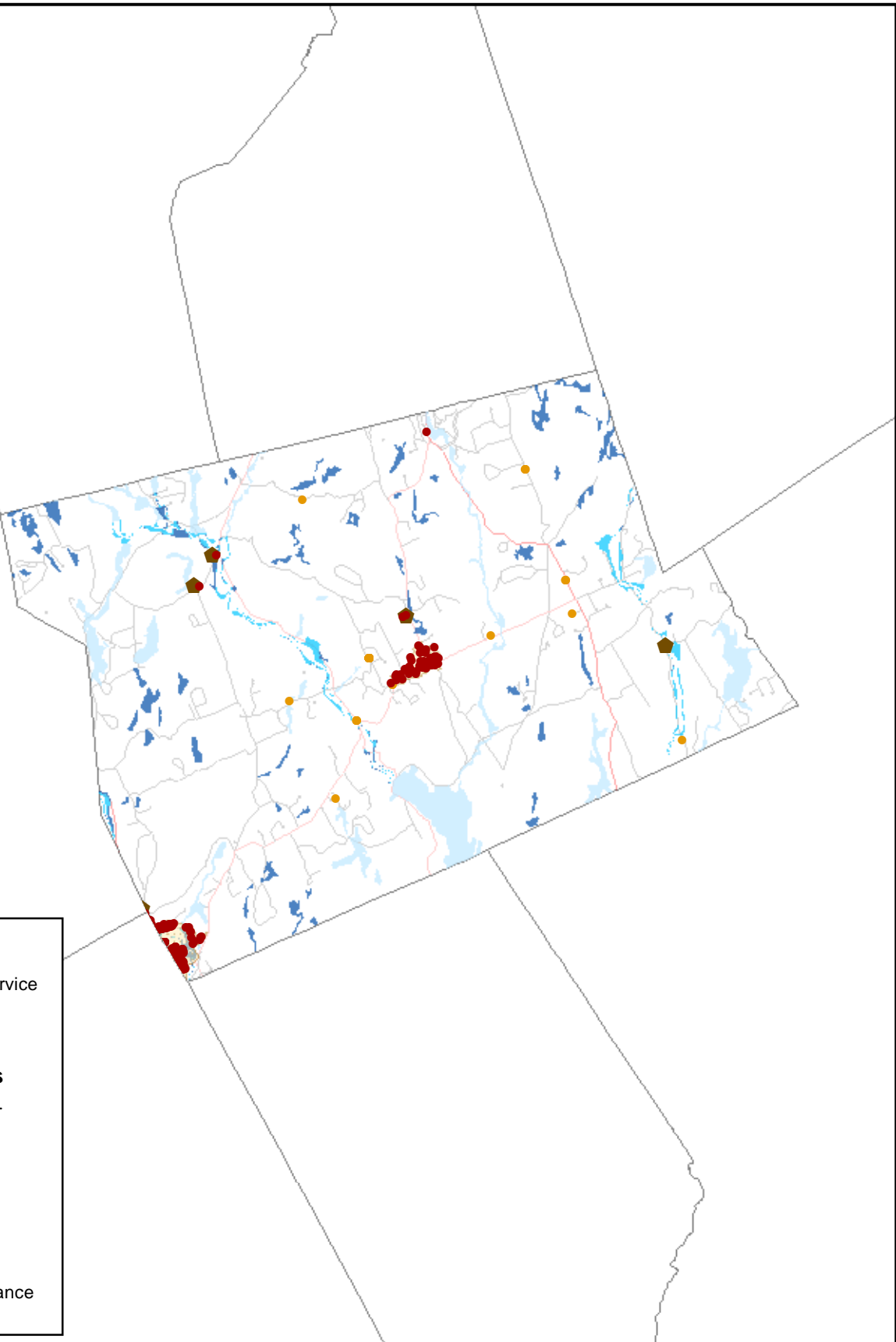
 State Register

**Flood Zones**

 A

 AE

 0.2% Annual Chance Flood Hazard

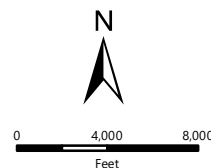




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Historic Resources with Flood Zones and  
 Dam Failure Inundation Areas  
 WestCOG Hazard Mitigation Plan  
 Town of Redding

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



SCALE 1" = 8,468'

DATE 1/6/2021

3101-22  
 PROJ. NO.

**FIG. 2-3**

## 2.3 Infrastructure

### 2.3.1 Transportation

The primary transportation corridors in Redding are Routes 53 and 58 running generally north to south, Route 107 running southwest to northeast, and Cross Highway connecting the Town center to the eastern part of the Town. The western edge of Redding lies roughly along Route 7.

The MTA Metro-North Railroad has two stations in or near Redding: The West Redding station and the Branchville Station. These two stations lie on the Metro-North Railroad's New Haven commuter rail line.

### 2.3.2 Utilities

The only community public water system in Redding is provided by Aquarion Water Company and serves part of the Georgetown neighborhood. Many other non-community public water systems are operated throughout Town. Most properties are on private wells.

Wastewater in the Georgetown neighborhood of Redding, along with the Meadow Ridge retirement community, is collected by the Georgetown Sewer Treatment Plant, which cleans the wastewater before discharging it to the Norwalk River. Other properties utilize septic systems.

Electricity and natural gas are provided to Redding by Eversource.

## 2.4 Planning and Regulatory Capabilities

### *Emergency Operations Plan*

Redding maintains an Emergency Operations Plan (EOP) that it reviews annually, and updates as needed. The Town is currently in the process of rewriting its EOP to conform with the new Connecticut State template. This updated EOP will be available in a digital format.

### 2.4.1 Review of Existing Local Plans

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

- **Plan of Conservation and Development (POCD):** Redding updated its most recent Plan of Conservation and Development (POCD) in 2018, though it was not adopted until 2020. The document calls for protection of waterbodies, streambelts, and floodplains from development, as well as conservation of other open spaces and natural areas. Flood risks are explicitly noted in the "Land, Water and Climate" section and the "Major Natural Constraints" section of Chapter 2: Natural Resources. Flooding and stormwater management are addressed in numerous other parts of the plan as well.
- **Stormwater Management:** Redding maintains a Stormwater Management Plan. This document has been updated to comply with the requirements of the US EPA 2017 updated *General Permit for the Discharge of Stormwater from Small Municipal Separate Storm Sewer Systems* (MS4 General Permit).

- **Capital Improvement Plan (CIP):** Redding 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:** Redding 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):** Redding's EOP is reviewed annually and updated as needed. Dam failure Emergency Action Plans (EAPs) for dams with failure inundation zones that may impact Redding, and for which EAPs are available, are on file locally.
- **Watershed Management Plan:** Watershed Management Plans have been developed for the Saugatuck-Aspetuck, Still, and Norwalk River Watersheds. The Saugatuck River Watershed Based Plan was developed by the former South Western Regional Planning Agency (SWRPA) in 2012. The Still River Watershed Management Plan was developed by the Housatonic valley Association with support from the Still River Partners in 2019. The Norwalk River Watershed Action Plan was prepared by the Norwalk River Watershed Initiative Committee, HDR/HydroQual, and the former South Western Regional Planning Agency (SWRPA) in 1998 and updated in 2011. 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:** An Open Space Plan, written in 2018, was adopted in 2020 as an addendum to the POCD. The plan lays out open space preservation goals and guides conservation efforts throughout the Town. Preservation of wetland and floodplain spaces is mentioned. The document does not expressly consider open space preservation as a natural hazard mitigation strategy.

Since the previous Hazard Mitigation Plan, the Town acquired the Mary Ann Guitar Preserve to maintain as open space within the Centennial Watershed State Forest. The acquisition was performed with money from an OSHA grant, Aquarion, and the Redding Land Trust. The site is bordered by 107, 53, Newtown turnpike. It was previously known as the Biehn Property.

#### 2.4.1 Review of Regulatory Structures

Redding 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:** Redding enforces the Connecticut State Building Code locally.
- **Zoning Regulations:** Most recently updated in November 2018.
- **Inland Wetlands and Watercourses Regulations:** Most recently updated in April 2013.

## 2.5 Emergency Services, Critical Facilities, Sheltering, and Evacuation

The Town considers its police, fire, governmental, and major transportation arteries to be its most important critical facilities since these are needed to ensure that emergencies are addressed while day-to-day management of Redding continues. The Town also considers various infrastructure and facilities (such as water and sewer pump stations) to be critical facilities, as well as companies and businesses storing hazardous materials. Table 2-6 identifies all of these critical facilities.

### *Sheltering Capabilities*

Emergency shelters are an important subset of critical facilities as they are needed in many emergency situations. There are two identified shelters in the town that are also considered critical facilities. Joe Barlow High School on Black Rock Turnpike is the primary shelter if neighboring regional shelters reach capacity.

John Read Middle School on Redding Road is considered the backup shelter. The Community Center is used as a commodities/warming center during emergency situations. All three facilities have backup generators.

The Meadow Ridge Senior Living facility is a large complex that includes a senior living center (which does not have a generator), a long-term care facility (has an emergency generator) and an assisted living center (has a generator). The Meadow Ridge Facility is located on top of hill at the end of a long driveway, and does not have any direct flood risk. Access to the site during or following a disaster is a concern because Route 107, or the facility's long driveway, may be blocked by flooding or debris. The facility does have a service access off Old Farm Road. During past storms, the facility has opened its doors for town residents as a warming center, showering facility, and comfort station. The Town has been discussing with Eversource whether the facility is considered critical with regards to power restoration following an outage.

### *Emergency Response Capabilities*

The Police Department and Emergency Services coordinate emergency preparedness in the Town of Redding. The Town's Emergency Operations Center (EOC), including its Emergency Communications Center, is located at the Redding Police Department. The EOC's goal is to provide citizens with the highest level of emergency preparedness before, during, and after disasters or emergencies. That Town coordinates with all departments internally to develop plans, protocols, and procedures that assure the safety of Redding's citizens. It also provides technical assistance to state and local emergency response agencies and public officials.

**Table 2-6: Critical Facilities**

Facility	Address or Location	Comment	Em. Power	Shelter	In SFHA
<b>Redding Community Center</b>	37 Lonetown Road	Warming Center	✓		No
<b>Joel Barlow High School</b>	100 Black Rock Turnpike	Primary Shelter	✓	✓	No
<b>John Read Middle School</b>	486 Redding Road	Back-up overnight shelter	✓	✓	Yes
<b>Police Department and EOC</b>	96 Hill Road	Emergency Operations Center (EOC)	✓		No
<b>Town Hall</b>	100 Hill Road	Town Hall	✓		No
<b>Sewage Facility / Wastewater Treatment Plant</b>	19 North Main Street		✓		No
<b>Highway Garage</b>	28 Great Oak Lane	Emergency Assistance	✓		No
<b>Georgetown Fire Department</b>	6 Portland Avenue	Emergency Response	✓		No
<b>Redding Ridge Fire Department and EMS Company – Fire District #1</b>	186 Black Rock Turnpike	Emergency Response	✓		No
<b>West Redding Fire Department – Fire District #2</b>	306 Umpawaug Road	Emergency Response	✓		No
<b>Town Cell Towers</b>	Multiple locations	Communications			No
<b>Meadow Ridge Facility</b>	100 Redding Road	Elderly Housing Warming/Comfort Station	✓*	CS	No**

\* Meadow Ridge generator provides partial power to the facility.

\*\* Route 107 at the Meadow Ridge driveway is at risk of flooding from the Norwalk River, creating an access issue.  
CS – Comfort Station

The Town's EOP guides its response to emergencies arising from both natural and anthropogenic hazards. The Town utilizes a program known as "CT Alert" to direct geographically specific emergency notification telephone calls into affected areas. The local radio station, 98Q (WDAQ Danbury) is also utilized for notifications purposes.

The Town's Highway Department performs vegetation control including tree trimming and removal in the town's rights-of-way. During emergencies and following storms, the Highway Department, responds to calls related to downed trees.

### LEGEND

#### Dams

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

#### Flood Zones

- A
- AE
- 0.2% Annual Chance Flood Hazard

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

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

SCALE	1" = 8,468'
DATE	7/29/2021
PROJ. NO.	3101-22

**FIG. 2-4**



### *Communications*

Town officials have indicated that the cellular communication towers in Redding, especially the one on Redding Road, are critical facilities. In the past, storm events have caused significant power outages that required cell towers to utilize backup generators. Due to the length of the power outages, the generators ran out of fuel, leaving the community without cell service and extensively limiting communications.

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

Redding posts emergency preparedness information on its website, [www.Townofreddingct.org](http://www.Townofreddingct.org), through the town Health Department. The website includes a list of emergency supplies and materials that residents should make sure they have on hand, and presents information about receiving emergency alerts.

The Town utilizes an emergency notification system known as CT Alert to send geographically specific warnings into areas at risk for hazard damage. Alerts can be sent by voice recording (by telephone), text message, email, and social media. The Town has been working hard to get residents signed up; they currently have over 6,000 subscribers and will continue to educate residents on its use.

### 3.0 HAZARD ASSESSMENT

Top hazard concerns of Redding include the following:

- The risk of flooding from the Norwalk River in Georgetown and West Redding
- Flash flooding on roads in West Redding
- The risk of flooding of CT Route 58 near Putnam Park Road
- The risk of flooding of CT Route 53 and Umpawaug Road
- Flooding at the John Read Middle School, and of the roads leading to the school becoming flooded and impassible
- Flooding of Chestnut Tree Road
- Beaver-dam-related drainage issues around Topstone Road, Marchant Road, and Chestnut Road
- Downed trees and utility wires during storms
- The lack of pressurized firefighting water in the area of the Redding Elementary School

More details about natural hazards in Redding are described in this chapter.

### 3.1 FLOODING (COASTAL, INLAND, AND ICE JAMS)

#### 3.1.1 **Setting**

According to FEMA, most municipalities in the United States have at least one clearly recognizable floodprone area around a river, stream, or large body of water. These areas are outlined as SFHAs and delineated as part of the NFIP. A regulatory floodplain with AE designation has been mapped along the Aspetuck River, Norwalk River and the Saugatuck 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 Umpawaug Pond Brook, Saugatuck River, and the Little River distribute these traits. Figure 2-4 for the areas of Redding susceptible to flooding based on FEMA flood zones.

Flooding can occur in some areas with a higher frequency than those mapped by FEMA. This nuisance flooding occurs during heavy rains with a much higher frequency than those used to calculate the 1% annual chance flood event and often in different areas than those depicted on the FIRM panels. These frequent flooding events occur in areas with insufficient drainage; where conditions may cause flashy, localized flooding; and where poor maintenance may exacerbate drainage problems.

In general, the potential for flooding is minimal Redding, 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 Redding is considered likely for any given year, with flood damage potentially having significant effects during extreme events.

### LEGEND

#### Dams

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

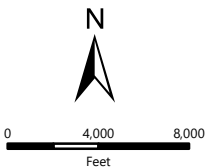
#### Flood Zones

- A
- AE
- 0.2% Annual Chance Flood Hazard

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Critical Facilities with Flood Zones and  
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 WestCOG Hazard Mitigation Plan  
 Town of Redding

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



SCALE	1" = 8,468'
DATE	7/29/2021
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**FIG. 3-1**

### 3.1.2 Capabilities

#### *National Flood Insurance Program*

The Town has consistently participated in the National Flood Insurance Program (NFIP) since September 30, 1982 and intends to continue participation in the NFIP. SFHAs in Redding are delineated on a Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS). The FIRM delineates areas within Redding that are vulnerable to flooding and was most recently published on October 16, 2013 as part of the Fairfield County FIS update. The hydrologic and hydraulic analyses from the FIS report dated December 15, 1981 were prepared by Philip Genovese and Associates for FEMA, under Contract No. H-4711, completed in May 1980.

The Zoning Enforcement Officer (ZEO) is the NFIP administrator in Redding and oversees the enforcement of NFIP regulations. The degree of flood protection established by the variety of regulations in the Town meets or exceeds the minimum criteria established by the NFIP. The Town is not enrolled in the Community Rating System program but may consider enrolling. The town is a member of CAFM, and the ZEO attended the inaugural CAFM conference in October 2014. Future participation is anticipated.

The Town discourages new construction and substantial reconstruction within the 1% annual chance floodplain by raising concerns during the floodplain permit process. New development is strictly managed through the Town's land use process.

#### *Ordinances, Regulations, and Plans*

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

- **Zoning Regulations:** the Town of Redding Zoning Regulations were effective July 30, 2014, and have been enacted "to preserve the predominant residential, rural and agrarian characteristics of the Town of Redding, and to protect the health, safety and general welfare of its inhabitants; to secure safety from fire, panic, flood, erosion, air pollution, water pollution, and other dangers; to prevent contamination of groundwater and of surface water, including all streams, ponds, wetlands, aquifers, floodplains, well fields and water supply sources, and to control the erosion and siltation of water courses.

Section 5.4.5 describes Flood Safety requirements and is essentially the local articulation of the NFIP regulations. The Zoning Commission first enacted flood damage prevention regulations in 1996. These regulations were revised in 2014 and reflect State of Connecticut and NFIP modifications.

- Section 5.4.5.1 states that it is the purpose of this Regulation to promote the public health, safety and general welfare and to minimize public and private losses due to flood conditions in specific areas by provisions designed to:
  - (a) restrict and prohibit uses which are dangerous to health, safety, and property due to water or erosion hazards or which results in damaging increases in the erosion or in flood heights or velocities;

- (b) require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
  - (c) control the alteration of natural floodplains, stream channels, [and] natural protected barriers which are involved in the accommodation of flood waters;
  - (d) control filling, grading, dredging and other development which may increase erosion or flood damage; and
  - (e) prevent or regulate the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards to other lands.
- Section 5.4.5.4 outlines permit requirements and the duties and responsibilities of the Zoning Enforcement Officer.
  - Section 5.4.5.5 describes the provisions for flood hazard reduction. Section 5.4.5.5(51)(j) stated that manufactured homes are prohibited in all Special Flood Hazard Areas, this includes manufactured homes located outside a manufactured home park or subdivision, in a new manufactured home park or subdivision, in an existing manufactured home park or subdivision, in an expansion to an existing manufactured home park or subdivision, or on a site in an existing park which a manufactured home has incurred substantial damage as a result of a flood.
  - Section 5.4.5.5 (5.3) outlines specific standards for Special Flood Hazard Areas A and AE as follows:
    - New construction or substantial improvement of any residential, commercial, industrial or nonresidential structure shall have the lowest floor, including basement, elevated at least to two feet above the base flood elevation. Nonresidential structures may be floodproofed in lieu of being elevated provided that together with all attended utilities and sanitary facilities, the areas of the structure below the required elevation are watertight with walls substantially impermeable to the passage of water, and use structural components having the capability of resisting hydrostatic and hydrodynamic loads in the effect of buoyancy.
    - In addition, no encroachments, including fill, new construction, substantial improvements and other developments shall be permitted in floodways unless certification (with supporting technical data) by a registered professional engineer is provided demonstrating through hydrologic and hydraulic analyses performed in accordance with standard engineering practice, that encroachments shall not result in any (0.0 feet) increase in the flood levels during occurrence of the base flood discharge.

- Section 5.4 outlines Erosion and Stormwater Control requirements and requires the control of stormwater discharge to prevent flooding and the scouring and siltation of watercourses.

□ **Inland Wetlands and Watercourse Regulations:** These regulations were effective in 1973 and are revised through April 25, 2013. They were implemented to protect the quality of the inland wetlands and watercourses within the Town of Redding by making provisions for the protection, preservation, maintenance, and use of inland wetlands and watercourses, including deterring and inhibiting the danger of flood and pollution.

- Section 2.1 defines Regulated Activity “as any operation within or use of a wetland or watercourse involving removal or deposit of material, or any obstruction, construction, alteration, contamination, or pollution of such wetlands or watercourses, but shall not include the specified activities in Section 4 of these regulations. In all cases, the precise location of wetlands and watercourses shall be determined by the actual character of the land, the distribution of wetland soil types and locations of watercourses. The applicant shall provide this information to the Commission. Such determination shall be made by field inspections and testing conducted by a soil scientist, where soil classifications are required, or by any other qualified individual where locations of watercourses are required.

The following are also deemed regulated activities:

- (a) the location of any portion of any subsurface waste disposal system, including any earth-disturbing activities associated therewith, within 200 feet of the mean water line of the Norwalk, Saugatuck, Aspetuck, and Little Rivers; of Great, Umpawaug, Steichen’s, Factory, Sterritt’s, South, Falls, and Hedmond’s Ponds; of Mirror Lake and Saugatuck Reservoir; within 150 feet of the mean water line and/or perimeter of all other watercourses; and within 100 feet of all wetlands;
- (b) the location of any portion of any structures including any earth-disturbing activities associated therewith (for example, driveway or utility installation), or the engaging in any significant impact activity within 150 feet of the mean water line of the Norwalk, Saugatuck, Aspetuck, and Little Rivers; of Great, Umpawaug, Steichen’s, Factory, Sterritt’s, South, Falls, and Hedmond’s Ponds; of Mirror Lake and Saugatuck Reservoir; and within 100 feet of all other wetlands and watercourses;
- (c) the location of any portion of any subsurface waste disposal system or structure, including any earth-disturbing activities associated therewith, or the engaging in any significant impact activity, within 500 feet of the high-water line of a vernal pool;

- (d) the engaging in any significant impact activity or the location of any portion of any structure, including any earth-disturbing activities associated therewith, as defined and regulated pursuant to the Flood Hazard Mitigation Program, as described and regulated pursuant to Section 5.4.5 "Flood Safety" of the Zoning Regulations of the Town; and
  - (e) any activity within the Town, the likely effect of which will have a significant impact on the existing condition of any of the wetlands or watercourses of the state.
- Section 4.1.b states that no residential homes will be permitted "as of right" in wetlands and watercourses after July 1, 1987.
  - Section 6.1 states that no person may conduct or maintain a regulated activity without obtaining a permit. Section 7 outlines the permit application requirements.
- ❑ **Subdivision Regulations:** Adopted in 1957 and revised in 1980, the Town's Subdivision Regulations establish minimum acceptable standards of street construction; regulate the layout and development of lots and streets; and outline measures to prevent degradation of potable water sources, control erosion and siltation, preserve adequate and convenient open spaces, and retain the natural features of the land.
- Article III, Section 3.1 states that land to be subdivided shall be demonstrated to be fully capable of providing healthful and safe living conditions for its occupants, and in its projected use to protect such conditions for adjacent areas, especially with respect to water supply, sewage disposal, flood and erosion hazards, traffic and pedestrian safety and accessibility to emergency services.
  - Article III, Section 3.2 identifies lands which require special evaluation, such as floodplains, primary and secondary aquifer recharge areas, wetlands and watercourses, all areas of soil types with "severe" or "very severe limitations, areas subject to unusual erosion hazards, natural slopes of twenty percent and greater and ledge rock areas.
  - Article III, Section 3.3.1 states that development of any land requiring special precautions for development is prohibited unless specifically approved by the Commission.
  - Article IV, Section 4.3.8 states that whenever possible, storm drainage shall be accommodated in retention basins for controlled and gradual release.
  - Article IV, Section 4.5.1 states that applications include planned control of stormwater runoff in order to prevent flooding, conserve water tables, promote groundwater recharge, minimize erosion and siltation and protect wetlands and other natural resources.
  - Article IV, Section 4.6 outlines Open Space Requirements
- ❑ **Plan of Conservation and Development:** This 2018 document is the Town's vision statement for future development. It is updated every 10 years. Recommendations in the Plan include but are not limited to the following:

- **Section 2** - Protect habitats through open space conservation and environmentally sensitive stewardship. Continue to work with partner public-benefit organizations such as the Redding Land Trust, the Trust for Public Land, The Nature Conservancy, etc. to further these efforts.
- **Section 2** - Review Town regulations for compliance with the CT DEEP Stormwater Management Plan and the CT DEEP Stormwater Manual.
- **Section 3** - Purchase tracts of land as they come on the market to protect the Town as a vital watershed, maintain its rural character, provide for active and passive recreation, and preserve an equitable tax base by minimizing costs of additional schools and services. Continue meetings of Redding's seven-member Open Space Committee (consisting of two members from the Conservation Commission and Planning Commission, a representative of the Historical Society and the Redding Land Trust and the Land Use Coordinator) on an as-needed basis to review the status.
- **Section 3** - In order to preserve environmentally sensitive land, consider adoption of coordinated amendments to the Zoning Regulations and Subdivision Regulations to require that the countable portion of newly created lots in residential zones shall not include land comprised of wetlands, watercourses, 100 year floodplains or slopes of 20% or greater.
- **Section 3** - In reviewing Subdivision applications, encourage use of scenic and historic vistas, the view from the road and ridgelines as open space set asides to preserve the rural character along with the long-standing priority of land conservation. Study ways to amend the Subdivision Regulations and Zoning Regulations to protect scenic vistas and areas of unique environmental value.
- **Section 6** - Actively pursue land acquisition for open space, recreation, conservation, water supply protection as a vital investment in the Town's future quality of life and financial stability.

According to the POCD, approximately 7,530 acres (36%) of Redding has been preserved as permanent conservation and open space. "Moreover, most of the conserved land is located in contiguous parcels forming undeveloped corridors through the town. These 'forever green' corridors provide protected natural habitat, opportunities for passive recreation, and vital protection of the public water supply watershed."

#### *Drainage, Street Flooding, and Structural Projects*

The Town Zoning Office has developed and maintains a stormwater information webpage. The site includes the current Stormwater Management Plan and links to local watershed groups and is updated periodically. Milone & MacBroom, Inc. prepared the 2013 Stormwater Annual Report for the Town of Redding. According to the report, the Highway Department documents annual catch basin inspection and cleaning. However, due to limited Town resources, it is not feasible to perform annual maintenance on all catch basins within the Town.

There are areas of street flooding throughout the town, and these are addressed by the Public Works Department as necessary. These typically relate to ponding and impassability of the given street but result in limited, if any, property impacts.

The Town's capital improvement plan (CIP) for drainage projects is a four-year plan. The CIP that was effective at the time of adoption of the previous edition of this Hazard Mitigation Plan (July



2014) had a goal of upgrading drainage systems and culverts along 20 miles of roadways. The following table shows drainage upgrades listed in the previous HMP, based on the 2014-2015 CIP, as well as the status of the projects.

Redding has a robust road reconstruction program. The Town is consistently working through a list of roads to repave and rehabilitate, and road drainage systems, including culverts, are upgraded when the roads are redone.

The following table summarizes recent and planned road, bridge, and culverts repair projects.

**Table 3-1: Recent Road, Culvert, and Bridge Projects**

Road	Notes
<b>Stepnee Road</b>	Bridge Redone in 2015
<b>Bald Rock Road</b>	This Road has been rehabilitated since the previous HMP
<b>Diamond Hill Road</b>	This Road has been rehabilitated since the previous HMP
<b>Poverty Hollow Road</b>	This Road has been partially rehabilitated since the previous HMP. Portions of the road still need to be redone in the future.
<b>Station Road</b>	Road work planned for the summer of 2020
<b>Marchant Road</b>	Town plans to rehabilitate this road in the coming five years.
<b>Simpaug Turnpike</b>	Town plans to rehabilitate this road in the coming five years.
<b>Topstone Road</b>	Addressing flooding on this road is an ongoing project.

Connecticut DOT has reconstructed the Route 53 Bridge over the Saugatuck River at a higher elevation. The Town has not experienced a major flood event since the bridge was rebuilt, but it is believed that the raised elevation will help mitigate the flooding that has historically impacted the area. It is noted that the low-lying areas on either side of the bridge continue to be low lying, and so at risk from flooding.

Drainage work has also been recently completed on Putnam Park Road; the Town believes this work may have mitigated some of the flood concerns in this area.

The town's primary focus for flood mitigation is the commercial area of Georgetown located along the Norwalk River. Installation of flood walls and floodproofing has been a large part of redevelopment and design in this neighborhood.

#### *Communications*

The National Weather Service issues a flood watch or a flash flood watch for an area when conditions in or near the area are favorable for a flood or flash flood, respectively. The Town can access the National Weather Service website at <http://www.weather.gov/> to obtain the latest flood watches and warnings before and during precipitation events. The Town also receives regular weather updates through Division of Emergency Management and Homeland Security (DEMHS) Region 5 email alerts.

Informational pamphlets regarding natural hazards are disseminated to public locations, and emergency information is available through several different media, such as newspaper, radio, and the internet.

### *Summary*

In summary, 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. The flood damage prevention regulations require freeboard, exceeding the NFIP regulations.

### **3.1.3 Vulnerabilities and Risk Assessment**

In general, potential present-day flooding problems in Redding are concentrated along the Saugatuck River and the Little River. The highest risk area along the Saugatuck River is in the vicinity of Route 53 at Umpawaug Road. Flooding along the Little River is prevalent along Route 58 and Putnam Park Road. Town officials note that flooding and ponding also occurs along the following streets: Diamond Hill Road, Marchant Road, Simpaug Turnpike, Topstone Road and Poverty Hollow Road.

Topstone Road has two low-lying areas susceptible to flooding; one section is a dirt road, and the other is paved. The paved low-lying section reportedly experiences flooding from Umpawaug Pond Brook relatively frequently. Mitigating this flooding is an ongoing effort of the Town. Nearby Chestnut Woods Road also experiences relatively frequent flooding.

### *Vulnerability Analysis of Critical Facilities*

The list of critical facilities provided by the Town (Section 2.5) was used with the parcel data to accurately locate each critical facility throughout the town. One critical facility was found to lie within the 1% annual chance floodplains of a variety of watercourses in the town. Table 3-2 lists this facility.

**Table 3-2: Critical Facilities Located Within the 1% Annual Chance Floodplain**

Name or Type	Address	Flooding Source
John Read Middle School	486 Redding Road	Saugatuck River

The middle School is partially located in a 1% annual chance flood zone, and the while the property experiences flooding frequently, it has not experienced serious flooding damage in recent years. Flooding of Redding Road could isolate the school in cases when the building may not flood.

### *Vulnerability Analysis of Areas Along Watercourses*

The primary waterways in Town are the Norwalk River, Saugatuck River, Aspetuck River and the Little River. The remaining waterways in Redding are mostly small streams and brooks. Specific areas susceptible to flooding are identifiable by the FEMA defined special flood hazard areas. Refer to Figure 3-1 for the areas of Redding susceptible to flooding based on FEMA flood zones.

According to town officials the most persistent flooding in the town are adjacent to the Saugatuck River and the Little Rive. Town officials have indicated that periodic flooding also

occurs in the village of Georgetown along the Norwalk River. Flash flooding on roads in the West Redding area is also reportedly a problem during major rain events.

#### *Saugatuck River*

The Saugatuck River drainage basin poses flood risks in the vicinity of Route 53 near Umpawaug Road and John Read Middle School. Flooding in this area has historically caused frequent road closures. While the Route 53 Bridge over the Saugatuck has been elevated by the state, low-lying sections of road on either side of the bridge continue to be low-lying and at risk from flooding.

According to a September 2, 2013 NBCconnecticut.com article, heavy rains and flash flooding caused Simpaug Turnpike and Long Ridge Road to flood and cars were submerged up to their windows. The town plans to install additional stormwater infrastructure along the Saugatuck River in an effort to reduce flooding and ponding impacts.

Umpawaug Pond Brook is a tributary of the Saugatuck, flowing north from Topstone Park to join the Saugatuck near the Redding train station at Simpaug Turnpike. Umpawaug Brook is reported to cause flooding on a section of Topstone Road, as well as Chestnut Woods Road.

#### *Little River*

Route 58 in the vicinity of Putnam Park Road experiences flooding that often requires road closures. This road is the main route to the hospital in Danbury.

#### *Norwalk River*

According to the Norwalk River Watershed website, "the Norwalk River has not had a significant flood since 1955. A modern repeat of the 1955 flood would do over \$21 million in damage along the river... and the State has identified the region as a 'high risk basin in immediate need of better flood control management and hazard mitigation.'" Redding views the commercial area of Georgetown, located along the Norwalk River, as a primary area of concern.

## 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.

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

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

While flooding from a dam failure generally has a moderate geographic extent, the effects are potentially catastrophic. A major dam failure is considered only a possible hazard event in any given year.

### 3.2.2 **Capabilities**

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

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

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

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

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

(3) a formal notification system to alert appropriate local officials who are responsible for the warning and evacuation of residents in the inundation zone in the event of an emergency.

Dam failure analyses have been prepared for many of the high hazard dams, and these are included in the EAPs. The inundation limits portrayed in the dam failure analysis maps represent a highly unlikely, worst-case scenario (1,000-year) flood event and should be used for emergency action planning only. These analyses should not be interpreted to imply that the dams evaluated are not stable, that the routine operation of the dams presents a safety concern to the public, or that any particular structure downstream of the dam is at imminent risk of being affected by a dam failure.

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

The Town Open Space Manager monitors beaver dams in Town. When problematic impacts are observed, Public Works staff attempt to break up or remove the dams using machinery or by hand.

#### *Actions Completed and New Capabilities*

The town has developed a standard procedure for managing beaver dams.

### **3.2.3 Vulnerabilities and Risk Assessment**

As of 2013, there were 54 DEEP-inventoried dams within the Town of Redding. These dams are shown in Figure 2-4. Three of these dams are considered high hazard (Class C). Failure of a Class C dam has a high potential for loss of life and extensive property and infrastructure damage. As shown in Table 3-3, the three high hazard dams in the town are owned by private companies. One Class B (significant hazard) dam is located in adjacent Ridgefield. Failure of this structure may have an impact on Redding.

**Table 3-3: High Hazard Dams with Potential to Affect the Town of Redding**

Number	Name	Stream	Class	Owner
11701	Factory Pond Dam	Norwalk River, Redding	C	Georgetown Land Development Company LLC
11739	Meadow Ridge Detention Dam	Unnamed brook, Redding	C	Redding Life Care LLC
11742	Meadow Ridge Fire Irrigation Pond Dam	Unnamed brook, Redding	C	Redding Life Care LLC
11801	Millers Pond Dam	Norwalk River, Ridgefield	B	Dana Matthrow

*Millers Pond (Dam No. 11801) – Norwalk River, Ridgefield*

The Millers Pond Dam is a Class B dam located at the southern end of Millers Pond in Ridgefield and impounds a reservoir from a contributing watershed of 7.04 square miles. The earthen dam is 13 feet in height and 152 feet in length. It is privately owned and used to impound a reservoir for aesthetic purposes. The dam discharges to the Norwalk River, crossing under Florida Hill Road before flowing alongside State Route 7 into Redding. Floodwaters may cause an increase in water surface elevations in the Norwalk River in Redding, potentially affecting a number of structures located between the river and Route 7.

*Factory Pond Dam (Dam No. 11701) – Norwalk River, Redding*

The Factory Pond Dam is located at the southeast end of Factory Pond and impounds a storage volume of 192 acre-feet from a contributing watershed of 12.2 square miles. The earthen dam was constructed in 1874 and is 18.75 feet in height and 175 feet in length. It is owned by the Georgetown Land Development Company, LLC and used to impound a reservoir for recreation.

An EAP for the Factory Pond Dam was prepared by Philip W. Genovese & Associates, Inc. addressing actions to be taken during an emergency. In August 2006, drawdown and inspection indicated seepage and mortar issues. Tighe & Bond developed design plans in 2007 detailing corrective procedures that included low pressure grouting and repointing the spillway.

The Georgetown historical area of Redding is located immediately downstream of the structure. Floodwaters from a failure would affect structures in this developed area. An August 1981 Phase II dam inspection report includes an Emergency Operations Plan for structure. The plan identifies Gilbert & Bennett Manufacturing Company as the responsible party for response in an emergency situation; however, the factory has since been closed and is being redeveloped as housing. A dam breach analysis completed for this 1981 EOP includes an inundation map of the downstream area. Mapping indicates floodwaters would inundate structures on the both sides of Route 57/107.

*Meadow Ridge Detention Dam (Dam No. 11739) – Unnamed watercourse, Redding*

The Meadow Ridge Detention Dam is a Class C earth dam located between Woods Way and Meadow Ridge Road, impounding a 1.5-acre pond. The structure is owned by Redding Life Care LLC and used to create a detention sediment basin. The dam is 11 feet in height and 240 feet in length. There are no structures located downstream of the dam.

*Meadow Ridge Fire Irrigation Pond Dam (Dam No. 11742) – Unnamed brook, Redding*

The Meadow Ridge Fire Irrigation Pond Dam is a Class C earth dam located at the southwest end of an impoundment used for fire protection. The dam is owned by Redding Life Care LLC and is located approximately 960 feet north of the Redding Life Care facility, on the east side of Meadow Ridge Road. The structure is 8 feet in height and 180 feet in length. Although there are no structures located downstream of the pond, floodwaters resulting from failure have the potential to affect Meadow Ridge Road, and access to the care facility.

#### *Other Dams*

According to town officials, the Topstone Dam, which is defined as a low-hazard dam has an effect on the hydraulic control of the Umpawaug Pond Brook and has had some scour issue and Topstone Road has experienced erosion. The town considered this an area of concern for maintenance and observation.

#### *Beaver Dams*

Finally, the Town of Redding is concerned with potential failures of beaver dams. Town officials noted that there are several beaver dams in town. Particular problem locations are around Topstone Road, Marchant Road, and Chestnut Woods Road. Beaver activity that could present minor flooding risks occurs adjacent to Diamond Hill Road on Moffitts Brook, as well as off of Chestnut Woods Road on a branch of the Umpawaug Pond Brook. Chestnut Woods Road regularly experiences minor flooding as the stream flows over the road. These beaver dams cause a significant amount of drainage issues and damage to Town infrastructure, but at this point damage to private property has not been reported.

#### *Changes and Improvements*

The Town of Redding continues to be at low risk for dam failure.

### **3.3 HURRICANES AND TROPICAL STORMS**

#### **3.3.1 Setting**

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

Inland Connecticut is vulnerable to hurricanes despite moderate hurricane occurrences when compared with other areas within the Atlantic tropical cyclone basin. Since hurricanes tend to weaken within 12 hours of landfall, inland areas are relatively less susceptible to hurricane wind damages than coastal areas in Connecticut; though recent events, such as Tropical Storm Isaias in 2020, have shown that inland winds can still be devastating. Additionally, the heaviest rainfall often occurs inland (as was seen in Tropical Storm Irene in 2011). Therefore, inland areas are vulnerable to riverine and urban flooding during a hurricane.

#### **3.3.2 Capabilities**

Existing mitigation measures appropriate for flooding were discussed in Section 3.1. These include the ordinances, codes, and regulations that have been enacted to minimize flood damage. In addition, various structures exist to protect certain areas, including dam and local flood protection projects.

Wind loading requirements are addressed through the state building code. The 2018 Connecticut State Building Code was amended in 2009 and adopted with an effective date of October 1, 2018. The code specifies the design wind speed for construction in all the Connecticut municipalities. Effective 2018, the design wind speed for Redding is 110 miles per hour for a Category 1, 120 miles per hour for a Category 2 and 130 for Category 3 or greater. Redding has adopted the Connecticut Building Code as its building code. The town website provides links to the State Building Codes so that developers are able to find design standards for wind.

The Redding tree warden maintains an aggressive tree and tree limb trimming program with an annual budget of around \$15,000. Utilities must be placed underground in new developments; this capability is considered proactive to prevent damage from wind and falling trees.

Eversource, the local electric utility, provides tree maintenance near its power lines

During emergencies, the Town currently has two designated emergency shelters available for residents as discussed in Section 2.5.

Prior to severe storm events, the Town ensures that warning/notification systems and communication equipment are working properly and prepares for the possible evacuation of impacted areas. The Town participates in the statewide CT Alert system, and has utilized it effectively during previous events. During Tropical Storm Irene, the Town used the CT Alert system to notify all residents in the SFHA that they may evacuate and use one of the shelters.

#### **3.3.3 Vulnerabilities and Risk Assessment**

The Town of Redding is vulnerable to hurricane damage from wind and flooding and from any tornadoes accompanying the storm.



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

Debris such as signs, roofing material, and small items left outside become flying missiles in hurricanes. Extensive damage to trees, towers, aboveground and underground utility lines (from uprooted trees or failed infrastructure), and fallen poles cause considerable disruption for residents. Streets may be flooded or blocked by fallen branches, poles, or trees, preventing egress. Downed power lines from heavy winds can also start fires during hurricanes with limited rainfall.

Downed trees and wires have been a big challenge in previous storms, and tree maintenance continues to be a major concern for the town. While the Town has a tree warden and a tree maintenance budget, it is reported to be insufficient for the amount of work that needs to be done as a very rural Town with many forested roads. Additionally, the tree warden has identified many dead Ash trees (killed by the Emerald Ash Borer infestation) all around Town that are fall risks. While the Public Works Department is chipping away at dangerous trees little by little, it does not have the budget to address everything.

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

Redding's housing stock consists of historic buildings greater than 50 and sometimes 100 years old, relatively younger buildings built before 1990 when the building code changed to address wind damage, and relatively recent buildings that utilize the new code changes. Since most of the existing housing stock in the town predates the recent code changes, many structures are highly susceptible to roof and window damage from high winds. Homes located within SFHAs are also at risk from flooding as a result of the heavy rainfall that typically occurs during tropical storms and hurricanes.

As the Town of Redding is not affected by storm surge, hurricane sheltering needs have not been calculated by the U.S. Army Corps of Engineers for the town. The Town determines sheltering need based upon areas damaged or needing to be evacuated within the town. Under limited emergency conditions, a high percentage of evacuees will seek shelter with friends or relatives rather than go to established shelters. 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.

### **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 Redding. 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 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.

#### **3.4.2 Capabilities**

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.

Aside from warnings, several other methods of mitigation for wind damage are employed in Redding as explained in Section 3.3. In addition, the Connecticut State Building Code includes guidelines for the proper grounding of buildings and electrical boxes.

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

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

#### **3.4.3 Vulnerabilities and Risk Assessment**

The Town of Redding has moderate to high potential to experience tornado damage. 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. The likelihood of lightning strikes in the Redding 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 Redding is considered moderate in any given year.

Most thunderstorm damage is caused by straight-line winds or downbursts exceeding 100 mph. The risk of downbursts occurring during such storms and damaging the Town of Redding is believed to be low for any given year. All areas of the town are susceptible to damage from high winds although more building damage is expected in the town center while more tree damage is expected in the less densely populated areas.

Secondary damage from falling branches and trees is more common than direct wind damage to structures. Heavy winds can take down trees near power lines, leading to the start and spread of fires. Town personnel note that strong thunderstorms will cause power lines to fall all over the town. Most downed power lines in Redding 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.

### *Summary*

The entire Town of Redding is at relatively equal risk for experiencing damage from summer storms and tornadoes. Based on the historic record, very few summer storms or 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.

### **3.5 WINTER STORMS AND NOR'EASTERS**

#### **3.5.1 Setting**

The entire Town of Redding 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**

Capabilities specific to winter storms are generally those related to preparing plows and sand and salt trucks, tree trimming to protect power lines, and other associated snow removal and response preparations.

The amended Connecticut Building Code specifies that a pressure of 40 pounds per square foot (psf) be used as the base "ground snow load" for computing snow loading for different types of roofs. The International Building code specifies the same pressure for habitable attics and sleeping areas, and specifies a minimum pressure of 35 psf for all other areas. Snow accumulation on the roofs of critical facilities has not been reported to be an issue.

The Highway Department has eleven plow trucks with an annual budget over \$200,000 for snow removal. There are ten routes which total approximately 101 miles: 93.92 miles of paved road and eight miles of dirt road. The MgCl/salt mixture is used for deicing. 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. The Town reports that its snow removal capabilities are robust.

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).

#### *Actions Completed and New Capabilities*

The Town of Redding continues to mitigate winter storms.

#### **3.5.3 Vulnerabilities and Risk Assessment**

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

Recent climate change studies predict a shorter winter season for Connecticut (as much as two weeks) and less snow-covered days with a decreased overall snowpack. These models also

predict that fewer, more intense precipitation events will occur with more precipitation falling as rain rather than snow. This trend suggests that future snowfalls will consist of heavier (denser) snow, and the potential for ice storms will increase. Such changes will have a large impact on how the state and its communities manage future winter storms and will affect the impact such storms have on the residents, roads, and utilities in the state.

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

The structures and utilities in Redding 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.

Icing causes difficult driving conditions throughout the hillier sections of the town, including along Route 53 in the northwestern portion of town. The Town's standard of pre-salting has been helpful in controlling ice in these problem areas.

#### *Summary*

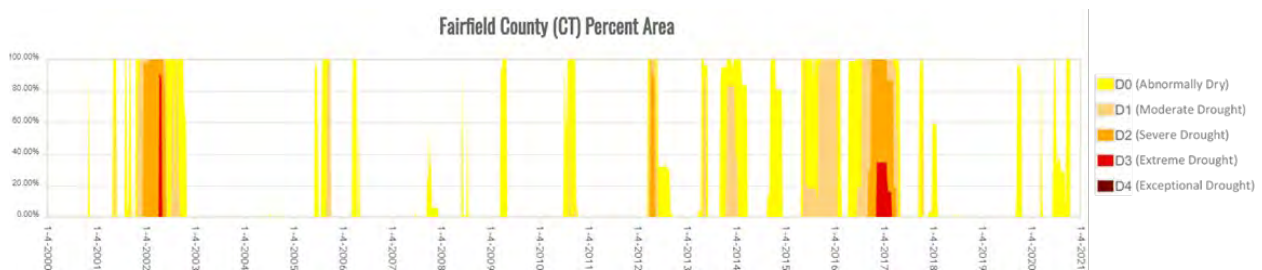
The entire Town of Redding is at relatively equal risk for experiencing damage from winter storms although some areas (such as icing trouble spots and neighborhoods with a high concentration of flat roofs) are more susceptible. The Town budget for tree removal and minor repairs is generally adequate to handle winter storm damage, although the plowing budget is often depleted.

## 3.6 WILDFIRES AND DROUGHT

### 3.6.1 Setting

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

In addition, Redding, 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 3-2 depicts the various drought conditions in Fairfield County since 2000, where the warmer colors represent more advanced drought stages.



**Figure 3-2: USDM Drought Time Series for Fairfield County**

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

### 3.6.2 Capabilities

Existing mitigation for wildland fire control is typically focused on Fire Department training and maintaining an adequate supply of equipment. Redding reports that its firefighting capabilities are robust.

The Connecticut DEEP Division of Forestry monitors the weather each day during nonwinter months as it relates to fire danger. This allows the DEEP and the Town to monitor the drier areas of the state to be prepared for forest fire conditions. Forest fire danger levels are classified as low, moderate, high, very high, or extreme. In addition, the National Weather Service issues a Red Flag warning when winds will be sustained or there will be frequent gusts above a certain threshold

(usually 25 mph), the relative humidity is below 30%, and precipitation for the previous five days has been less than one-quarter inch. Such conditions can cause wildfires to quickly spread from their source area.

The following regulations regarding fire protection are outlined in the Redding Zoning Regulations:

- **Section 3.6** states that every building shall be capable of safe, legal access from a public road or street. When developed, the lot shall be provided with a driveway for use by emergency vehicles such as fire apparatus, police and rescue vehicles.
- **Section 5.1.3** requires that adequate fire and police protection be provided before a special permit application is granted.
- **Section 5.2.9(d)** requires the submittal of plans that demonstrate the availability of, and an agreement to provide to the site a water supply system, for both domestic use and fire protection.
- **Section 5.2.9(f)** requires plans for the protection of persons and property from fire. At a minimum such plans shall be based on advisory reports of the local Fire Marshal and/or the Town Building Official and shall (1) provide automatic fire suppression capabilities (sprinkler systems) in all units of multiple use buildings, in all two family and multiple family dwellings and in all other nonresidential buildings in excess of 1,000 square feet floor area, in conformity with National Fire Protection Association (NFPA) Standards 13, 13D and 13R and (2) conform to NFPA Standard "Fire Protection in Planned Building Groups, 1985 edition."
- **Section 5.4.4** states that stormwater runoff shall be collected and detained where feasible, creating water storage basins accessible and usable for firefighting, flood control and irrigation purposes.

The town has nine dry hydrants in the Redding Ridge fire district and utilizes mutual aid agreements with neighboring towns as needed. Additional dry hydrants are believed present in the Georgetown and West Redding districts.

The Connecticut DEEP Open Burning Program requires designation of certified Open Burning Officials in each municipality. This individual oversees permitting of open burning.

The Redding Fire Department goes to the fires whenever possible. This proactive approach is believed to be effective for controlling wildfires.

#### *Actions Completed and New Capabilities*

Redding continues to maintain its strong wildfire mitigation capabilities.

### **3.6.3 Vulnerabilities and Risk Assessment**

The historic record suggests that most wildfires in Connecticut are relatively small. In the drought year of 1999, the average wildfire burned five acres in comparison to the two most extreme wildfires recorded since 1986 that burned 300 acres each. Given the availability of firefighting water in Redding, 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. Areas within Redding vulnerable to wildfire are shown in Figure 3-3.

Connecticut has a particular vulnerability to fire hazards where urban development and wildland areas are in close proximity. The "wildland/urban interface" is where many such fires are fought. Wildland areas are subject to fires because of weather conditions and fuel supply. An isolated wildland fire may not be a threat, but the combined effect of having residences, businesses, and lifelines near a wildland area causes increased risk to life and property. Thus, a fire that might have been allowed to burn itself out with a minimum of firefighting or containment in the past is now fought to prevent fire damage to surrounding homes and commercial areas as well as smoke threats to health and safety in these areas.

The Wildland-Urban Interface (WUI) index is used to identify areas that may be at greater risk of wildfires based on the density of development in comparison to the amount of wildfire prone vegetation. The Town of Redding is a patchwork of high and medium density development intermixed, and low-density development intermixed with fire prone vegetation types. However, given firefighting capacity and water availability, it is likely that the town has effective capabilities to minimize damage from fires that may occur.

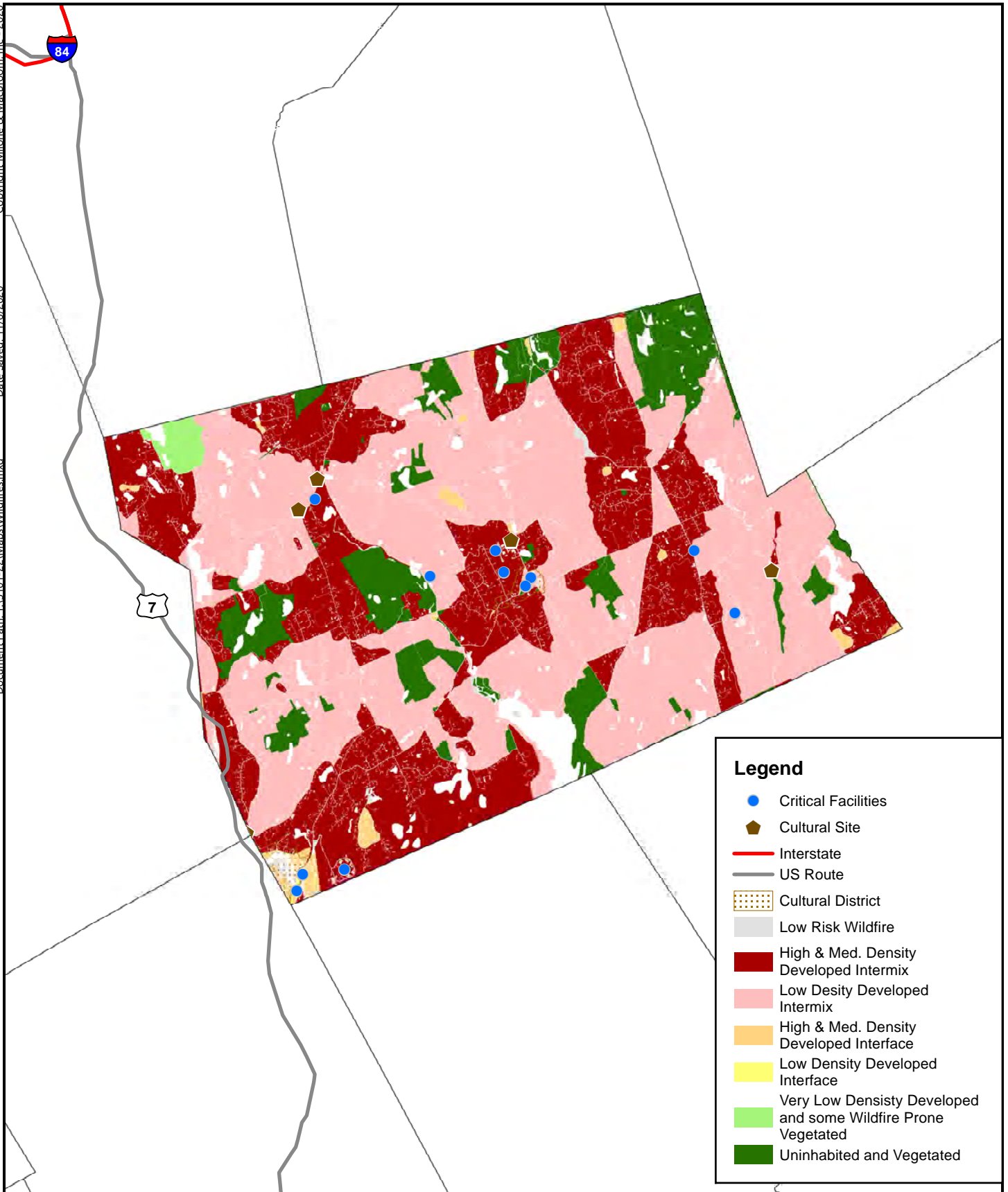
According to the Town of Redding, the Town sees small brush fires every year. The total cost to fight wildfires in any given year is \$9,000 (equipment and labor) for an average of three wildfire events. Property damage is negligible, as the damage occurs only in forested areas without any structures.

There is no public water system available in the area of the Redding Elementary School. This is an area of particular concern; if a fire were to occur in that area, the Town would not be able to provide sufficient water pressure to protect the school structure. Under current conditions the town would pull water directly out of the pond across the way. While this is not specifically a wildfire risk, a wildfire occurring in this area could potentially spread to the school structure.

Traditionally, the highest forest fire danger in Connecticut occurs in the spring from mid-March to mid-May.

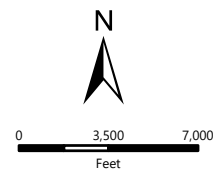
Given the industrial nature of some land uses in downtown Redding, the potential for wildfires becoming structural fires involving chemicals does exist.





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**Wildland-Urban Interface: Wildfire Risk Areas**  
 WestCOG Hazard Mitigation Plan  
 Town of Redding  
 NPS: Cultural Resources  
 Wildland-Urban Interface:USFA



SCALE 1" = 7,511'  
 DATE 11/13/2020  
 3101-22  
 PROJ. NO.  
**FIG. 3-3**

## 3.7 EARTHQUAKES AND LANDSLIDES

### 3.7.1 Setting

According to the *2019 Connecticut Natural Hazards Mitigation Plan Update*, Connecticut is at a low to moderate risk for experiencing an earthquake of a magnitude greater than 3.5 and at a moderate risk of experiencing an earthquake of a magnitude less than 3.0 in the future. No earthquake with a magnitude greater than 3.5 has occurred in Connecticut within the last 30 years, and the USGS currently ranks Connecticut 43<sup>rd</sup> out of the 50 states for overall earthquake activity.

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 Redding. Results are presented in Table 3-4.

**Table 3-4: Probability of a Damaging Earthquake in the Vicinity of Redding**

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%

Based on the historic record and the probability maps generated from the USGS database, the state of Connecticut possesses areas of seismic activity. It is likely that Connecticut will continue to experience minor earthquakes (magnitude less than 3.0) in the future. While the risk of an earthquake affecting Redding is relatively low over the short term, long-term probabilities suggest that a damaging earthquake (magnitude greater than 5.0) could occur within the vicinity of Redding.

The entire Town of Redding 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.

The built environment in Connecticut includes old nonreinforced masonry that is not seismically designed. Those who live or work in nonreinforced masonry buildings, especially those built on filled land or unstable soils, are at the highest risk for injury due to the occurrence of an earthquake.

### 3.7.2 Capabilities

The Connecticut Building Codes include design criteria for buildings specific to each municipality as adopted by the Building Officials and Code Administrators (BOCA). These include the seismic coefficients for building design in the Town of Redding. The Town has adopted these codes for new construction, and they are enforced by the Building Official. Due to the infrequent nature of damaging earthquakes, land use policies in the Town do not directly address earthquake hazards.

However, various documents do indirectly discuss areas susceptible to earthquake damage and regulations that help to minimize potential earthquake damage.

- **Plan of Conservation and Development:** The 2020 Plan discusses the protection of land-related resources such as steep slope areas and certain soil types.
- **Subdivision Regulations:** The 1980 regulations do not explicitly address the issue of construction on steep slopes. The regulations do require that soil erosion and sediment control plans be developed for proposed projects.
- **Zoning Regulations:** The 2014 regulations require applicants to provide the location of proposed erosion and sediment control measures on site plans. The regulations also state that all uses shall make proper provision for control of erosion, sedimentation and stormwater in particular to: (a) minimize soil loss and sedimentation due to the effects of wind, water, ice, and construction activity; (b) preserve the stability, fertility and vegetation cover of unpaved site areas; (c) control stormwater discharge to prevent flooding and the scouring and siltation of watercourses; (d) conserve water tables through adequate on-site stormwater recharge and € protect lives and facilities from the effects of major floods.

#### *Actions Completed and New Capabilities*

The tow is currently developing plans to allow for municipal employees to work remotely during an any type of event that does not allow access to a facility.

### **3.7.3 Vulnerabilities and Risk Assessment**

Surficial earth materials behave differently in response to seismic activity. Unconsolidated materials such as sand and artificial fill can amplify the shaking associated with an earthquake. In addition, artificial fill material has the potential for liquefaction. When liquefaction occurs, the strength of the soil decreases, and the ability of soil to support building foundations and bridges is reduced. Increased shaking and liquefaction can cause greater damage to buildings and structures and a greater loss of life.

Some areas in the Town of Redding are underlain by sand and gravel. Structures in these areas are at increased risk from earthquakes due to amplification of seismic energy and/or collapse. Many of these areas occur in floodplains associated with the various streams and rivers in Redding. The areas that are not at increased risk during an earthquake due to unstable soils are the areas underlain by glacial till, which includes most of the town.

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

#### *Changes and Improvements*

Redding continues to be at low risk of earthquakes.

## 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	Utilize the CT Alert emergency notification system to its fullest capabilities	Capability	<i>Town pushes out information to get as many residents as possible to sign up. They have been using the CT Alert system during the Covid-19 crisis, and signing more people up. Currently the system has 6,300 contacts in Town. Alerts can be sent by voice, text, email, and social media. Town will continue educating residents on use.</i>
2	Encourage residents to purchase and use NOAA weather radios with alarm features	Capability	<i>Emergency communication equipment is on the list of emergency supplies and materials to have on hand, put out through the Health Department on the town webpage. With changing technology, a NOAA radio might not be the specific recommendation, but the Town does have general recommendations about communication tools.</i>
3	Review potential evacuation routes to ensure timely migration of people seeking shelters.	Capability	<i>Town is aware of areas that get flooded and may be cut off. The evacuation routes the town has established are sufficient.</i>
4	Add pages to the Town website (www.Reddingct.gov) dedicated to citizen education and preparation for hazard events.	Capability	<i>The town web page is updated frequently. <a href="http://www.Townofreddingct.org">www.Townofreddingct.org</a> There is an emergency alert system through the webpage. The town also has a very active town social media presence with regards to emergency alerts. The Health Department puts out information to remind people where to find hazard information on the website.</i>
5	Incorporate elements of the hazard mitigation plan into the Plan of Conservation and Development when it is updated in 2018.	Complete	<i>The POCD went to public hearing and was expected to be adopted at the time of this HMP update. Hazards are incorporated into the document.</i>

#	Description	Status	Notes
6	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	<i>There are requirements related to runoff in new development.</i>
7	Conduct a drainage analysis of the Saugatuck River drainage basin, with a focus on Route 53 and Umpawaug Road, Long Ridge Road and Simpaug Turnpike, to determine potential flood reduction methods.	Carry Forward	<i>This action has not yet been completed. The intersection (Long Ridge / Side Cut / Simpaug) has recently been redone, and a portion of the intersection was raised (although not for hazard mitigation purposes) and drainage improvements were made. This action is carried forward</i>
8	Evaluate drainage issues along the Little River in the vicinity of Route 58 and Putnam Park Road to determine potential flood reduction methods.	Carry Forward with Revisions	<i>No action has been taken on this strategy. There is a beaver dam problem at this site. This site is the responsibility of the State DOT; there are no town roads or facilities in that area. The road was just repaved about 2 years ago. Carry forward with revision: request action from state.</i>
9	Encourage property owners to purchase flood insurance under the NFIP.	Capability	<i>This action is achieved through mortgage lenders and information provided by the municipality about flood zones.</i>
10	Consider enrolling in the Community Rating System (CRS)	Carry Forward	<i>Town has not yet pursued this action.</i>
11	Provide outreach regarding home elevation and relocation, flood barriers, dry floodproofing, wet floodproofing, and other home improvement techniques to private homeowners and businesses with flooding problems	Drop	<i>The town does not feel this action is necessary, as there are no homes or businesses with specific known flood problems</i>

#	Description	Status	Notes
12	Ensure that the appropriate municipal personnel are trained in flood prevention methods	Carry Forward with Revisions	<i>In the past, some Redding staff were members of CAFM; this is no longer the case. This action is carried forward to specifically call for members of Redding staff to become members of CAFM.</i>
13	Selectively pursue conservation recommendations listed in the Plan of Conservation and Development and other studies and documents.	Capability	<i>This is a capability. Since the previous plan, the Town acquired the Mary Ann Guitar Preserve to maintain as open space within the Centennial Watershed State Forest. The acquisition was performed with money from an OSWA grant, Aquarion, and the Redding Land Trust. The site is bordered by 107, 53, Newtown turnpike. It was previously known as the Biehn Property.</i>
14	Review culvert conveyances based on existing hydrology and Northeast Regional Climate Center guidance.	Carry Forward	<i>Town has not yet pursued this action due to funding limitations. Carry Forward</i>
15	Several undersized culverts are located along State roads. Redding could encourage the CT DOT to remediate these areas.	Completed	<i>The Town has a good relationship with the local DOT staff, and calls them directly when issues are observed. In recent years, Rt 53, Rt 107, and half of Rt 58 have been redone by the state. All of the culverts would have been improved during that work. Rt 58 from Cross Highway to the Bethel town line has not been redone.</i>
16	Upgrade drainage and culverts: Bald Rock Road Diamond Hill Road Poverty Hollow Road Station Road Marchant Road Simpaug Turnpike Topstone Road	Carry Forward with Revision	<i>Stepnee Road, Bald Rock Road, and Diamond Hill Road have been completed. Progress has been made on Poverty Hollow Road, but road reconstruction is not yet complete. Poverty Hollow Road, Station Road, Marchant Road, Simpaug Turnpike, and Topstone Road are carried forward.</i>
17	Evaluate flooding at the intersection CT Route 58 and Putnam Park Road which may impact emergency vehicles, school buses, and the general public to ensure adequate access to the Hospital in Danbury.	Carry Forward	<i>Town has not seen significant flooding at this site in 9 years, and believes that drainage work completed on Putnam Park Road may have mitigated some flooding in this site. Additionally, there are multiple routes around this intersection, so flooding would not significantly hinder access. Nevertheless, this area has been identified as experiencing flooding problems, and this action is carried forward.</i>



#	Description	Status	Notes
18	Continue tree limb inspection and maintenance programs to ensure that the potential for downed power lines is diminished.	Capability	<p><i>This is a capability, though the town wishes to increase its tree maintenance capabilities.</i></p> <p><i>Following Irene and Superstorm Sandy, it was impossible to travel anywhere due to downed trees. Rt 53 and Rt 58 are the main corridors to Danbury. EMS departments follow same routes every time, but trees fell down and blocked all state roads. In a major storm, if it knocked down trees, that would severely impact access to hospital.</i></p> <p><i>The town notes that it is the state's responsibility to clear trees. An action related to tree clearing may be advisable.</i></p>
19	Work with CL&P to determine the feasibility of placing non-conducting steel cable above the power lines	Carry Forward with Revisions	<p><i>The Town would like to work with its current utility provider, Eversource, to mitigate power outages in any way possible.</i></p>
20	The Building Department should provide literature regarding appropriate design standards for wind.	Capability	<p><i>Building department addresses wind design standards on a case by case basis.</i></p> <p><i>As an example, somebody wanted to put a prefabricated structure on their property, but the building official wouldn't allow it because it didn't meet wind standards. The official brought in information about wind loads to educate the individual in question.</i></p>
21	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	<p><i>Town implements the State Building Code, which is regularly updated, locally. The standards required by this code are sufficient</i></p>
22	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.	Drop	<p><i>This hasn't been an issue for the Town, and no action is deemed necessary</i></p>

#	Description	Status	Notes
23	Provide information on the dangers of cold-related hazards to people and property.	Capability	<i>Pushed out through town website and health department, social media</i>
24	Consider posting the snow plowing routes in Town buildings each winter to increase public awareness.	Drop	<i>There are 10 plow routes in town. The routes start in the center and spiral out. In the past the DPW has sent out information to the public explaining prioritization without providing specifics. Town does not feel this is necessary.</i>
25	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	<i>DPW and the fire departments (which also operate EMS) have a good relationship. In big winter storms the highway department will have plows assist responding vehicles.</i>
26	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.	Drop	<i>Town implements the State Building Code, which is regularly updated, locally. The standards required by this code are sufficient</i>
27	Identify drainage improvements that may reduce icing along Route 53.	Drop	<i>This is a state road and a state responsibility. Town has a good relationship with State DOT staff. Action not needed.</i>
28	Ensure that municipal departments have adequate backup facilities in case earthquake damage occurs to municipal buildings.	Capability	<i>Town is going through this now because of the COVID-19 crisis. They have had to improve the capabilities for people to work remotely. Nothing specific to earthquakes has been completed, or is deemed necessary.</i>
29	The town may consider bracing systems and assets inside critical facilities. This could help protect IT systems, important records and files.	Drop	<i>Hard records are all being scanned and going onto the cloud, and all electronic records are backed up in cloud. Physical bracing is not necessary.</i>



#	Description	Status	Notes
30	Include dam failure inundation areas in the CT Alert emergency notification system contact database	Drop	<i>Town can isolate specific areas for notification through CT Alert. They do not think preemptively setting areas in dam failure zones is necessary.</i>
31	File EOPs/EAPs with town departments and emergency personnel	Capability	<i>This is a capability</i>
32	Coordinate with the owner of Topstone Dam to ensure scour issues are addressed, in order to minimize impacts to Topstone Road.	Carry Forward	<i>This has not yet been completed. An engineering study was done several years ago, and the state has the dam listed as a problem, but there are significant obstacles for getting to the dam to perform work. Building a road would cost half a million dollars, and the dam repair cost would be a small fraction of that. The town is currently considering reducing water level in the impoundment and driving equipment to the dam over the beach during the off season. Carry Forward.</i>
33	Consider replacing culverts frequently flooded by beavers with free span bridges.	Drop	<i>The town does not think this action is feasible. They will focus on beaver control measures and upgrading culverts as needed.</i>
34	Develop a long-term beaver management plan	Drop	<i>Town has a standard procedure for dealing with beavers, and does not need a formal long-term plan. The town breaks up the dams as needed, and is aware of problem locations. Beaver dams are not endangering homes or roads, just causing occasional nuisance flooding.</i>
35	Consider the use of beaver deterrent devices such as beaver stops, beaver bafflers or beaver deceivers.	Carry Forward	<i>The town has not yet used such measures. Carry Forward</i>
36	Coordinate with Aquarion Water Company to identify areas where fire-fighting capacity may be limited due to lack of water pressure or storage.	Carry Forward	<i>Town plans to install dry hydrants at the pond across from the Elementary School (see above).</i>
37	Revise and enhance the town's website concerning the local regulatory requirements concerning open burning.	Complete	<i>Requirements are listed on website, and the names of fire marshals to contact for more information are given.</i>
38	Increase the availability of water sources in the town's high-risk areas	Carry Forward	<i>Elementary School (see above)</i>

#### 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 City proposed to initiate several new mitigation actions for the upcoming five years.

Downed trees and utility wires have been a major challenge in previous storms, and continue to be a major concern for the Town. The Town is interested in pursuing any strategies that may mitigate power outages and road closures that result from these storm impacts.

The Town is updating its EOP to conform with the State template and to be available online. This effort will include consideration of natural hazards.

Redding plans to install dry hydrants in Lonetown Marsh, the pond across from Redding Elementary School.

Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions.

A complete list of actions to be pursued in the next five years is presented below:

Action RDD-01	
<b>Collaborate with CIRCA on the "Resilient Connecticut" project</b>	
Lead	BOS
Cost	\$0 - \$25,000
Funding	Operating Budget
Timeframe	2022
Priority	High

Action RDD-02	
<b>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.</b>	
Lead	Planning
Cost	\$0 - \$25,000
Funding	Operating Budget, CT SHPO
Timeframe	2022
Priority	High

Action RDD-03	
<b>Coordinate with Aquarion Water Company to identify areas where fire-fighting capacity may be limited due to lack of water pressure or storage.</b>	
Lead	Fire Department
Cost	\$0 - \$25,000
Funding	Operating Budget, FEMA Assistance to Firefighters Grant
Timeframe	2022
Priority	High

Action RDD-04	
<b>Assess the costs and potential benefits to enrolling in the Community Rating System (CRS)</b>	
Lead	ZEO
Cost	\$0 - \$25,000
Funding	Operating Budget, FEMA Grant
Timeframe	2022
Priority	Med

Action RDD-05	
<b>Ensure that the appropriate municipal personnel are trained in flood damage prevention methods by becoming a CAFM member, and/or by attending DEEP, FEMA-deployed, or CAFM trainings.</b>	
Lead	ZEO, EMD
Cost	\$0 - \$25,000
Funding	Operating Budget
Timeframe	2022
Priority	Med

Action RDD-06	
<b>Work with Eversource to identify municipal actions to improve electric grid resiliency.</b>	
Lead	PW
Cost	\$0 - \$25,000
Funding	Operating Budget
Timeframe	2023
Priority	Low

Action RDD-07	
<b>Require consideration of the most recent Northeast Regional Climate Center rainfall statistics (<a href="http://precip.eas.cornell.edu">precip.eas.cornell.edu</a>) when developing alternatives for culvert and bridge replacement designs and sizes.</b>	
Lead	PW
Cost	\$0 - \$25,000
Funding	Operating Budget
Timeframe	2023
Priority	Low

Action RDD-08	
<b>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.</b>	
Lead	Planning
Cost	\$25,000 - \$50,000
Funding	CT SHPO
Timeframe	2024
Priority	High

Action RDD-09	
<b>Evaluate flooding at the intersection CT Route 58 and Putnam Park Road which may impact emergency vehicles, school buses, and the general public to ensure adequate access to the Hospital in Danbury.</b>	
Lead	PW, EMS
Cost	\$25,000 - \$50,000
Funding	Operating Budget, Grant
Timeframe	2024
Priority	Med

Action RDD-10	
<b>Annually conduct an emergency operations exercise for a local terrorism, sabotage, or mass casualty event.</b>	
Lead	EMD
Cost	\$25,000 - \$50,000
Funding	Operating Budget
Timeframe	2024
Priority	Low

Action RDD-11	
<b>Use beaver deterrent devices such as beaver stops, beaver bafflers, or beaver deceivers where necessary to protect property.</b>	
Lead	PW
Cost	\$25,000 - \$50,000
Funding	Operating Budget, Capital Improvement Plan, CT DEEP
Timeframe	2025
Priority	Low

Action RDD-12	
<b>Work with CTDOT to evaluate drainage issues along the Little River in the vicinity of Route 58 and Putnam Park Road to determine potential flood reduction methods.</b>	
Lead	PW
Cost	\$25,000 - \$50,000
Funding	Capital Improvement Plan, FEMA Grant
Timeframe	2025
Priority	Low

Action RDD-13	
<b>Increase the availability of water sources in the town's high-risk areas</b>	
Lead	Fire Department
Cost	\$100,000 - \$500,000
Funding	Capital Improvement Plan, Other Grant
Timeframe	2025
Priority	High

Action RDD-14	
<b>Install dry hydrants at the pond located across from Redding Elementary School.</b>	
Lead	Fire Department
Cost	\$100,000 - \$500,000
Funding	Capital Improvement Plan, Other Grant
Timeframe	2025
Priority	High

Action RDD-15	
<b>Conduct a drainage analysis of the Saugatuck River drainage basin, with a focus on Route 53 and Umpawaug Road, Long Ridge Road and Simpaug Turnpike, to determine potential flood reduction methods.</b>	
Lead	PW
Cost	\$50,000 - \$100,000
Funding	Capital Improvement Plan, FEMA Grant
Timeframe	2025
Priority	Low

Action RDD-16	
<b>Coordinate with the owner of Topstone Dam to ensure scour issues are addressed, in order to minimize impacts to Topstone Road.</b>	
Lead	EMD
Cost	\$100,000 - \$500,000
Funding	Capital Improvement Plan, Other Grant
Timeframe	2026
Priority	Low

Action RDD-17	
<b>Upgrade drainage and culverts on Poverty Hollow Road</b>	
Lead	PW
Cost	More than \$500,000
Funding	Capital Improvement Plan, FEMA Grant, Other Grant
Timeframe	2026
Priority	Low

Action RDD-18	
<b>Upgrade drainage and culverts on Station Road</b>	
Lead	PW
Cost	More than \$500,000
Funding	Capital Improvement Plan, FEMA Grant, Other Grant
Timeframe	2026
Priority	Low

Action RDD-19	
Upgrade drainage and culverts on Marchant Road	
Lead	PW
Cost	More than \$500,000
Funding	Capital Improvement Plan, FEMA Grant, Other Grant
Timeframe	2026
Priority	Low

Action RDD-20	
Upgrade drainage and culverts on Simpaug Turnpike	
Lead	PW
Cost	More than \$500,000
Funding	Capital Improvement Plan, FEMA Grant, Other Grant
Timeframe	2026
Priority	Low

Action RDD-21	
Upgrade drainage and culverts on Topstone Road	
Lead	PW
Cost	More than \$500,000
Funding	Capital Improvement Plan, FEMA Grant, 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	
RDD-01	Collaborate with CIRCA on the "Resilient Connecticut" project	ResilientCT	BOS	\$0 - \$25,000	Operating Budget	2022	1	1	1	0	0	1	1	0	0	0	0	0	0	0	7
RDD-02	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, CT SHPO	2022	1	1	1	1	0	1	0	0	0	0	0	0	0	0	7
RDD-03	Coordinate with Aquarion Water Company to identify areas where fire-fighting capacity may be limited due to lack of water pressure or storage.	Wildfire Fighting Capacity	Fire Department	\$0 - \$25,000	Operating Budget, FEMA Assistance to Firefighters Grant	2022	0	1	1	0	1	1	1	0	0	0	0	0	0	0	7
RDD-04	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
RDD-05	Increase the availability of water sources in the town's high risk areas	Wildfire Fighting Capacity	Fire Department	\$100,000 - \$500,000	Capital Improvement Plan, Other Grant	2025	0	1	1	0	1	1	1	0	0	0	0	0	0	0	7
RDD-06	Install dry hydrants at the pond located across from Redding Elementary School.	Wildfire Fighting Capacity	Fire Department	\$100,000 - \$500,000	Improvement Plan, Other Grant	2025	0	1	1	0	1	1	1	0	0	0	0	0	0	0	7
RDD-07	Assess the costs and potential benefits to enrolling in the Community Rating System (CRS)	CRS	ZEO	\$0 - \$25,000	Operating Budget, FEMA Grant	2022	1	1	0	1	1	1	0	0	0	-1	0	0	0	0	6
RDD-08	Ensure that the appropriate municipal personnel are trained in flood damage prevention methods by becoming a CAFM member, and/or by attending DEEP, FEMA-deployed, or CAFM trainings.	Municipal Capacities	ZEO, EMD	\$0 - \$25,000	Operating Budget	2022	0	1	1	1	1	0	1	0	0	0	0	0	0	0	6
RDD-09	Evaluate flooding at the intersection CT Route 58 and Putnam Park Road which may impact emergency vehicles, school buses, and the general public to ensure adequate access to the Hospital in Danbury.	Emergency Response	PW, EMS	\$25,000 - \$50,000	Operating Budget, Grant	2024	1	1	1	1	1	1	0	0	-1	0	0	0	0	0	6
RDD-10	Work with Eversource to identify municipal actions to improve electric grid resiliency.	Energy Resiliency & Backup Power	PW	\$0 - \$25,000	Operating Budget	2023	1	1	1	1	1	1	0	0	-1	-1	0	0	0	0	5
RDD-11	Require consideration of the most recent Northeast Regional Climate Center rainfall statistics (precip.eas.cornell.edu) when developing alternatives for culvert and bridge replacement designs and sizes.	NRCC	PW	\$0 - \$25,000	Operating Budget	2023	0	1	0	0	0	1	1	0	0	-1	0	0	0	0	4
RDD-12	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
RDD-13	Conduct a drainage analysis of the Saugatuck River drainage basin, with a focus on Route 53 and Umpawaug Road, Long Ridge Road and Simpaug Turnpike, to determine potential flood reduction methods.	Drainage	PW	\$50,000 - \$100,000	Capital Improvement Plan, FEMA Grant	2025	0	1	0	1	1	1	1	0	0	0	0	0	-1	0	5
RDD-14	Coordinate with the owner of Topstone Dam to ensure scour issues are addressed, in order to minimize impacts to Topstone Road.	Dam Safety	EMD	\$100,000 - \$500,000	Improvement Plan, Other Grant	2026	0	1	0	0	1	1	1	0	0	-1	0	0	0	0	5
RDD-15	Upgrade drainage and culverts on Poverty Hollow Road	Bridge & Culvert	PW	More than \$500,000	Capital Improvement Plan, FEMA Grant, Other Grant	2026	0	1	0	1	1	1	1	0	0	0	0	0	-1	0	5
RDD-16	Upgrade drainage and culverts on Station Road	Bridge & Culvert	PW	More than \$500,000	Improvement Plan, FEMA Grant, Other Grant	2026	0	1	0	1	1	1	1	0	0	0	0	0	-1	0	5

#	Action Description	Regional Theme	Lead Department	Cost Estimate	Potential Funding Sources	Timeframe for Completion	Weighted STAPLEE Criteria														Total STAPLEE Score
							Benefits							Costs							
							Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	
RDD-17	Upgrade drainage and culverts on Marchant Road	Bridge & Culvert	PW	More than \$500,000	Capital Improvement Plan, FEMA Grant, Other Grant	2026	0	1	0	1	1	1	1	0	0	0	0	0	-1	0	5
RDD-18	Upgrade drainage and culverts on Simpaug Turnpike	Bridge & Culvert	PW	More than \$500,000	Capital Improvement Plan, FEMA Grant, Other Grant	2026	0	1	0	1	1	1	1	0	0	0	0	0	-1	0	5
RDD-19	Upgrade drainage and culverts on Topstone Road	Bridge & Culvert	PW	More than \$500,000	Capital Improvement Plan, FEMA Grant, Other Grant	2026	0	1	0	1	1	1	1	0	0	0	0	0	-1	0	5
RDD-20	Use beaver deterrent devices such as beaver stops, beaver bafflers, or beaver deceivers where necessary to protect property.	Drainage	PW	\$25,000 - \$50,000	Operating Budget, Capital Improvement Plan, CT DEEP	2025	0	1	1	0	1	1	0	0	-1	0	0	0	0	0	4
RDD-21	Work with CTDOT to evaluate drainage issues along the Little River in the vicinity of Route 58 and Putnam Park Road to determine potential flood reduction methods.	Drainage	PW	\$25,000 - \$50,000	Capital Improvement Plan, FEMA Grant	2025	0	1	0	1	1	1	1	0	0	-1	0	0	-1	0	4

## **APPENDIX B**

### **Appendix B: SVI Summary**



# **Town of Redding**

## **Climate Vulnerability Assessment**

### **A Component of Sustainable CT Action 5.4**

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

#### **Hazards**

##### ***Inland Flooding***

With FEMA flood zones in town along several streams and rivers, such as along the Saugatuck River and the Aspetuck River, there is continuously concern for riverine flooding. Some areas are of higher concern, including Georgetown which is at risk of flooding from the Norwalk River and other roadways which are prone to 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. 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***

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

##### ***Drought and Extreme Temperatures***

Most of the town relies on private wells for drinking water, 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 rural 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 Redding include:

- Private well owners
- Emergency access
- Agricultural operations

#### **Secondary Impacts**

## Economic Impacts

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

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

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

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

## Social Impacts

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

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

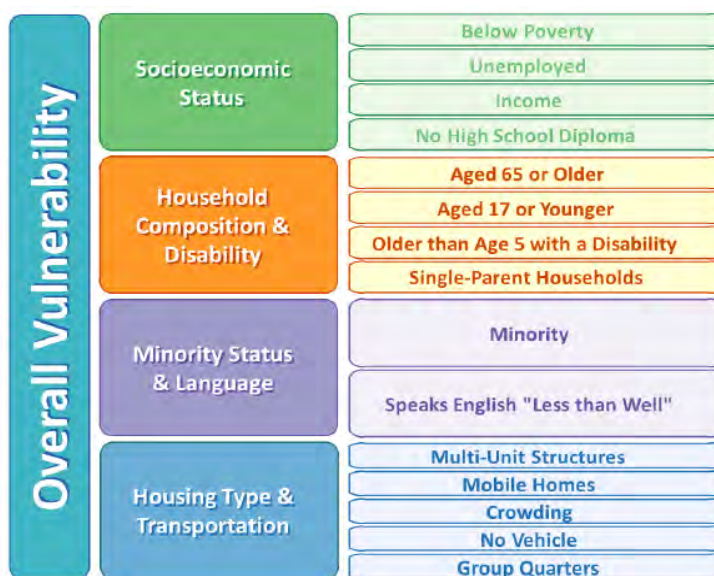


Figure 1: The CDC SVI Index Factors. Graphic: svi.cdc.com



1 indicates a higher vulnerability. Table 1 presents the overall vulnerability and theme rankings for Redding.

Table 1: Redding SVI Factor Rankings

	Overall SVI	Socioeconomic	Household Composition & Disability	Minority Status & Language	Housing Type & Transportation
REDDING	.21	.04	.34	.18	.45

The Town of Redding is considered to have a low level of vulnerability, with their most vulnerable social housing type and transporting, followed by household composition and disability. Both vulnerable populations for the town are primarily identified in the western tract, with the eastern half of the town identifying a very small population vulnerable in regard to housing type and transportation.

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 Redding, 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)<sup>1</sup> has identified at least one assisted living facility and one convalescent home in Redding.

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

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

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