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

Municipal Annex
for
Darien, CT

2 Renshaw Road
Darien, CT 06820
August 2021

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

MMI #3101-22

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

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

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

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 Darien 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 1820, the Town of Darien is located in Southern Fairfield county and home to a population of 20,732 (2010 U.S. Census). Darien is bordered by the municipalities of Stamford to the west, Norwalk to the east, New Canaan to the north, and the southern border of the town is coastline along Long Island Sound. Refer to Figure 2-1 for a map showing the regional location of Darien.

Darien is a coastal community, with several rivers and streams flowing throughout. The Town is characterized by residentially developed, lower elevations adjacent the shoreline just south, with suburban development sprawling northward away for the urban areas. Interstate 95 bisects the town running east to west; most commercial development in town is centralized along this corridor. The Noroton River flows south along the town's western border, emptying into the Sound via Holly Pond. The Five Mile river also flows into the Sound along the southern half of the town's eastern border. There are several other streams in town including the Goodwives River and Stony Brook. The highest elevation in Darien is about 270 feet in the central northern areas in town, with the southern coastline of Darien being at, or close to sea level. The varying terrain of Darien makes the town vulnerable to an array of natural hazards.

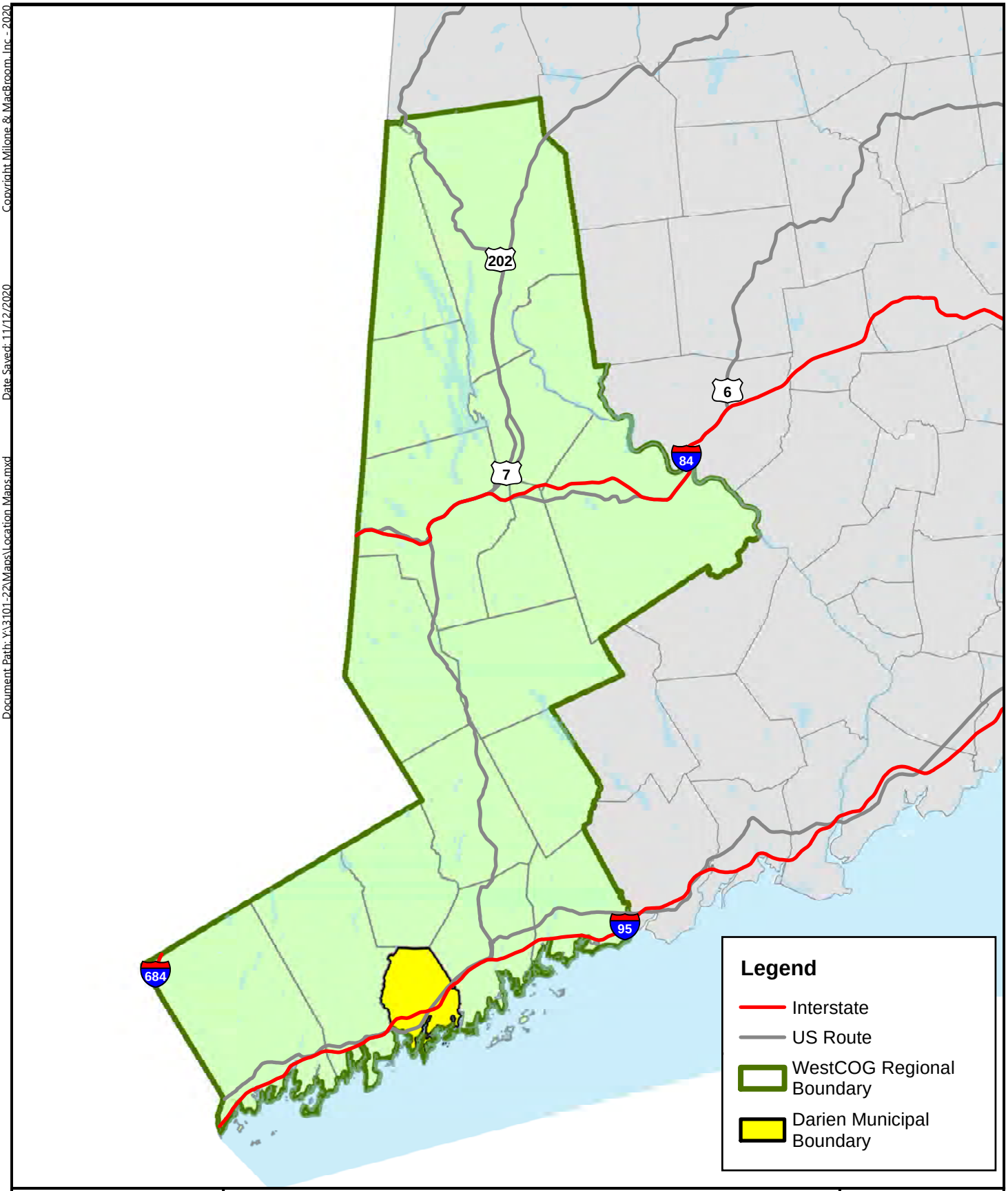
The Center for Land Use Education and Research (CLEAR) has developed a land cover dataset derived from 2016 satellite imagery to depict statewide land cover. The land cover by percent of total land can be found in Table 2-1.

Table 2-1: Land Cover by Area

Land Cover Class	Percent of Total Land
Developed	28.1%
Turf & Grass	16.7%
Other Grasses	0.3%
Agricultural Field	0.2%
Deciduous Forest	13.0%
Coniferous Forest	1.8%
Water	0.7%
Non-Forested Wetland	0.1%
Forested Wetland	0.2%
Tidal Wetland	0.2%
Barren Land	0.5%
Utility Corridor	0.03%

Date Saved: 11/12/2020

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



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

Regional Location of Darien

WestCOG Hazard Mitigation Plan
Town of Darien

N

0 40,000 80,000
Feet

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

FIG. 2-1

2.1.2 Land Use

Darien is a small town with some commercial activity along the interstate corridor, and suburban development throughout a majority of the town. Higher density residential development is primarily located in the western areas of town both north of 95 and south in the Noroton neighborhood, as well as along the northwestern border. Commercial activity is primarily concentrated along the Interstate 95 corridor. South of 95 in the Tokeneke area is 1-acre residential development, with larger 2-acre lot zoning in the most northern areas of Darien.

According to the town's 2016 Plan of Conservation and Development (POCD), the 2014 Darien Assessor records identified 65% of Darien's total land area to be residential development. Historically, low to moderate density single-family residential uses have been situated throughout the northern and southern areas in town, with higher density one family and multi-family zoning in closer proximity to the commercialized areas along Interstate 95. Table 2-2 summarizes 2014 land use data identified in the POCD.

Table 2-2: 2014 Land Use by Area

Use	Percent of Total Land
Residential	65%
Business	2
Town Facility & Institutional Uses	5%
Dedicated Open Space	10%
Road/Rail/Parking/Water	15%
Vacant	3%
Developed/Committed	97%
Vacant/Undeveloped	3%
Total Land Area	100%

Source: Darien 2014 Assessor Database

2.1.3 Climate and Climate Change

Current Conditions

Over the course of the year, the temperature in Darien typically varies from 23°F to 83°F and is rarely below 9°F or above 90°F. The warm season lasts from June 1 to September 15, with an average daily high temperature above 74°F. The hottest day of the year is July 20, with an average high of 83°F and low of 68°F. The cold season lasts from December 3 to March 12, with an average daily high temperature below 46°F. The coldest day of the year is January 29, with an average low of 23°F and high of 37°F.

Precipitation falls throughout the year in Darien. The wetter season lasts from March 31 to December 10, with a greater than 29% chance of a given day being a wet day. The chance of a wet day peaks at 35% on May 29. The smallest chance of a wet day is 22% on January 28.

The most rain falls during the 31 days centered around June 3, with an average total accumulation of 3.8 inches. The least rain falls around February 6, with an average total accumulation of 2.0 inches.

The snowy period of the year lasts from November 19 to April 5, with a sliding 31-day liquid-equivalent snowfall of at least 0.1 inches. The most snow falls during the 31 days centered around January 26, with an average total liquid-equivalent accumulation of 0.8 inches.

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

Climate Change

Climate change projections for Connecticut were sourced from the 2019 Connecticut Physical Climate Science Assessment Report, which was developed by the University of Connecticut (UConn) Atmospheric Sciences Group, commissioned by the Connecticut Institute for Resilience and Climate Adaptation (CIRCA) with funding from the Department of Energy and Environmental Protection (DEEP). All projections are based on the IPCC high CO_2 emission scenario (RCP8.5).

Temperature

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

Precipitation

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

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

The Northeast Regional Climate Center (NRCC) has partnered with the Natural Resources Conservation Service (NRCS) to provide a consistent, current regional analysis of rainfall extremes (http://precip.eas.cornell.edu/). In 2020 this dataset listed the 24-hour rainfall amount for a 50% annual-chance storm in Darien as 3.45 inches.

The NOAA Atlas 14, released on September 30, 2015 puts the 24-hour rainfall amount for a 50% annual-chance annual storm in Darien at 3.46 inches.

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

Table 2-3: 24-Hour Rainfall Amounts by Annual-Chance Occurrence

Source	24-Hour Rainfall Amount (inches) by Annual-Chance Occurrence		
	50%	4%	1%
Technical Paper No. 40	3.3	5.7	7.2
NRCC	3.45	6.38	8.95
NOAA Atlas 14	3.54	6.55	8.33

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 Darien can expect the 24-hour rainfall amount for a 50% annual-chance storm to be around 3.7 to 3.8 inches or greater.

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

2.1.4 Drainage Basins and Hydrology

Darien is divided among four sub-regional watersheds as shown in Table 2-4. All four basins flow directly into Long Island Sound. All of the water that passes through Darien ultimately empties into the 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
Darien River	6.21	5.52	3,532.88	43.46%
Noroton River	11.03	2.72	1,737.65	21.42%
Southwest Shoreline	41.41	3.60	2,307.68	28.35%
Five Mile River	12.49	0.86	551.00	6.77%
Total	n/a	12.7	8,129.21	100%

Source: Connecticut Department of Energy & Environmental Protection GIS Data

Darien is entirely encompassed within the Southwest Coast drainage basin, which drains directly into Long Island Sound. Of the four subregional drainage basins and their respective streams, the Five Mile River is the largest basin, and the Darien basin is the smallest.

The Noroton River is approximately 10 miles long and originates in New Canaan. The river flows into the Sound through Holly Pond.

2.2 Society, Culture, and Government

2.2.1 Population and Demographic Setting

According to the 2010 U.S. Census, Darien had a population of 20,732, with 1,632 persons per square mile. According to the 2018 American Community Survey five-year estimates, Darien's population between 2013 and 2018 was approximately 21,759. The Connecticut State Data Center predicts that population in Darien will increase in the future, with the population in 2040 projected to be 22,250.

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 Darien, 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.

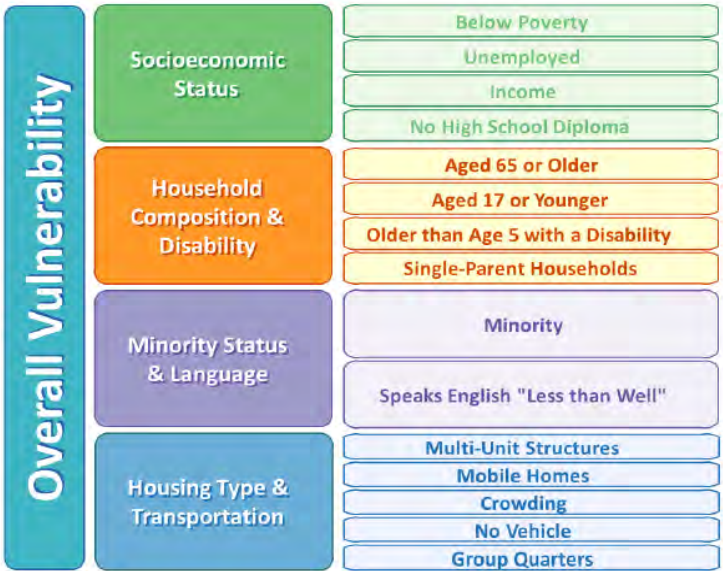


Figure 2-2: The CDC SVI Index Factors. Graphic: svi.cdc.com

The Town of Darien is considered to have a low level of overall vulnerability, with their most vulnerable social aspect being minority populations, and populations that speak English "less than well", along with populations with vulnerable household composition. These vulnerable populations are concentrated in the northern and western tracts. Appendix B explores the SVI for Darien in more depth, including maps showing overall vulnerability, and theme vulnerability.

2.2.2 Development Trends

While the neighboring City of Stamford rapidly settled in the early 18th century, farmers and settlers began expanding into the now region of Darien. Seeking less developed areas, the population of the town slowly grew and maintained a rural character.

The advancement of transportation, such as the railway and automobile slowly contributed to an increasing population, including many New York residents who built vacation homes along the coast. Overall, the town maintained a rural characteristic into the 19th century, as more suburbanized communities began to appear outside of the built-up corridor along the railway and interstate.

Development continues at a moderate pace in Darien, focused in the western areas of Town and along the Route 95 corridor. Darien supports limited transit-oriented development in the areas

around its Noroton Heights and downtown passenger rail stations. The Town recognizes some limitations in each, given the proximity to flood zones.

Recent developments include three new mixed-use developments currently underway and expected to be complete within two to four years. These new developments are complying with Town regulations and including updates to the local drainage infrastructure. One such development involves the previous Pear Tree Point School property, which is being converted to multiple lots of single-family homes. Parts of this property are located in close proximity to 1% annual-chance flood zones, but no structures will be built within a flood zone. This is typical of all new developments in Darien. They are either located in areas with lowest risk, or developed in a way that reduces risk. Overall, community vulnerabilities are not increasing.

2.2.3 Governmental Structure

The Town of Darien has an elected Board of Selectman including the Chief Elected Official, the First Selectman, and four other board members. In addition to the Board of Selectman, that are several boards, commissions, and committees that provide input and direction to town administrators. Town departments provide municipal services and day-to-day administration. Several commissions and committees play a role in hazard mitigation including Planning and Zoning, Environmental Protection, Advisory Commission on Coastal Waters, and the Advisory Committee on Sustainability. Town departments such as Public Works, Emergency Management, and the Fire Department also play a role.

2.2.4 Historic and Cultural Resources

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

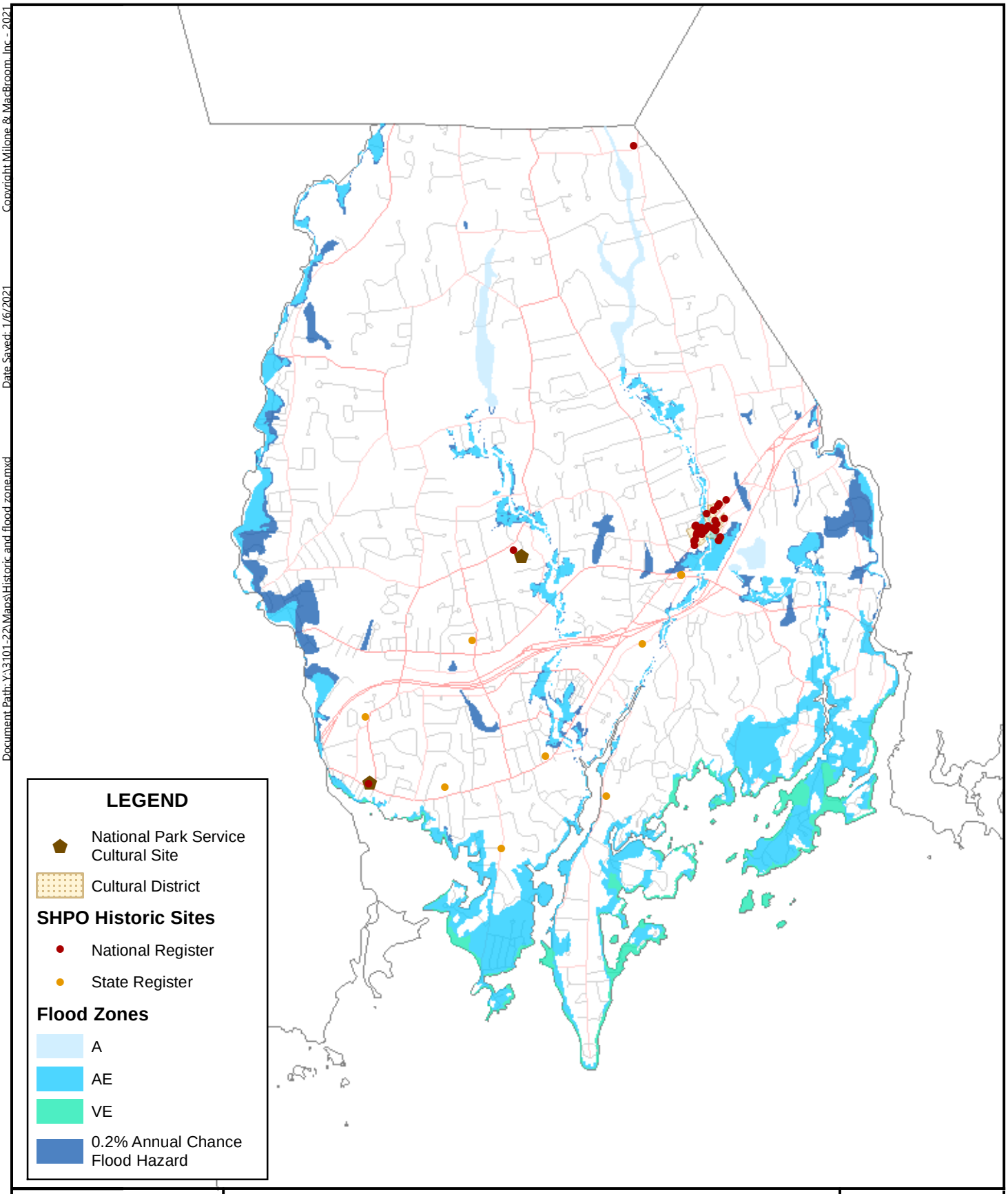
> **Historic preservation planning** helps protect historic properties and cultural resources from demolition or alteration. **Hazard mitigation planning** helps protect life and property from damage caused by natural and manmade hazards. **Integrating** these two planning processes helps create safe and sustainable historic communities.
> - Paraphrased from FEMA Report 386-6

Historic resources in Darien are concentrated within the Boston Post Road Historic District. The district has 23 contributing buildings, including the First Congregational Church, the old town hall building, a row of 12 nineteenth-century houses, and the Bates-Scofield House. Darien historic resources also include the Stephen Tying Mather House, the Meadowlands, the Pond-Weed House, and other sites around Town. 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 that some of these resources are exposed to natural hazards, as shown in Table 2-5.

Date Saved: 1/6/2021

Document Path: Y:\3101-22\Maps\Historic and flood zone.mxd



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

Historic Resources with Flood Zones and Dam Failure Inundation Areas

WestCOG Hazard Mitigation Plan

Town of Darien

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

N

0 2,000 4,000
Feet

SCALE 1 " = 3,998 '

DATE 1/6/2021

3101-22
PROJ. NO.

FIG. 2-3

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

Hazard	Count
Dam Failure	0
Earthquake	42
Flooding	-
1% Annual	0
0.2% Annual	2
Storm Surge	0
Hurricane/Tropical Storm	42
Sea Level Rise	0
Thunderstorm	42
Tornado	42
Winter Storm	42
Wildfire	1

There are several historic resources in close proximity to the Goodwives River and another unnamed stream, putting these sites at an increased risk of flooding during an event. These, and other resources throughout town, may also be at risk of damages from wind or heavy snow depending on the age and ability of the structure to withstand severe weather.

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

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

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

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

2.3 Infrastructure

2.3.1 Transportation

Major transportation routes in Darien include Interstate 95 and the Route 1. Both routes bisect the town running from the southwest northeast to the Norwalk border. Routes 124 runs from the northern border south terminating at Route 1; route 136 also terminates at a similar location on route 1 but runs north from the Norwalk border. The terminus of these roads is adjacent is a

major intersection of Route 1, Interstate 95, and the Metro-North railway, with the Darien train station in proximity.

In addition, the Metro North/Amtrak rail lines also run through the town relatively parallel to Interstate 95. There are two stations in town. The Darien station is located in downtown Darien, and the Noroton Heights station is located farther west in the southern part of the Noroton Heights neighborhood. The CTtransit bus system is also active in the town with several stops throughout the community.

2.3.2 Utilities

Aquarion Water Company owns and operates one public water system in Darien; this is the utility's largest main system. This system provides water for a majority of the town; there are no other public water systems in Town. There are properties in the northern areas of town that rely on a private well for drinking water due to the lack of service mains identified in these areas.

Residents and businesses use oil, propane, or natural gas for heat. Natural gas is available intown via distribution lines from Eversource. Eversource is also the electric provider for Town. The Darien Public Works Department maintains the sewer systems in town along with an active Sewer Commission.

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

2.4 Planning and Regulatory Capabilities

Darien has in place a number of community planning mechanisms, regulations, and policies that serve to mitigate natural hazards by limiting development in hazardous areas, requiring buildings be constructed to certain standards, or otherwise directing development and construction toward increased resilience. These are summarized below.

2.4.1 Review of Existing Local Plans

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

- **Plan of Conservation and Development (POCD):** Darien's most recent POCD was adopted in 2016. It addresses natural hazard concerns within the community, and includes strategies that will mitigate risks from those hazards as the community continues to develop.
- **Stormwater Management:** Darien maintains a Stormwater Management Plan. This plan complies 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):** Darien 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:** Darien 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):** Darien's EOP is reviewed annually and updated as needed.
- **Watershed Management Plan:** A Watershed Management Plan has been developed for the Five Mile River Watershed. The Five Mile River Watershed Based Plan was developed for the South Western Regional Planning Agency (SWRPA) by AKRF, Inc. in 2012. This plan is 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:** Darien incorporates Open Space planning into the community's POCD. Additionally, the Town developed the *Darien Parks & Recreation Master Plan* in January 2018; this document highlights the public-health benefits of open space, summarizes existing open space assets, and calls for continued acquisition of open space areas.

2.4.2 Review of Regulatory Structures

Darien 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:** Darien enforces the Connecticut State Building Code locally.
- **Zoning Regulations:** Most recently updated in August 2020.
- **Inland Wetlands and Watercourses Regulations:** Most recently updated in April 2016.
- **Subdivision Regulations:** Most recently updated in June 2009. Include provisions promoting control of stormwater runoff, installation of firefighting water sources, construction of sufficient access and egress for emergency response, and burial of utilities.

2.5 Emergency Services, Critical Facilities, Sheltering, and Evacuation

The Town considers its police, fire, and governmental facilities to be critical since these are needed to ensure that emergencies are addressed while day-to-day management of Darien continues. Table 2-6 identifies these critical facilities.

Table 2-6: Critical Facilities

Facility	Address or Location	Type	Emergency Power	Shelter	In 1% Floodplain
Town Hall	2 Renshaw Rd	Municipal	✓	✓	**
Darien High School	80 High School Ln	School / Shelter		✓	**
Middlesex Middle School	204 Hollow Tree Ridge	School / Shelter		✓	
Tokeneke Elementary School	7 Old Farm Rd	School / Shelter		✓	***
Mather Community Center	2 Renshaw Rd	Community Center	*	*	
Darien Emergency Medical Service	0 Ledge Rd	Emergency Response			
Paramedics Station	701 Boston Post Road	Emergency Response			
Darien Police Department	25 Hecker Ave	Police/EOC			
Darien Volunteer Fire Department	848 Post Rd	Emergency Response			***
Noroton Fire Department	1873 Post Rd	Emergency Response			

Facility	Address or Location	Type	Emergency Power	Shelter	In 1% Floodplain
Noroton Heights Fire Department	209 Noroton Ave	Emergency Response			
Darien DPW	126 Ledge Rd	Public Works			
Hindley Elementary School	10 Nearwater Ln	School			
Holmes Elementary School	18 Hoyt St	School			
Ox Ridge Elementary School	395 Mansfield Ave	School			
Royle Elementary School	133 Mansfield Ave	School			
Tokeneke Elementary School	7 Old Farm Rd	School			
Atria of Darien	50 Ledge Rd	Care Facility			
Maplewood Of Darien	599 Post Rd	Care Facility			
The Residence at Sellecks Woods	1 Parklands Drive	Care Facility			

*** These facilities are located partially within, or within close proximity to, 1% annual-chance flood zones*
**** Located within 0.2% annual-chance flood zones*

There are several shelters for residents throughout the town, including schools and the community center. The Senior Center is the Town's primary emergency shelter.

Critical facilities are mapped in Figure 2-4.

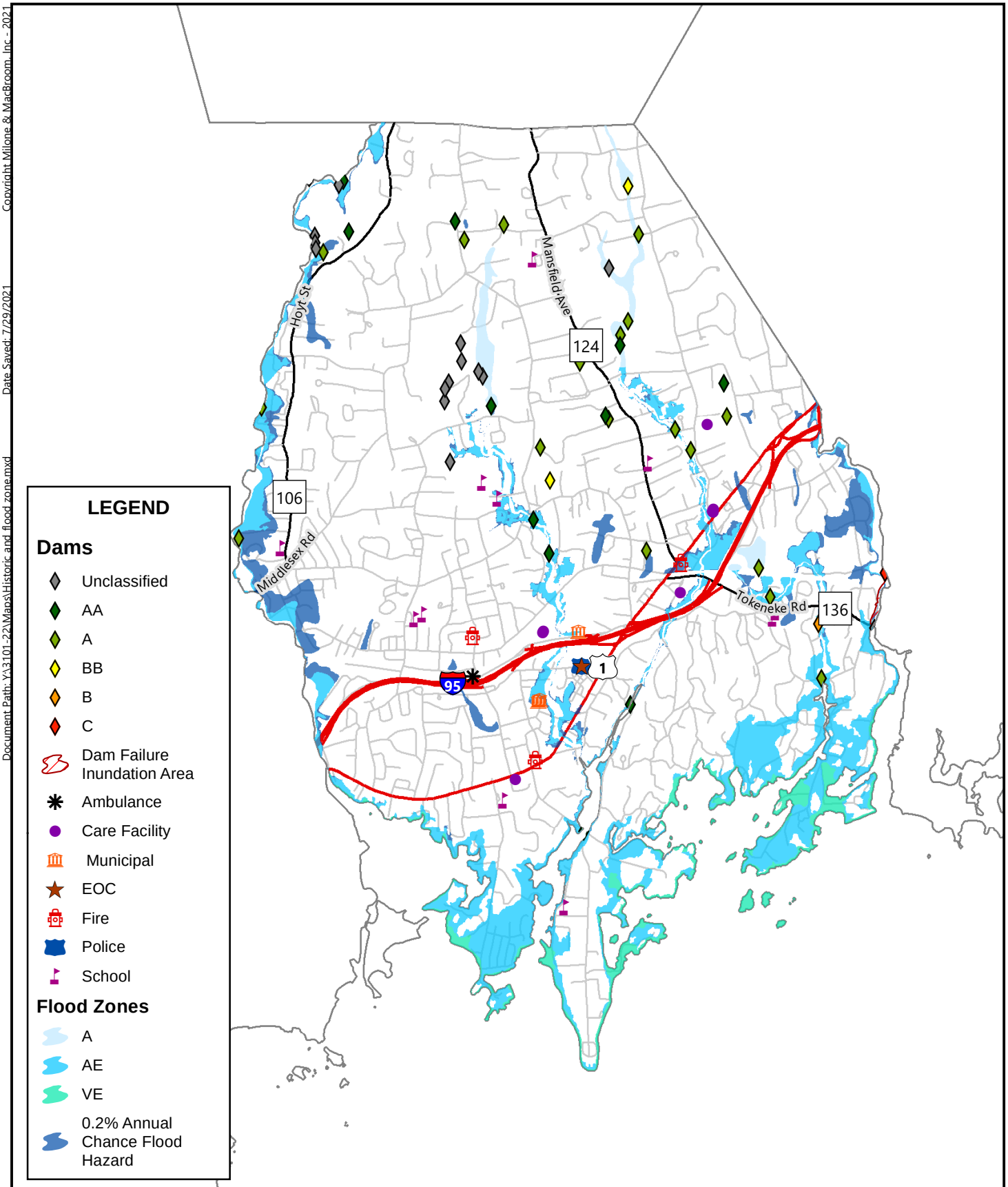
Emergency Response

The town's Emergency Operations Center (EOC), is located in the Police Department. Darien is located in the Connecticut Department of Emergency Services and Public Protection (DESPP) Region 1, consisting of 14 municipalities in southwestern Connecticut.

The town has an active tree maintenance program, which includes a pruning list to track progress and need throughout the town.

Date Saved: 7/29/2021

Document Path: YA3101-22\Maps\Historic and flood zone.mxd



LEGEND

Dams

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

Flood Zones

- A
- AE
- VE
- 0.2% Annual Chance Flood Hazard

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

Critical Facilities with Flood Zones and Dam Failure Inundation Areas

WestCOG Hazard Mitigation Plan

Town of Darien

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

N

0 1,500 3,000
Feet

SCALE 1 " = 3,993 '

DATE 7/29/2021

3101-22
PROJ. NO.

FIG. 2-4

Emergency Communication Capabilities

The Town of Darien utilizes the CodeRED notification system to alert residents of emergency situations. This system allows the town to alert residents of situations with emergency notification telephone calls. Various media outlets are also used to relay information to the public. These resources are identified in Table 2-7.

Table 2-7: Public Media Outlets in Darien

Outlet	Media Type
WNLK-1350	AM Radio
WSTC-1400	AM Radio
WEFX-95.9	FM Radio
WKHL 96.7	FM Radio
WTNH Channel 8	Television
WFSB Channel 3	Television
News 12	Cable TV
Darien Channel 79	Cable TV
211 Infoline	Phone Hotline
NOAA NWS Weather Alert Radio	Radio

Information about natural hazards and hazard preparedness are posted on the town Website through the Public Safety Health & Welfare Department.

Changes to Emergency Services since the Previous HMP

The Town upgraded the backup generator at the Town Hall at the end of 2020. This new equipment also serves the adjacent Senior Center, and allows that facility to serve as the Town's primary shelter.

3.0 HAZARD ASSESSMENT

3.1 FLOODING (COASTAL, INLAND, AND ICE JAMS)

3.1.1 Setting

The potential for flooding exists across Darien, with the majority of major flooding occurring along established riverine and coastal 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 can also be a concern. This type of flooding occurs particularly along roadways as a result of inadequate drainage and other factors. Coastal flooding can occur during a severe storm event by way of storm surge, and can also occur as nuisance flooding, which is experienced during extremely high tide events. The frequency of flooding in Darien is considered likely for any given year, with flood damage potentially having significant effects during extreme events.

A regulatory floodplain with AE designation has been mapped along the Noroton River, Stony Brook, Goodwives River, Tokeneke Brook, and the Five Mile River. There are also regulatory floodplain areas with a VE or an AE designation along the Long Island Sound shoreline. The 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. Floodplain and floodway designations have also been established along the rivers with AE designations. Refer to Figure 2-4 for the areas of Darien susceptible to flooding based on FEMA flood zones.

In general, potential flooding problems in Darien are concentrated along the multiple rivers, and the coastline. Town officials have noted that nuisance flooding has become an increasing concern, especially along Pear Tree Beach. Other areas at risk of coastal flooding including Holly Pond, Contentment Island Road, and sections of Tokeneke.

Coastal flood events, especially storm surge during hurricanes and tropical storms, can cause some of the most severe damage with high economic impacts to the town and residential properties. Figure 3-1 depicts hurricane storm surge inundation zones.

3.1.2 Capabilities

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

Floodplain Management, NFIP and CRS

The Town has consistently participated in the NFIP since January 2, 1981 and intends to continue participation in the NFIP. SFHAs in Darien are delineated on a Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS). The FIS and FIRMs for the town were most recently revised in 2013.

The NFIP administrator for the Town oversees the enforcement of NFIP regulations. The degree of flood protection established by the variety of regulations in the Town meets the minimum reasonable for regulatory purposes under the NFIP. The City has a minimum elevation standard to include one foot of freeboard.

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

The town does not participate in the FEMA Community Rating System (CRS) program.

Ordinances, Regulations, and Plans

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

- ***Zoning Regulations***:
  - Section 820: Flood Damage protection
  - Section 825(d)(6) & (7): New and substantially improved residential and nonresidential buildings require 1 foot of freeboard.
  - Section 825(f)(7): There shall be no alteration of sand dunes that would increase potential flood damage.

- ***Inland Wetland and Watercourse Regulations***:
  - "Significant Impact": any activity, including, but not limited to, the following activities which have a major effect: any activity which substantially diminished the natural capacity of an inland wetland or watercourse to: support aquatic, plant or animal life and habitats; prevent flooding; supply water; assimilate water' facilitate drainage; provide recreation or open space; or perform other functions.

- ***Subdivision Regulations:***
  - Generally requires that land of certain geophysical nature that may aggravate or create a flood hazard cannot be used unless appropriates measures are taken.
  - In areas contiguous to brooks, rivers, or other bodies of water subject to flooding, including tidal areas, proper provision shall be made for flood protection, including effects on neighboring properties and downstream areas, or properties.
  - Reiterates 1 foot of freeboard for new and substantially improved residential construction.

Drainage and Street Flooding

The Town Department of Public Works (DPW) is in charge of the maintenance of the town's drainage systems and performs clearing of bridges and culverts and other maintenance as needed.

Flooding associated with poor drainages frequently occurs in various areas of town. The intersection of Route 1 and Hecker Avenue often experiences flooding related problems, as well as Leroy Avenue and Raymond street at railroad underpasses. Certain stretches of Route 1 flood often enough that businesses are pursuing mitigation strategies to prevent future disruptions and future damages.

The town tracks flooding complaints as they are filed with planning and zoning, public works and the First Selectman's office.

Warning and Alerts

The town receives regular weather updates through Division of Emergency Management and Homeland Security (DEMHS) Region 1 email alerts as well as watches and warnings through the National Weather Service. A tidal gauge in Bridgeport helps town officials watch for flooding conditions and respond accordingly.

Public Information

Darien hosts links to all of the most recent FIRMs for the community on its website. Additionally, the Town maintains an interactive online flood mapper that allows members of the public and decision-makers to explore a detailed digital FIRM for the entire Town. The online mapper includes information about the NFIP and map updates, as well as links to Darien Flood Damage Prevention Regulations and the Connecticut Institute for Resilience & Climate Adaptation (CIRCA) sea level rise projections.

Actions Completed and New Capabilities

The town is currently addressing infrastructural needs and upgrades in certain flood prone areas, especially in regard to coastal infrastructure at risk of inundation. The town is also continuously exploring ways to preserve open space to minimize the risk of flooding. Development of the interactive Darien Flood Hazard Mapper has increased the Town's capability to communicate important flood hazard information to the public.

3.1.3 Vulnerabilities and Risk Assessment

Repetitive Loss Properties

There are 55 repetitive loss properties (RLPs) located in the Town of Darien; 45 are residential and 10 are commercial. There are 30 properties located along the shoreline that are likely repetitive due to coastal flooding, 7 along Stony Brook, 2 properties along the Goodwives River, 7 along the Noroton River, and the remaining properties are not located in a FEMA designated flood zone.

Table 3-1: Repetitive Loss Properties

Count	Flooding Source	Mapped Floodplain
30	Coastal Flooding	1% Annual Chance
7	Stony Brook	1% Annual Chance
2	Goodwives River	1% Annual Chance
7	Noroton River	1% Annual Chance
9	Other	X: Minimal Risk of Flooding

Critical Facilities

There are no critical facilities located entirely in a FEMA flood zone, however, there are two facilities that are either partially located in a zone (the Town Hall) or in close proximity of a flood zone (the Darien High School). These are listed below. There are also two facilities located in the 0.2% annual chance flood zone: Darien Volunteer Fire Department on Boston Post Road and areas of the Tokeneke Elementary School property, but not the building itself.

The at-risk facilities include:

- Darien Town Hall
- Darien High School

Darien staff has also observed that there are several sewer pumping stations in Town that are vulnerable to flooding. The Town is interested in pursuing floodproofing and other upgrades.

At-Risk Areas

Figure 2-4 depicts FEMA flood zones in Darien. Figure 3-1 shows hurricane storm surge inundation zones.

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

- Neighborhood adjacent to Town Hall
- Boston Post Road and Hecker Avenue
- Leroy Avenue, and Raymond Street at train underpasses
- Various locations along Boston Post Road
- Pear Tree Beach
- Weed Beach
- Coastal flooding at Holly Pond, Contentment Island Road, and through Tokeneke

Flooding at the intersection of state and town roads results in major traffic diversions and impedes emergency response capabilities, as the reroutes for emergency vehicles are very indirect. Boston Post Road and Leroy Avenue, which lie on either side of the Darien Train Station, flood during heavy rains; Town staff observe that drainage issues appear to be related to tides. The Town has begun to permanently station barricades along these roadways for deployment because flooding has become so frequent. Boston Post Road is the Town's primary emergency route. Mitigation of flooding in this area should be a focus for the Town moving forward; such mitigation would also align with the goals of the Resilient CT initiative, which supports the creation of resilient corridors centered around transportation hubs, such as train stations.

Two areas of flooding concern include the location of a new mixed-use development, and a residential neighborhood adjacent to town hall. It is anticipated that the drainage upgrades associated with the mixed-use projects will help alleviate these concerns.

Flooding in front of the Jaguar Dealership along Boston Post Road, just south of the I-95 interchange, is also problematic. The dealership has begun to address flooding on the property with pursuing the installation of a floodwall, however, the roadway still floods.

There are sections of the Noroton River that have relatively wide floodplains in town, increasing the flood risk to development in these areas. In addition, there is also a large floodway surrounding Gorhams Pond, which is located at the confluence of Stony Brook and the Goodwives River. While other streams in town also have flood zones, these may be the higher risk areas.

Town staff have also noted a concern with regard to privately-owned and maintained roads; the associations responsible for these roads sometimes do not perform the maintenance or upgrades necessary to ensure adequate drainage and flood control. This can result in blocked or washed-out roads, and a need for municipal intervention to perform emergency stabilization or resident rescues.

Long Island Sound Coastline

The shoreline of Darien is primarily residential. The entire coastline, specifically the southern areas of Norton and the eastern neighborhoods of Tokeneke are identified to have low lying, coastal stretches which may be at risk of both nuisance and storm surge flooding.

Changes and Improvements

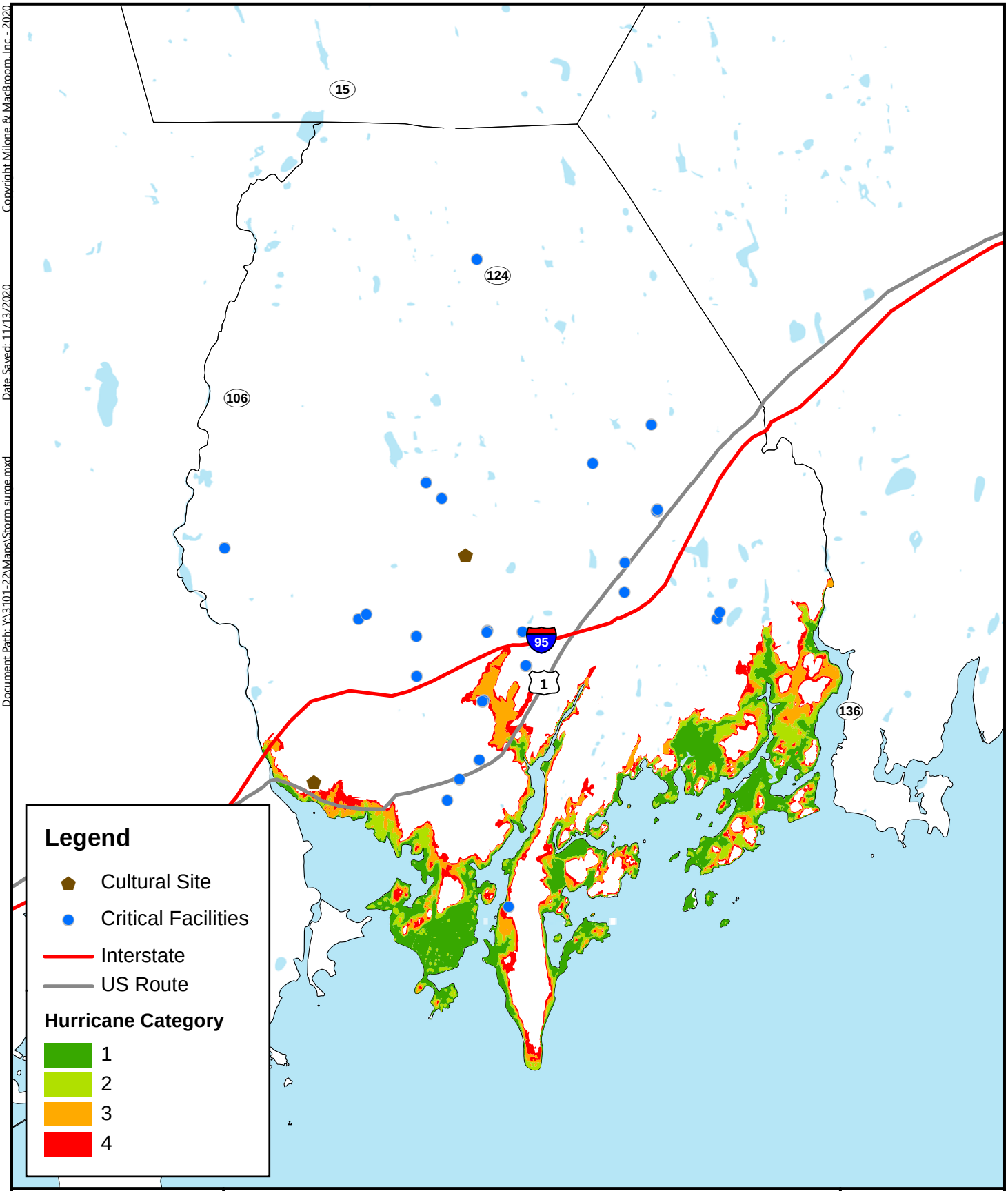
The town has begun evaluating the best course of action to upgrade Town-owned facilities along Pear Tree Beach and Weed Beach.

A new mixed-use development is currently being constructed in an area that has experienced poor drainage flooding in the past. The town has worked closely with developers to ensure drainage designs will control this flooding concern in the future.

Town staff report that several repetitive loss properties have been elevated, though this is not reflected on the official RLP list.

Date Saved: 11/13/2020

Document Path: Y:\3101-22\Maps\Storm surge.mxd



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

Hurricane Storm Surge Inundation Areas

WestCOG Hazard Mitigation Plan
Town of Darien

NPS: Cultural Resources
DEEP: Storm Surge Areas

N

0 1,500 3,000
Feet

SCALE	1 " = 3,994 '
DATE	11/13/2020
PROJ. NO.	3101-22

FIG. 3-1

3.2 DAM FAILURE

3.2.1 Setting

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

3.2.2 Capabilities

Dam failure inundation areas are included in the CT Alert emergency notification system contact database. The Town works with dam owners to ensure compliance with Connecticut DEEP Dam Safety Regulatory Program, which oversees dam maintenance and reporting. There are few dams of concern in or upstream of Darien.

Actions Completed and New Capabilities

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

3.2.3 Vulnerabilities and Risk Assessment

As of 2013, there were 46 DEEP-inventoried dams within the Town of Darien. These dams are shown in Figure 2-4. There are no Class C high hazard dams located in the Town of Darien; there is however a Class C dam located on Five Mile River in Norwalk along the town border. There is only one dam in town that is a Class B, significant Hazard. As shown in Table 3-1, the high hazard dams pose the greatest risk in the event of a breach

Table 3-1: High Hazard Dams with Potential to Affect the Town of Darien

#	Name	Location	Class	Owner
10312	Chasmars Pond Dam	Five Mile River, Norwalk	C	Private & CT DOT
3501	Streets Pond Dam	Tokeneke Brook	B	Private

Failure of a high hazard dam can affect properties downstream of the impoundment, with potential large inundation zones traveling along each respective waterway. The Chasmars Pond Dam, as delineated by Connecticut DEEP, does not have a large inundation zone in relation to other Class C dams in the State. The failure of this dam could potentially impact residential properties along the Five Mile River, and quickly disperse into the sound as the dam is located close to the mouth of the river.

Changes and Improvements

Darien continues to be at low risk from dam failure.

3.3 HURRICANES AND TROPICAL STORMS

3.3.1 Setting

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

Connecticut is located in FEMA Zone II regarding maximum expected wind speed. The maximum expected wind speed for a three-second gust is 160 mph. The American Society of Civil Engineers recommends that new buildings be designed to withstand this peak three-second gust.

3.3.2 Capabilities

Wind loading requirements are addressed through the state building code. The current code was updated and effective as of October 1, 2018. The code specifies the design wind speed for construction in all the Connecticut municipalities. Effective 2018, the ultimate design wind speed for Darien is 110 miles per hour for a Category 1, 120 miles per hour for a Category 2 and 130 for Category 3 or greater. Darien 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 Town has a tree maintenance program, with an active pruning list; tree maintenance is critical to reducing outages.

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

Actions Completed and New Capabilities

Several public facilities have been recently upgrade to either meet or exceed wind codes.

3.3.3 Vulnerabilities and Risk Assessment

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

Most of the housing stock in town predates recent building code changes, and so may be susceptible to roof and window damage from high winds. The primary risk associated with tropical storm winds is the downing of trees and limbs, leading to power outages and blocked roads.

No specific areas of concern regarding windstorms have been noted by town staff. The Department of Public Health has great concern over loss of power as it directly impacts food safety, water potability/availability, and the municipal sewage system during a crisis.

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 Darien. 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 Darien 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

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

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

Actions Completed and New Capabilities

Darien has upgraded facilities to withstand severe winds storms. The town also continuously maintains trees throughout town to minimize downed power lines and outages.

3.4.3 Vulnerabilities and Risk Assessment

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

Darien has moderate to high potential to experience tornado damage. In addition, NOAA states that climate change has the potential to increase the frequency and intensity of tornadoes, so it is possible that the pattern of occurrence in Connecticut could change in the future.

Thunderstorms are expected to impact Darien about 20 days each year. The majority of these events do not cause any measurable damage. Although lightning is usually associated with thunderstorms, it can occur on almost any day. The likelihood of lightning strikes in the Darien area is high during any given thunderstorm although no one area of the town is at higher risk of lightning strikes. There is also risk of a hailstorm occurring at least once per year in Darien.

The risk of downbursts occurring during such storms and resulting in damage 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 more densely developed and surrounding areas, while more tree damage is expected in the less densely populated areas in the northern areas of town.

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. Most downed power lines in Darien 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.

In May 2018, a series of intense thunderstorms, including downbursts, struck the region. This event did not impact Darien to the same extent as it impacted some nearby communities, but high winds did result in downed electrical wires and power outages.

Changes and Improvements

Darien maintains a strong tree trimming program, reducing risks throughout town.

3.5 WINTER STORMS AND NOR'EASTERS

3.5.1 Setting

The entire Town of Darien is susceptible to winter storms and, due to its variable elevation, can have higher amounts of snow in the northern neighborhoods. In general, winter storms are considered highly likely to occur each year (although major storms are less frequent), and the hazards that result (nor'easter winds, snow, and blizzard conditions) can potentially have a significant effect over a large area of the town.

3.5.2 Capabilities

Prior to a winter weather event, the town ensures that all warning/notification and communications systems are ready and ensures that appropriate equipment and supplies, especially snow removal equipment, are in place and in good working order. In some known problem areas, prestorm treatment is applied to roadways to reduce the accumulation of snow. The town also prepares for the possible evacuation and sheltering of some populations that could be impacted by the upcoming storm (especially the elderly and special needs persons).

The town has robust road-clearing capabilities with regard to snow events. Priority is given to plowing egresses to critical facilities. CT DOT plows all State roads and Interstates. Homeowners, private associations, and businesses are responsible for plowing their own driveways and roads.

For municipal property, the town budget for tree removal and minor repairs is generally adequate to handle winter storm damage although the plowing budget is often depleted.

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

Actions Completed and New Capabilities

Darien's winter storm mitigation capabilities continue to be significant, although there has not been a significant change in these capabilities since the previous HMP was adopted.

3.5.3 Vulnerabilities and Risk Assessment

The entire Town of Darien 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. Since 2003, the town has received over $350,000 in public assistance reimbursements for winter storms, proving these events can be very costly. However, many damages are relatively site specific and occur to private property (and therefore are paid for by private insurance) while repairs for power outages are often widespread and difficult to quantify to any one municipality.

Icing is often a concern for the entire community. While there is no one area of concern, the degree of impacts to certain areas is variable with each storm.

The structures and utilities in town 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 is typically a concern for the entire community, with impacts to certain areas varying with each storm.

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

3.6 WILDFIRES AND DROUGHT

3.6.1 Setting

The Town of Darien is generally considered a moderate risk area for small wildfires but a low risk area for large wildfires. Wildfires are of particular concern in outlying areas without public water service and other areas with poor access for fire-fighting equipment. Such areas in Darien are limited to the northern stretches of town where public water is likely unavailable. Hazards associated with wildfires include property damage and loss of habitat.

In addition, Darien, 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.

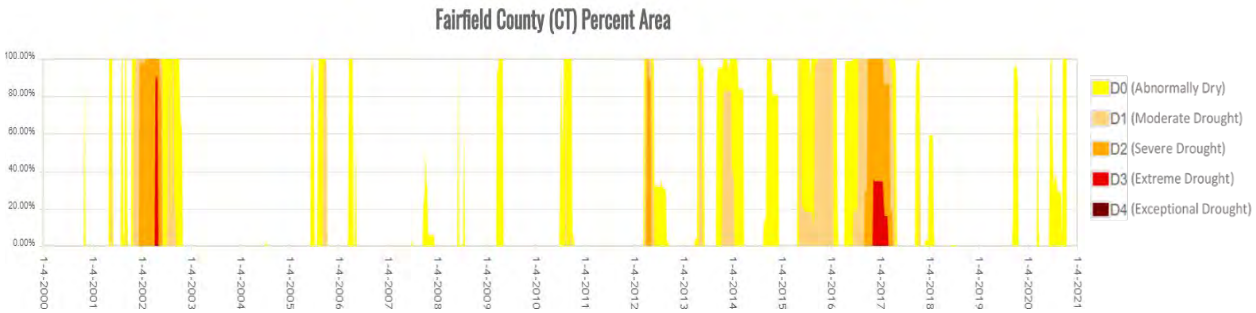


Figure 3-2: USDM Drought Time Series for Fairfield County

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

3.6.2 Capabilities

Regulations regarding fire protection in Darien are outlined in the town *Code of Ordinances:*

- Section 26-31: (a) No person, within the limits of the town and without a written permit issued by the fire marshal, shall burn any leaves, brush or other combustible material in the open air except:
  - (1) In a covered metal container constructed for such purpose;
  - (2) In a fireplace constructed of incombustible material and having a flue screen; or
  - (3) In a grill designed for cooking of foods.

- Section 26-32: When the fire marshal deems that the public safety of the town may be jeopardized by fires in the open air, he may deny any application for a fire permit for such period of time as he believes advisable or he may limit the duration of the permit. No permit shall be issued for a period in excess of 30 days.

The town's fire department is volunteer, with three stations located throughout the community.

- Darien Volunteer Fire Department – 848 Post Road
- Noroton Volunteer Fire Department – 1873 Boston Post Road
- Noroton Heights Volunteer Fire Department – 209 Noroton Avenue

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

The Town implements the state Open Burning Program locally. Information on open burning is available on the Town website.

Actions Completed and New Capabilities

The Town continues to mitigate wildfires adequately.

3.6.3 Vulnerabilities and Risk Assessment

In the drought year of 1999, the average wildfire in Connecticut burned five acres in comparison to the two most extreme wildfires recorded since 1986 that burned 300 acres each. Given the availability of firefighting water in Darien, including the use of nearby water bodies, it is believed that this average value for a drought year and the extreme value are applicable to the town as well.

Wildfires are more common in rural areas than in developed areas as most fires in populated areas are quickly noticed and contained. In many areas, structures and subdivisions are built abutting forest borders, creating areas of particular vulnerability. 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. There are few areas in Darien that pose a risk of wildfire or brushfire; these include the areas near Woodland Park, Littlebrook Road and Dunlap Lake, and the Wee Burn Country Club.

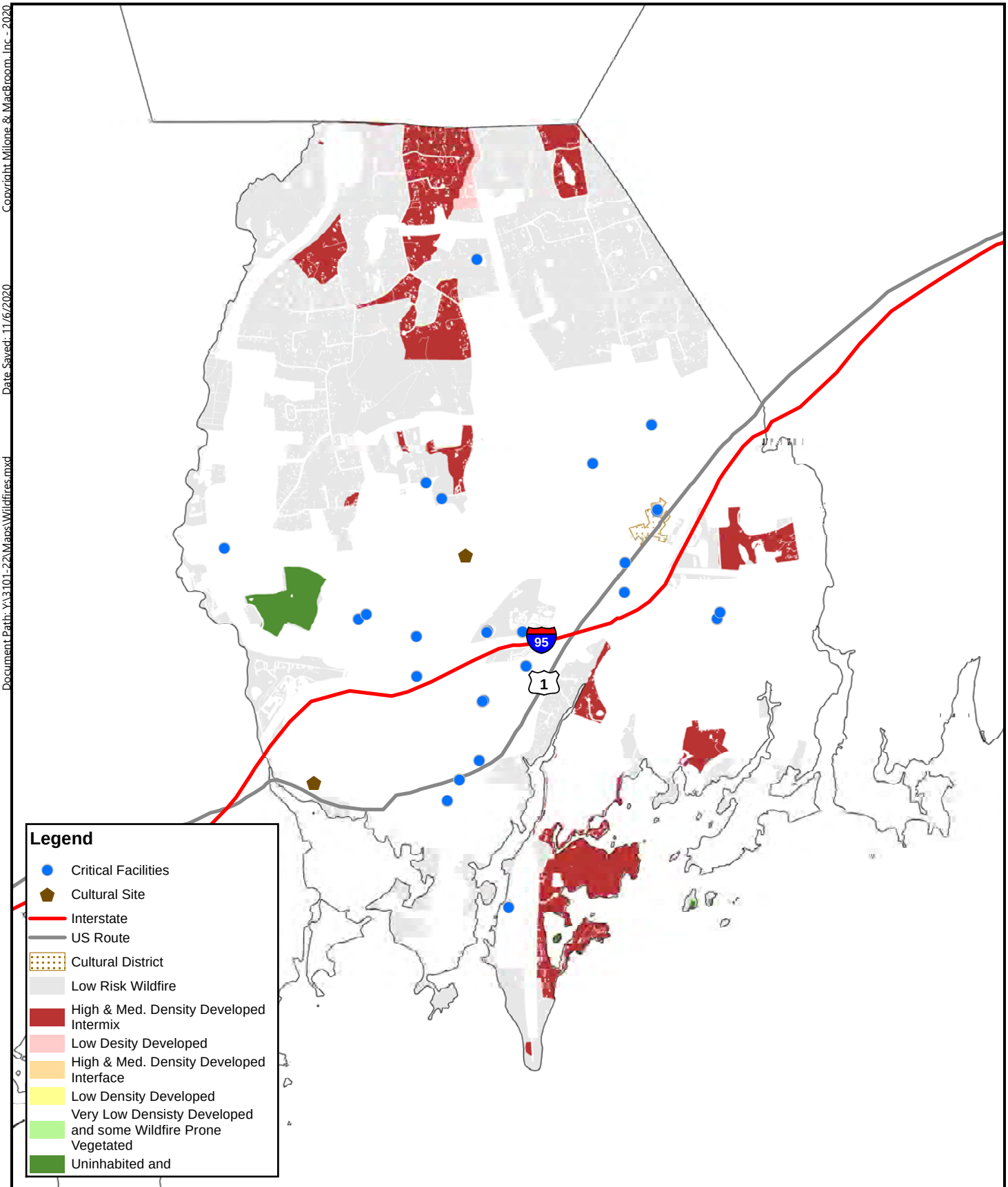
Wildfire Risk Areas are mapped in Figure 3-3

Changes and Improvements

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

Date Saved: 11/6/2020

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



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

Wildland-Urban Interface: Wildfire Risk Areas

WestCOG Hazard Mitigation Plan

City of Darien

NPS: Cultural Resources

Wildland-Urban Interface:USFA

N

0 1,500 3,000

Feet

SCALE 1 " = 3,992 '

DATE 11/13/2020

3101-22
PROJ. NO.

FIG. 3-3

3.7 EARTHQUAKES AND LANDSLIDES

3.7.1 Setting

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

3.7.2 Capabilities

The town has adopted the state building codes for new construction, and they are enforced by the Building Official. Due to the infrequent nature of damaging earthquakes, land use policies in the Town do not directly address earthquake hazards. However, various documents do indirectly discuss areas susceptible to earthquake damage and regulations that help to minimize potential earthquake damage.

- **Subdivision Regulations:**
  - Land of such geophysical nature that, in its present state, cannot be used for building purposes because of danger to health, or the public safety, because of peril from fire or flood, or other conditions, such as difficult drainage, configuration, inaccessibility, temporary flooding, erosion, steep sloping topography, wetlands, swamps, large rock outcrops, or high ground-water level, shall not be planned for residential use, nor for other such uses as may increase danger to health, life or property, or aggravate or create a flood hazard, unless appropriate measures have been taken by the subdivider to correct such hazard in accordance with the specifications declared a part of these Regulations, or the specific requirements established by the Planning and Zoning Commission, pursuant to these Regulations.
- **Plan of Conservation and Development:**
  - Recommends the continued protection of natural resources such as steep slopes, sensitive habitats and other natural diversity areas.
- **Zoning**
  - The town has a height restriction of 30 feet, which applies to most residential and municipal buildings; this may help reduce earthquake damage risks.

Actions Completed and New Capabilities

Darien continues to have appropriate capabilities for mitigating earthquake events.

3.7.3 Vulnerabilities and Risk Assessment

Some areas in Darien, specifically along the coastline, are underlain by artificial fill. Structures in these areas are at an increased risk from earthquakes due to amplification of seismic energy and/or collapse. Most of the remaining area is underlain by glacial till and is therefore not at increased risk during an earthquake due to unstable soils.

A series of earthquake probability maps was generated using the 2009 interactive web-based mapping tools hosted by the USGS. These maps were used to determine the probability of an

earthquake of greater than magnitude 5.0 or greater than magnitude 6.0 damaging the Town of Darien. Results are presented in Table 3-2 below.

Table 3-2: Probability of a Damaging Earthquake in the Vicinity of Darien

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

Changes and Improvements

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

3.8 SEA LEVEL RISE AND SHORELINE CHANGE

3.8.1 Setting

The coastal areas of Darien are susceptible sea level rise and shoreline change. With most of the shoreline being residential, and very little commercial and water dependent, residential properties are at a greater risk of future inundation. Sea level rise may not be considered a high hazard risk in and of itself, however, rising seas in conjunction with extreme weather may result in inundation farther inland that seen during past events. In addition to extreme weather, nuisance flooding may also become a more frequent issue during extreme high tides.

The State of Connecticut has adopted the recent sea level rise projections developed by the University of Connecticut, Connecticut Institute for Resilience and Climate Adaptation (CIRCA) as the latest planning threshold for coastal municipalities. This projection anticipates a rise of 50 cm by the year 2050.

3.8.2 Capabilities

The town has begun to see an increase in nuisance flooding, and has experience the impacts of extreme storm surge; leaving officials aware of the potential impacts of an extreme storm with elevated sea levels.

Town staff have begun to identify the areas that are at risk of increased nuisance flooding and solutions and mitigation strategies are being recognized. In an effort to protect municipal infrastructure, projects are also being developed and funded, such as the Greenwich Avenue pump station which is at risk of inundation.

Actions Completed and New Capabilities

The town has begun to upgrade infrastructure at risk of inundation, and private properties have begun elevating homes.

3.8.3 Vulnerabilities and Risk Assessment

The most at-risk areas are those immediately along the shoreline, with risk slightly declining moving inland. The southern areas of Noroton, and eastern properties in the Tokeneke neighborhood are particularly at risk of increased nuisance flooding under future sea levels. In addition, a 100-year storm event with one foot of sea level rise has the potential to inundate many of the coastal areas including Noroton Neck, Tokeneke Park, Hay Island, Butlers Island, and Colyer Point (at the western end of Contentment Island).

Pear Tree Beach regularly floods during high tides. This flooding has introduced a new challenge as the town begins to explore upgrades to the public facilities located on this beach.

Many of the coastal, low-lying areas that experienced flooding during Sandy have elevated homes, or in the process of elevating.

Other areas of concern for coastal flooding include Holly Pond, Contentment Island, and Tokeneke.

Flooding is also a concern for one of the primary sewer pumping stations near Weed Beach. The station was close to inundation during Sandy, and the town is concerned that with sea levels rising inundation may occur soon, ultimately disrupting the sewer service.

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	Targeted outreach and education to vulnerable communities and neighborhood associations to inform them of natural hazards that may impact them. Includes preparedness techniques such as understanding why voluntary evacuations should be taken seriously, the potential for emergency responders to not access parts of the community during severe events, and other concerns.	Carry Forward with Revisions	The town often sees pushback with this type of outreach and would like to see this incorporated into generic outreach activities.
2	Develop a series of additional brochures or website information promoting 'best management practices' for natural resources targeted to homeowners. Brochure examples include: sound landscaping practices and stormwater management.	Completed	Town is actively developing outreach materials. The Environmental Protection Committee also developed a wetlands brochure.
3	Review and continually update Darien's GIS system with information on Natural Disasters and other map layers that can be accessed for emergency as well as planning.	Capability	Capability. The town is continuously incorporating new data, including updated FEMA maps, into the GIS system.
4	Conduct drainage and watershed evaluations for the Tokeneke watershed.	Drop	Town sees this action as no longer pertinent. The risk does justify an evaluation.
5	Bridges, roadways and culverts, including those over navigable waterways should be maintained, inventoried, operated, repaired, and built to avoid or reduce potential for any significant adverse impacts on navigation, safety, environmental quality. Focus on several remaining bridges and culverts.	Carry Forward with Revisions	Revise this action to specifically identify the intersections and underpasses discussed.
6	Conduct an engineering study to assess the flood impacts and associated mitigation measures along Route 1 at the Metro-North rail overpass	Carry Forward with Revisions	The town would like to pursue this action, however, the financial burden should not full completely upon Darien. A revised action will provide more specificity.
7	Conduct outreach and education to volunteer Fire Department staff regarding emergency shelter operations, including associated protocols and best management practices.	Carry Forward with Revisions	Would like this action geared toward volunteer sheltering staff and not fire department staff as they are not typically involved in sheltering procedures.

#	Description	Status	Notes
8	Support and encourage the development of Long Range Water Supply Plans, to meet the future water supply needs. These include the State Drought Plan, the State Water Plan, and the Western CT Coordinated Water System Plan.	Capability	These plans are all complete as of 2018-2019, and the responsible agencies are working on implementation. This is an ongoing capability and the town remains active in supporting water supply planning implementation.
9	Support regulatory changes recommended in the PoCD regarding Zoning, Subdivision, Inland Wetlands and Watercourses regulations; and Harbors Ordinances.	Capability	The town is continuously supporting changes, and also relies on guidance from FEMA and changes necessary changes to regulatory standards.
10	Explore ways to protect and preserve open space, particularly coastal lands, wetlands and land within the flood plain. Acquire or protect land in the flood zone to minimize the risk of flooding.	Capability	This is an ongoing activity and capability of the town.
11	Continue to provide capital budget funds for drainage projects and investigation of drainage problems. Specifically, focus on remaining projects in capital improvement plan.	Capability	This is an ongoing, continuous action. The town wants to focus on the previous issues discussed.
12	Continue to encourage best management practices, including innovative Low-Impact Development (LID) practices, for managing stormwater runoff.	Capability	Capability. The town already promotes these activities.
13	Support local, regional and state efforts to provide protection and preservation of groundwater aquifers. These include the State Drought Plan, the State Water Plan, and the Western CT Coordinated Water System Plan.	Capability	Municipal staff is active in water supply planning, aquifer protection, and maintains a good relationship with Aquarion. The Plans mentioned are complete, and the responsible agencies are working on implementation.

4.3 Prioritization of Strategies and Actions

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

4.4 Mitigation Strategies and Actions Implementation Table

The Town proposed to initiate several new mitigation actions for the upcoming five years. These include the following:

- The town is looking to designate a new primary shelter.
- The intersections of concern are impacting access and the town would like to seek solutions for these issues.
- The pumping station at Weed Beach is vulnerable to inundation and mitigation actions may be necessary to protect this infrastructure.
- Regular flooding of Peach Tree Beach is impacting the necessary upgrades of public facilities and needs to be addressed. Darien is working with CT DEEP on a project to elevate the parking lot at Pear Tree Beach to help mitigate flooding.

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

The full suite of new actions to be pursued in this planning period are listed below.

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

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

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

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

Action DRN-05	
Mitigate flooding at the Weed Beach pumping station	
Lead	DPW
Cost	More than $500,000
Funding	Capital Improvement Plan, FEMA Grant, Other Grant
Timeframe	2025
Priority	High

Action DRN-06	
Conduct outreach and education to volunteer Emergency Shelter staff regarding emergency shelter operations, including associated protocols and best management practices.	
Lead	EM
Cost	$0 - $25,000
Funding	Operating Budget
Timeframe	2022
Priority	Med

Action DRN-07	
Collaborate with CIRCA on the "Resilient Connecticut" project; in particular, by pursuing mitigation of flooding along Boston Post Road and Leroy Avenue near the Darien Train Station, which aligns with Resilient Connecticut program goals.	
Lead	BOS
Cost	$25,000 - $50,000
Funding	Operating Budget
Timeframe	2022
Priority	Med

Action DRN-08	
Coordinate with CT SHPO to conduct outreach to owners of historic properties to educate them on methods of retrofitting historic properties to be more hazard-resilient while maintaining historic character.	
Lead	Planning
Cost	$0 - $25,000
Funding	Operating Budget
Timeframe	2022
Priority	Med

Action DRN-09	
Work with CT DEEP to elevate the parking lot at Pear Tree Beach to help mitigate flooding in this area.	
Lead	DPW
Cost	More than $1 million
Funding	Capital Improvement Plan, CT DEEP
Timeframe	2023
Priority	Med

Action DRN-10	
Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (flood zones, wildfire hazard zones, steep slopes) to identify historic resources at risk and support the preparation of resiliency plans across the state.	
Lead	Planning
Cost	$25,000 - $50,000
Funding	CT SHPO
Timeframe	2024
Priority	Med

Action DRN-11	
Develop a town-wide natural hazard outreach and education program to be implemented over the next five years to inform residents and business of natural hazard risks, mitigation measures, and preparedness techniques.	
Lead	EM
Cost	$25,000 - $50,000
Funding	Operating Budget
Timeframe	2024
Priority	Low

Action DRN-12	
Compare local floodplain regulations with Revised State Model Flood Regulations to identify any remaining opportunities for improvement	
Lead	Planning
Cost	$0 - $25,000
Funding	Operating Budget
Timeframe	2023
Priority	Low

Action DRN-13	
Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.	
Lead	EM, BOS
Cost	$0 - $25,000
Funding	Operating Budget, FEMA Grant
Timeframe	2023
Priority	Low

Action DRN-14	
Work with CT DEEP to validate and/or correct the RL list and update the mitigation status of each listed property.	
Lead	Planning
Cost	$25,000 - $50,000
Funding	FEMA Grant
Timeframe	2024
Priority	Low

Action DRN-15	
Annually conduct an emergency operations exercise for a local terrorism, sabotage, or mass casualty event.	
Lead	EMD
Cost	$25,000 - $50,000
Funding	Operating Budget
Timeframe	2024
Priority	Low

Action DRN-16	
Identify specific bridges and culverts known to be having adverse impacts on drainage, flooding, navigation, safety, and environmental quality. Upgrade identified bridges and culverts.	
Lead	DPW
Cost	More than $1 million
Funding	Capital Improvement Plan, FEMA Grant, Other Grant
Timeframe	2026
Priority	Low

Action DRN-17	
Work with CTDOT to conduct an engineering study to assess the flood impacts and appropriate mitigation measures along Route 1 at the Metro-North rail overpass.	
Lead	DPW
Cost	$50,000 - $100,000
Funding	Operating Budget, 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	
DRN-01	Provide information on the Town website about CT DEEP training and information around small business chemical management for hazard resilience.	CT DEEP Small Business Chem	EM, BOS	$0 - $25,000	Operating Budget, CT DEEP	2021	1	1	1	0	1	1	1	0	0	0	0	0	0	0	8
DRN-02	Use the CT Toxics Users and Climate Resilience Map to identify toxic users located in hazard zones within your community. Contact those users to inform them about the CT DEEP small business chemical management initiative.	CT DEEP Small Business Chem	EM, BOS	$0 - $25,000	Operating Budget, CT DEEP	2021	1	1	1	0	1	1	1	0	0	0	0	0	0	0	8
DRN-03	Host a CT DEEP presentation for municipal staff and local businesses about business chemical management for hazard resilience.	CT DEEP Small Business Chem	EM, BOS	$0 - $25,000	Operating Budget, CT DEEP	2021	1	1	1	0	1	1	1	0	0	0	0	0	0	0	8
DRN-04	Take one of the following actions that will mitigate natural hazard risks while also meeting Sustainable CT objectives: - Disseminate a toolkit for pre-disaster business preparedness. - Revise regulations to promote Low Impact Development. - Include the goals of this Hazard Mitigation Plan, and at least three other sustainability concepts, in your next POCD update.	Sustainable CT	BOS	$0 - $25,000	Operating Budget, Sustainable CT Community Match Fund	2021	1	1	1	1	0	1	1	0	0	0	0	0	0	0	8
DRN-05	Mitigate flooding at the Weed Beach pumping station	Critical Facility Mitigation	DPW	More than $500,000	Capital Improvement Plan, FEMA Grant, Other Grant	2025	0	1	1	1	1	1	1	0	0	0	0	0	0	0	8
DRN-06	Conduct outreach and education to volunteer Emergency Shelter staff regarding emergency shelter operations, including associated protocols and best management practices.	Emergency Response	EM	$0 - $25,000	Operating Budget	2022	1	1	1	1	0	1	0	0	0	0	0	0	0	0	7
DRN-07	Collaborate with CIRCA on the "Resilient Connecticut" project; in particular, by pursuing mitigation of flooding along Boston Post Road and Leroy Avenue near the Darien Train Station, which aligns with Resilient Connecticut program goals.	ResilientCT	BOS	$25,000 - $50,000	Operating Budget	2022	1	1	1	0	0	1	1	0	0	0	0	0	0	0	7
DRN-08	Coordinate with CT SHPO to conduct outreach to owners of historic properties to educate them on methods of retrofitting historic properties to be more hazard-resilient while maintaining historic character.	SHPO	Planning	$0 - $25,000	Operating Budget	2022	1	1	1	1	0	1	0	0	0	0	0	0	0	0	7
DRN-09	Work with CT DEEP to elevate the parking lot at Pear Tree Beach to help mitigate flooding in this area.	Structural Protection	DPW	More than $1 million	Capital Improvement Plan, CT DEEP	2023	1	1	1	1	0	1	0	0	0	0	0	0	0	0	7
DRN-10	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
DRN-11	Develop a town-wide natural hazard outreach and education program to be implemented over the next five years to inform residents and business of natural hazard risks, mitigation measures, and preparedness techniques.	Outreach and Education	EM	$25,000 - $50,000	Operating Budget	2024	1	0	1	1	0	1	1	0	0	0	0	0	0	0	6
DRN-12	Compare local floodplain regulations with Revised State Model Flood Regulations to identify any remaining opportunities for improvement	Floodplain Management Regulations	Planning	$0 - $25,000	Operating Budget	2023	0	1	1	0	1	1	0	0	0	0	-1	0	0	0	5
DRN-13	Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.	RLPs	EM, BOS	$0 - $25,000	Operating Budget, FEMA Grant	2023	0	1	1	0	1	1	0	0	0	-1	0	0	0	0	5

#	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	
DRN-14	Work with CT DEEP to validate and/or correct the RL list and update the mitigation status of each listed property.	RLPs	Planning	$25,000 - $50,000	FEMA Grant	2024	0	0	1	0	1	1	0	0	0	0	0	0	0	0	4
DRN-15	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
DRN-16	Identify specific bridges and culverts known to be having adverse impacts on drainage, flooding, navigation, safety, and environmental quality. Upgrade identified bridges and culverts.	Bridge & Culvert	DPW	More than $1 million	Capital Improvement Plan, FEMA Grant, Other Grant	2026	0	1	0	1	1	1	1	0	0	0	0	0	-1	0	5
DRN-17	Work with CTDOT to conduct an engineering study to assess the flood impacts and appropriate mitigation measures along Route 1 at the Metro-North rail overpass.	Flood Study	DPW	$50,000 - $100,000	Operating Budget, Grant	2026	1	1	0	1	1	1	0	0	-1	-1	0	0	0	0	4

APPENDIX B

Appendix B: SVI Summary

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

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

Hazards

Sea Level Rise

Rising seas have raised concerns in communities throughout the state for various reasons. The Town of Darien is currently experiencing increased occurrences of coastal flooding, both nuisance and storm related, with impacts to neighborhoods and critical infrastructure. While many homes have begun to elevate there is still concern regarding the low lying coastal areas that may become isolate during an event. There is also concern regarding sewer pumping stations. With sea levels rising, and storm intensity increasing, this infrastructure is vulnerable to inundation. Public facilities located at public beaches may also be impacted by nuisance flooding or storm surge.

Inland Flooding

With FEMA flood zones along a few rivers in town, such as the Noroton River and the Goodwives River, the town is also concerned with drainage related flooding. There are several locations along the Post Road that are prone to flooding because of poor drainage. These areas are situated in commercialized zones and often affect traffic patterns and emergency access to adjacent neighborhoods. With precipitation expected to increase due to climate change, flooding events may occur more frequently.

Winter Storms

Darien is largely residential, with many neighborhoods lacking multiple inlets and outlets. During winter storms, icing has proven to be of concern throughout many areas of the town. In conjunction with poor drainage in certain areas, and winter precipitation patterns expected to shift from snow to freezing rain and rain, icing may continue to be of concern to the town.

Drought and Extreme Temperatures

Most of the town is serviced by public water supply, with a small area of northern parcels likely serviced by private wells. 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.

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

- Coastal municipal infrastructure and neighborhoods
- Private well owners
- Poor drainage areas
- Emergency access

Secondary Impacts

Economic Impacts

With vulnerable critical infrastructure, the town faces an economic challenge of mitigating or relocating these facilities. There is also a potential economic impact to local businesses during inland flooding events. Poor drainage may reduce site access resulting in loss of business, or businesses may incur expenses related to flood mitigation or clean-up efforts.

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

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

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

Social Impacts

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

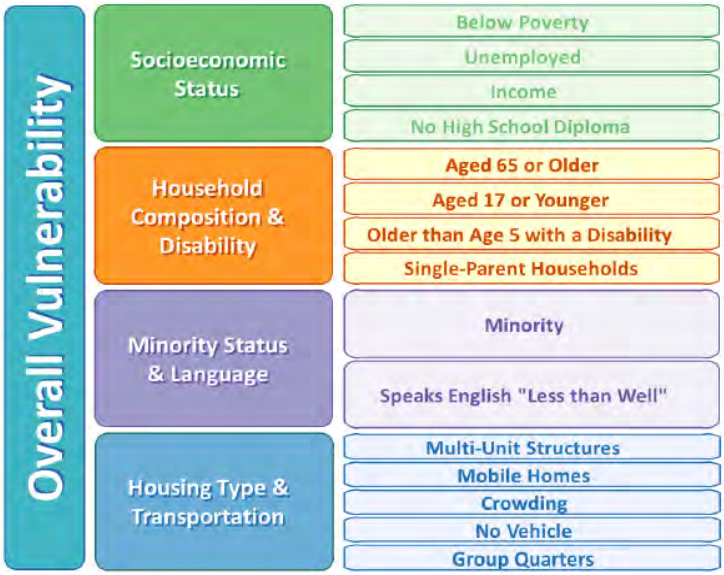


Figure 1: The CDC SVI Index Factors. Graphic: svi.cdc.com

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

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

Table 1: Darien SVI Factor Rankings

	Overall SVI	Socioeconomic	Household Composition & Disability	Minority Status & Language	Housing Type & Transportation
DARIEN	.08	.11	.18	.23	.11

The Town of Darien is considered to have a low level of overall vulnerability, with their most vulnerable social aspect being minority populations, and populations that speak English "less than well", along with populations with vulnerable household composition. These vulnerable populations are concentrated in the northern and western tracts.

These populations may be vulnerable to impacts from drought, inland flood and icing 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.

Poor drainage flooding presents the concern of pollution into nearby water bodies as these 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. In addition to the SVI, the Connecticut Department of Public Health (DPH)[1] has identified at least two facilities in Darien that are assisted living, and one convalescent home.

These 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, in addition to those identified in the SVI, 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.

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

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.