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

Municipal Annex
for
Norwalk, CT

125 East Avenue
Norwalk, CT 06851
August 2021

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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 City of Norwalk 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 1651, the City of Norwalk is located in southern Fairfield County and home to a population of 85,603 (2010 U.S. Census). Norwalk is bordered by the municipalities of Darien to the west, New Canaan and Wilton to the north, Westport to the east, as well as Long Island Sound along the south. Refer to Figure 2-1 for a map showing the regional location of Norwalk within the WestCOG region.

Norwalk is a coastal community, with several rivers and streams flowing throughout the community. The city is characterized by highly developed areas along the route 7 north to south corridor, and along the east to west running interstate 95 corridor. Lower elevations adjacent the shoreline is residentially developed, with commercial development increasing closer to the mouth of the Norwalk River; these areas are also low in elevation.

The Norwalk River flows south through the center of the City, parallel to Route 7, cutting through the suburban and urban areas before it eventually flows into Long Island Sound. There are no major lakes or reservoirs in the city, there are however several ponds along the Norwalk River, Fivemile River, and Woods Pond Brook.

The highest elevation in Norwalk is about 320 feet in the northern most areas bordering Wilton, with the southern area of Norwalk being at or close to sea level. The varying terrain of Norwalk makes the city 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 for Norwalk can be found in Table 2-1.

Table 2-1: Land Cover by Area

Land Cover Class	Percent of Total Land
Developed	44.7%
Turf & Grass	10.1%
Other Grasses	0.6%
Agricultural Field	10.7%
Deciduous Forest	1.2%
Coniferous Forest	0.8%
Water	0.1%
Non-Forested Wetland	0.4%
Forested Wetland	0.5%
Tidal Wetland	0.9%
Barren Land	0.2%
Utility Corridor	0.0%

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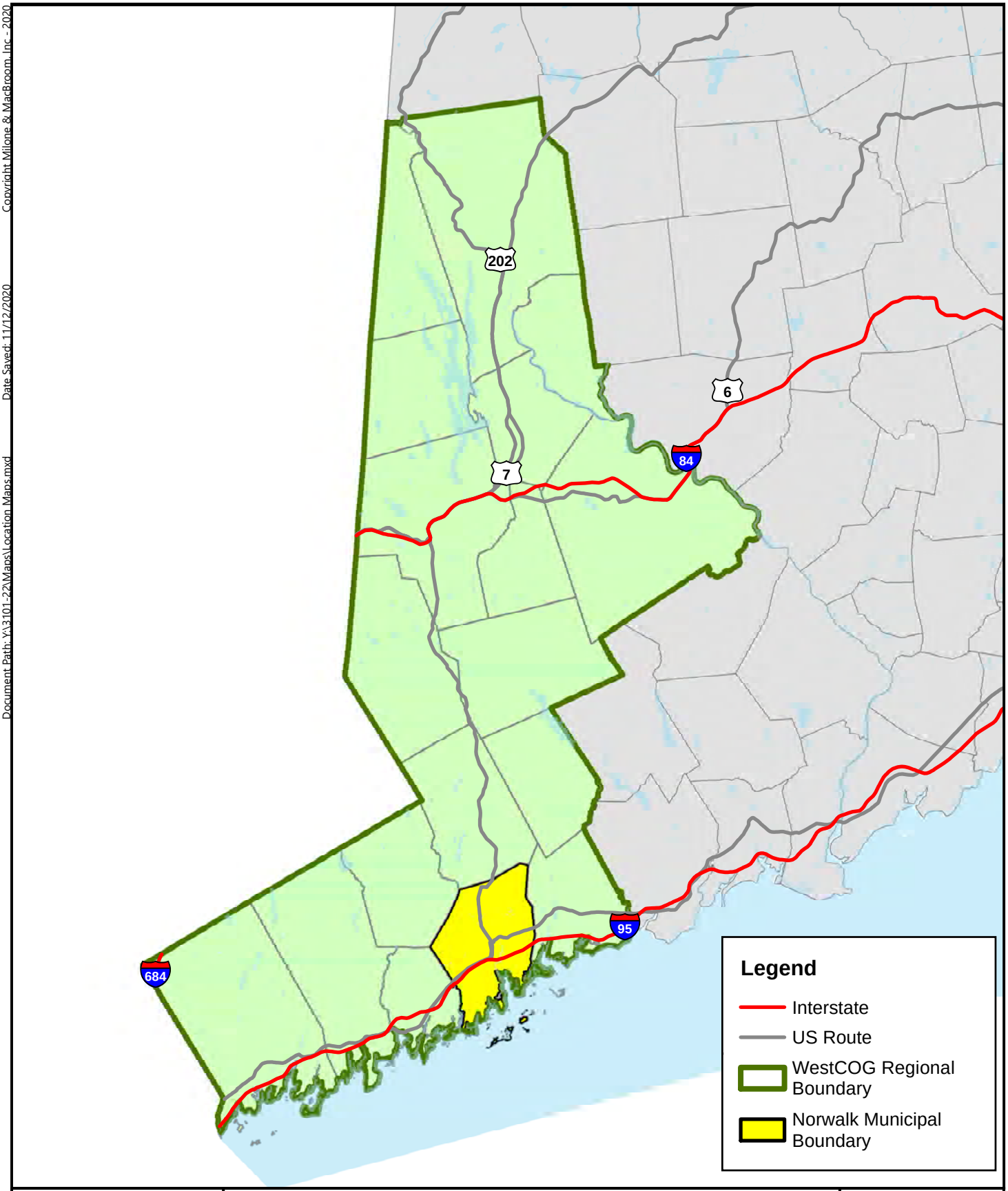

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Regional Location of Norwalk

WestCOG Hazard Mitigation Plan
City of Norwalk

N

0 40,000 80,000
Feet

SCALE 1 " = 82,167 '

DATE 11/12/2020

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FIG. 2-1

2.1.2 Land Use

Norwalk is a large city with both high urbanized areas, and suburban development. Most higher density development and commercial activity lies along the major roadway corridors, and along the Norwalk River. The highest concentration of commercial activity is focused in the southern part of the City around the Route 7 and I-95 interchange, in South Norwalk along the river. The areas outside of these corridors are primarily residential, with larger lot residential neighborhoods north of Interstate 95, and smaller lot residential south of 95.

According to the city's 2019 Plan of Conservation and Development (POCD), more than 65% of Norwalk's total land area is currently occupied by residential development. Almost 11% of the city's land use is accounted for by vacant residential, and commercial and industrial land uses. Table 2-2 summarizes 2019 land use data identified in the POCD.

Table 2-2: 2019 Land Use by Area

Use	Area (acres)	Parcels	Percent of Total Land
Residential			
Residential – 1 or 2 family	7,457	18,328	57.1%
Residential – 3 or more family	686	873	5.3%
Mixed Residential/Commercial	64	199	0.5%
Mixed Use – Village	0	1	0%
Business			
Commercial	1,201	872	9.2%
Industrial	201	117	1.5%
Public & Institutional Uses			
Government/Institutional	805	226	6.2%
Public Land and Open Space			
Open Space	705	73	5.4%
Cemetery	130	17	1%
Other			
Utility	107	21	1%
Other	906	603	7%
Vacant			
Vacant – Commercial	99	165	1%
Vacant – Industrial	20	37	0%
Vacant – Municipal	157	22	1%
Vacant – Residential	365	524	3%
Vacant – Utility	148	18	1%
Developed/Committed	12,262	20,458	94.2%
Vacant/Undeveloped	789	766	6%
Total Land Area	**13,051**	**21,224**	**100.2%**

Source: 2019 Norwalk Plan of Conservation and Development

2.1.3 Climate and Climate Change

Current Conditions

Over the course of the year, the temperature in Norwalk 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 16, 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 67°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 Norwalk. The wetter season lasts from March 31 to August 18, 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 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 18 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 Norwalk 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 Norwalk at 3.49 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	8.96
NOAA Atlas 14	3.49	6.49	8.26

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

Impervious surfaces and infrastructure in city 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

Norwalk is divided among five sub-regional watersheds as shown in Table 2-4. Three of the five sub-regional basins drain into Long Island Sound, with the Silvermine River basin draining into the Norwalk River basin, and the West Branch Saugatuck River basin draining into the Saugatuck River basin. All of the water that passes through Norwalk eventually empties into Long Island Sound.

Table 2-4: Sub-Regional Drainage Basins

Drainage Basin	Overall Sub-regional Area (sq. mi)	Area within City (sq. mi)	Area (acres)	Percent of City
Norwalk River	32.55	8.63	5,524.57	41.33%
Southwest Shoreline	41.41	5.54	3,544.59	26.53%
Fivemile River	12.49	4.88	3,124.07	23.37%
Silvermine River	22.52	1.82	1,165.02	8.72%
West Branch Saugatuck River	11.92	0.01	6.54	0.5%
Total	n/a	20.88	13,364.79	100%

Source: Connecticut Department of Energy & Environmental Protection GIS Data

Norwalk is entirely encompassed within the Southwest Coast drainage basin, which drains directly into Long Island Sound. Of the five subregional drainage basins and their respective streams, the

Norwalk River running through central Stamford is the largest, followed by the Silvermine River basin in the northern area of the city, which ultimately flows into the Norwalk River basin.

The Norwalk River is approximately 21 miles long, and originates in Ridgefield, Connecticut. The Norwalk Basin drains 32.55 square miles of land, and ultimately flows directly into Long Island Sound.

The Fivemile River is approximately 11 miles long and originates in New York, just over the New Canaan border. The river flows into the Sound along the western border of Norwalk adjacent to the Rowayton neighborhood.

2.2 Society, Culture, and Government

2.2.1 Population and Demographic Setting

According to the 2010 U.S. Census, Norwalk had a population of 85,603, with 3,740 persons per square mile. According to the 2018 American Community Survey five-year estimates, Norwalk's population between 2013 and 2018 was approximately 89,049.

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 Norwalk. The SVI uses census data to identify populations within the city that may be more vulnerable to natural hazards. As a result of this analysis, the city 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.

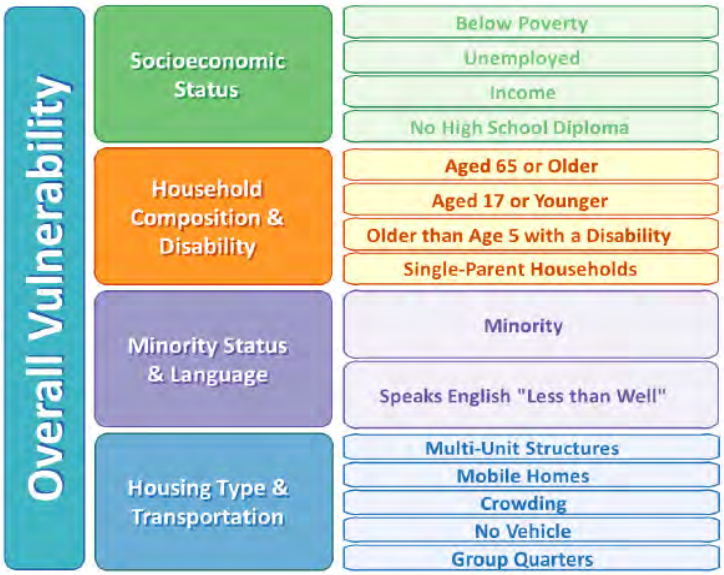

Figure 2-2: The CDC SVI Index Factors. Graphic: svi.cdc.com

The City of Norwalk is considered to have a low to moderate level of vulnerability, with their most vulnerable social aspect being minority populations and those that do not speak English well. In addition, there are socioeconomic concerns, as well as high density housing populations and transportation disparities. These vulnerable populations are concentrated in the south-central tracts centered around the Interstate 95 and route 7 interchange, and along the Norwalk River. It is important to note that the South Norwalk tract is considered highly vulnerable, with a ranking 0.82 on the SVI scale. Appendix B explores the SVI for Norwalk in more depth, including maps showing overall vulnerability, and theme vulnerability.

2.2.2 Development Trends

In the early 1900's, the City of Norwalk was characterized by a variety of land use types, walkable neighborhoods comprised of small lot sizes, and modified street grid development. As years progressed, suburban style development began to grow outwards of the urbanized core of the city. This character is still true today, with larger residential lots more prominent moving away from the urbanized areas, with larger block sizes and numerous cul-de-sacs throughout the neighborhoods. With the advancement of transportation, and the development of major roadways, land use types began to separate, with commercialized areas along these major roadways, including Route 1, Route 7, and the Merritt Parkway.

Today, Norwalk is the sixth most populous City in Connecticut. Redevelopment pressures are significant. South Norwalk and the downtown are experiencing ongoing investment and redevelopment, especially in housing, which is likely to continue into the future. Major travel corridors for Route 7 and Route 15 have the potential for redevelopment over the next 10 years. The City would also like to see mixed-use activities centers in every neighborhood, varying in sizes. The City of Norwalk has identified two transit-oriented development (TOD) focus areas: one centered around the East Norwalk Train Station, and one around the South Norwalk Train Station. Development in South Norwalk includes the new retail mall which is within walking distance of the train station. The TOD plans for South Norwalk (2016) and East Norwalk (2020) both recognize the present of existing flood zones; and both discuss the potential risks associated with sea level rise and other climate change impacts. Both plans call for development to be consistent with avoiding risks associated with these hazards.

More recently, the City has embarked on studies of its commercial and industrial parcels north of downtown along the Norwalk River; and commercial and water-dependent uses located along the harbor on Water Street. Both of these studies are meant to highlight the risks associated with redevelopment, as well as the unique opportunities in the City. While the City's potential for exposure to flood risks is significant due to the Norwalk River, Keeler Brook, and the shoreline; the TOD plans and two ongoing studies are directly addressing the need to reduce risks. Therefore, while development in Norwalk may not be able to reduce exposure to flooding, the opportunities for stringent redevelopment will at least reduce the risks and damage. These opportunities will also help reduce vulnerabilities to other natural hazards.

2.2.3 Governmental Structure

The City of Norwalk is a mayor-council style government, where the mayor is elected by city residents. The city charter delegates certain powers and duties to the Common Council, while others are a joint effort between the mayor and council.

In addition to Mayor and Common Council, there are boards, commissions and committees providing input and direction to City administrators, while City departments provide municipal services and day-to-day administration. Many of these commissions and departments play a role in hazard mitigation, including the Planning and Zoning Department, Code Enforcement, Highways Department, Conservation Commission, Building Management, the Fire Chief, and the Emergency Management Department.

2.2.4 Historic and Cultural Resources

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

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

There are numerous historic sites throughout the city. As one of the oldest cities in the State, Norwalk has been making strides to preserve historic resources. Historic resources in Norwalk are concentrated within the Norwalk Green, Fivemile River Landing, Camp Street, Golden Hill, Haviland And Elizabeth Streets/Hanford Place, Pudding Lane, Silvermine Center, South Main & Washington Street, and Village Creek Historic District. See Figure 2-3 for a map of historic resources in the community.

Resources also include Fodor Farm, Gallaher Estate at Cranbury Park, Oyster Row, Greens Ledge and Peck Ledge Lighthouses, the Railroad Station, and the Norwalk River Bridge. 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.

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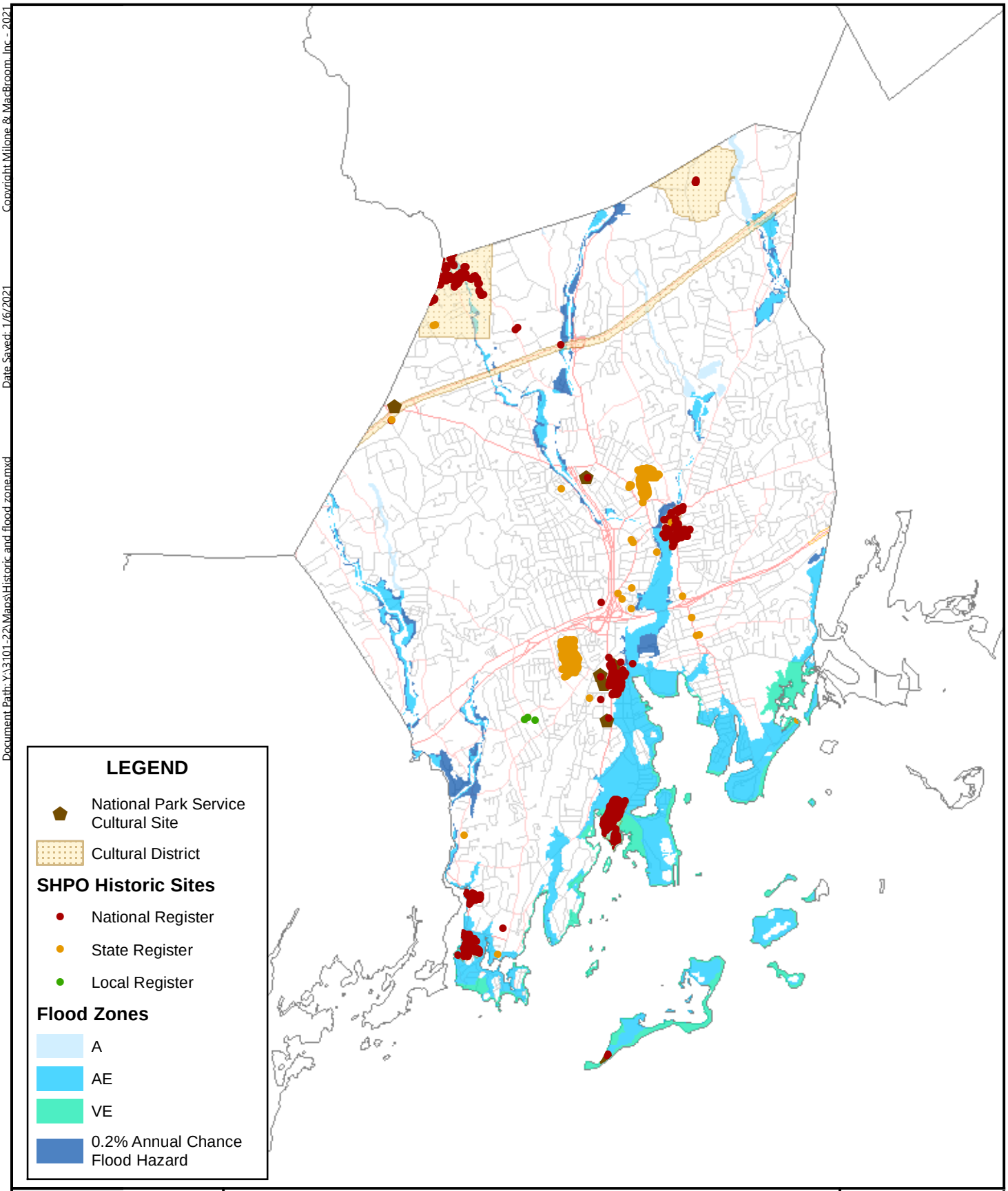

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Historic Resources with Flood Zones and Dam Failure Inundation Areas

WestCOG Hazard Mitigation Plan

Town of Norwalk

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

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FIG. 2-3

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

Hazard	Count
Dam Failure	0
Earthquake	731
Flooding	
1% Annual	0
0.2% Annual	7
Storm Surge	
Category 1	38
Category 2	45
Category 3	51
Category 4	62
Hurricane/Tropical Storm	731
Sea Level Rise	6
Thunderstorm	731
Tornado	731
Winter Storm	731
Wildfire	101

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 Norwalk include Interstate 95 and the Merritt Parkway (Route 15), which run east to west through the city. The Parkway runs through the norther part of the city, while I-95 runs through the southern region of Norwalk. Routes 7 runs south from the Wilton border south, where it ultimately merges I-95. Route 1 also runs through the city, running paralleling to I-95 in the western half of the city, running north from the I-95 and Route 7 Interchange, where the route then crosses the Norwalk River and runs east into Westport.

In addition, the Metro North/Amtrak rail lines also run through the city, south and parallel to Interstate 95. There are three stations located in the city: East Norwalk, South Norwalk, and Rowayton. The CTtransit bus system is also active in the city with several stops throughout the community.

2.3.2 Utilities

There are two public water systems the operate in the city. The Norwalk First Taxing District system operates in the eastern half of Norwalk, while the Second Taxing District system serves the western half. A majority of the city receives public water supply, with the potential exception of small residential areas in the northwest and north east corners of the city. These properties likely rely on a private well for drinking water.

Residents and businesses use oil, propane, or natural gas for heat. Natural gas is available in the via distribution lines from Eversource.

The Norwalk Water Pollution Control Authority maintains the sewer systems in the urbanized areas along I-95 and Route 7, and branches out into residential neighborhoods from the urbanized core. The system does not extend to some small areas along the coast, as well as multiple neighborhoods in the northern third of the city.

According to geoISP (geoISP.com), access to Broadband Internet is available to most residents in Norwalk. There are 2 DSL Providers (MegaPath, AT&T), 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 Norwalk.

2.4 Planning and Regulatory Capabilities

Norwalk 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 in this section.

2.4.1 Review of Existing Local Plans

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

- **Plan of Conservation and Development (POCD):** Norwalk's most recent POCD was adopted in 2019. 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:** Norwalk 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):** Norwalk 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:** Norwalk 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. The City also developed its own plan, the Norwalk *Economic Development Action Plan*, in 2015.
- **Emergency Operations Plan (EOP):** Norwalk's EOP is reviewed annually and updated as needed. Dam failure Emergency Action Plans (EAPs) for dams with failure inundation zones that may impact Norwalk, and for which EAPs are available, are on file locally.
- **Watershed Management Plan:** Watershed Management Plans have been developed for the Norwalk River Watershed, the Saugatuck-Aspetuck River Watershed, and the Five Mile River Watershed. 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. The Saugatuck River Watershed Based Plan was developed by SWRPA in 2012. The Five Mile River Watershed Based Plan was developed by AKRF, Inc. for SWRPA in 2012. 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.

2.4.1 Review of Regulatory Structures

Norwalk 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:** Norwalk enforces the Connecticut State Building Code locally.
- **Zoning Regulations:** Most recently updated in February 2019.
- **Inland Wetlands and Watercourses Regulations:** Most recently updated in February 2010.
- **Subdivision Regulations:** Most recently updated in January 2012. Include provisions promoting installation of firefighting water sources, construction of adequate emergency access and egress, and burial of utilities.

2.5 Emergency Services, Critical Facilities, Sheltering, and Evacuation

The City 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 Norwalk continues. The city also considers various facilities housing higher-risk individuals (such as elderly individuals or children) and large populations to be critical facilities. Table 2-6 identifies all of these critical facilities.

Table 2-6: Critical Facilities

Facility	Address or Location	Type	Emergency Power	Shelter	In 1% Floodplain
Norwalk Hospital	34 Maple Street	Hospital			
Norwalk Police Department	1 Monroe Street	Police			
Norwalk Police Marine Patrol	100 Water Street	Police			✔
Norwalk Fire Department Station 4	180 Westport Avenue	Fire/EMS			
Norwalk Fire Department Station 1	90 New Canaan Avenue	Fire/EMS			
Norwalk Fire Department Station 2 - Headquarters	121 Connecticut Ave	EOC/Fire/EMS			
Norwalk Fire Department Station 3	56 Van Zant Street	Fire/EMS			
Norwalk Fire Department Station 5	23 Meadow Street	Fire/EMS			
City Hall	125 East Avenue	City Hall	✔		
Public Works	125 East Avenue	Municipal	✔		
Norwalk High School	23 Calvin Murphy St.	School/Shelter	✔	✔	
Brien McMahon High School	300 Highland Ave.	School/Shelter	✔	✔	
Norwalk Wastewater Treatment Plant	15 South Smith Street	Critical Service	✔		
Sanitary Sewer Pump Stations	Multiple	Critical Service	✔		
Academy Of Learning	650 West Avenue	School			
All Saints Catholic School	139 West Rocks Rd	School			
Briggs High School	350 Main St.	School			
Brookside Elementary School	382 Highland Ave.	School			
Columbus Elementary School	46 Concord St.	School			
Cranbury Elementary School	5 Knowalot Ln.	School			
Fox Run Elementary School	228 Fillow St.	School			
Gibbs College	10 Norden Place	School			
Gibbs College	142 East Avenue	School			
Jefferson Elementary School	75 Van Buren Ave.	School			
Kendall Elementary School	228 Fillow St.	School			
Marvin Elementary School	15 Calf Pasture Beach	School			
Naramake Elementary School	16 King St.	School			
Nathan Hale Middle School	176 Strawberry Hill Av	School			
National Bartenders School	24 Belden Avenue	School			
Norwalk Community College	188 Richards Avenue	School			
Norwalk Hosp Sch Of Respir Car	24 Maple Street	School			
Oakbridge School Community Sol	57 West Rocks Road	School			
Parkway Chr Acad Happy Time Nu	260 New Canaan Avenue	School			
Ponus Ridge Middle School	21 Hunters Ln.	School			
Renasci Academy Of Hair, Inc	3 Isaac Street	School			
Roton Middle School	201 Highland Ave.	School			
Rowayton School	1 Roton Ave.	School			
Side By Side Community School	10 Chestnut St.	School			
Silvermine Elementary School	157 Perry Ave.	School			
Tracey School	20 Camp St.	School			

Facility	Address or Location	Type	Emergency Power	Shelter	In 1% Floodplain
West Rocks Middle School	81 West Rocks Rd.	School			
Wolfpit School	One Starlight Dr.	School			
Americares Free Clinic/Sono Community Center	98 South Main St.	Care Facility			
Casena Care	23 Prospect Avenue	Care Facility			
Catholic Family Services Of Norwalk	7 Chapel St	Care Facility			
Connecticut Renaissance Inc Outpatient	83 Wall Street	Care Facility			
Elmcrest Terrace Halfway House	16 Elmcrest Terrace	Care Facility			
Fairfield Manor Health Care Center	23 Prospect Ave	Care Facility			
Family & Children's Agency, Inc.	9 Mott St	Care Facility			
Gambro Healthcare-Norwalk	31 Stevens Street	Care Facility			
Honey Hill Care Center	24 Stevens St, Norwalk	Care Facility			
Louise Carlson Senior Residence	17 Nelson Ave	Care Facility			
Ludlowe Commons/Ludlowe Village	11 Rogers Square	Care Facility			
Meridian Hill Triage And Detoxification	4 Elmcrest Terrace	Care Facility			
New Vision Cataract Center	605 West Avenue	Care Facility			
Norwalk Center	73 Strawberry Hill Ave	Care Facility			
Norwalk Community Health Center	120 Connecticut Ave.	Care Facility			
Norwalk Department Of Health	137 East Ave	Care Facility			
Norwalk Methadone Treatment Program	20 North Main	Care Facility			
Notre Dame Convalescent Home	76 W Rocks Rd	Care Facility			
Project Reward	Ben Franklin Ctr - 165 Flax Hill Rd	Care Facility			
St. John Street Group Home	4 St John Street	Care Facility			
The Dr. Robert E. Appleby Health Center-Richard Briggs High School	350 Main Street	Care Facility			
The Marvin	60 Gregory Blvd	Care Facility			
The Robert E Appleby - Brien McMahon	Highland Avenue	Care Facility			
Vitam Center France Street	23 France St	Care Facility			
Vitam Center, Inc/Watson Hall	57 West Rocks Rd	Care Facility			
East Ave Gas Station	227 East Ave				
Devine Bros	38 Commerce St	POL Terminal, Storage Facility, or Tank Farm			

There are two designated shelters in the city, the Norwalk High School and Brien McMahon High School.

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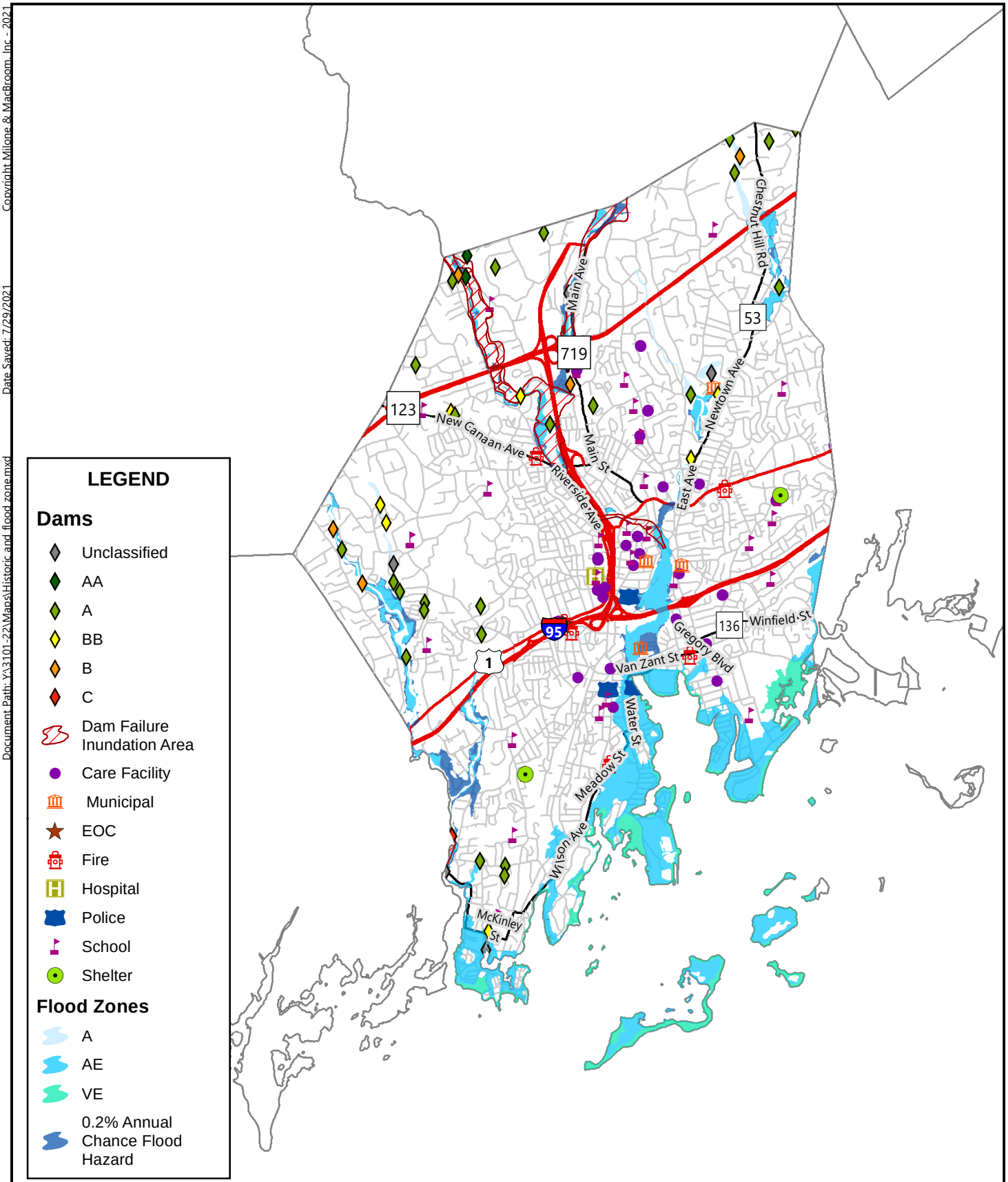

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Critical Facilities with Flood Zones and Dam Failure Inundation Areas

WestCOG Hazard Mitigation Plan

Town of Norwalk

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

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FIG. 2-4

Emergency Response

The City's Emergency Operations Center (EOC) is located in Norwalk Fire Department Station 2 – Headquarters on Connecticut Avenue. The fire department and EOC are connected to all public buildings, including schools, via a fiber optic network. Norwalk is located in the Connecticut Department of Emergency Services and Public Protection (DESPP) Region 1, consisting of 14 municipalities in southwestern Connecticut.

The City has also displayed long-term commitment to emergency response and management by utilizing warning system and various emergency planning techniques. In addition, there are two emergency management and planning specific roles in the city: Director of Combined Dispatch and Emergency Preparedness Planning. City staff are also trained in National Incident Management System (NIMS) and Incident Command system (ICS)

Emergency Communication Capabilities

The City of Norwalk utilizes the Code Red notification system to alert residents of emergency situations. This system allows the state to direct geographically specific emergency notification telephone calls into affected areas. The city also utilizes social media sources including Facebook and Twitter to post public information. Various media outlets are also used to relay information to the public. Residents can also sign up for city e-mail notifications. These messages can be in relation to natural hazards, or other city information.

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

Hazardous Materials

King Chemicals, which is located in 100-year flood zone, is a chemical manufacturer located along the Norwalk River.

Changes to Emergency Services since the Previous HMP

Both shelters have standby power, and is continuously pursuing the acquisition of back-up generators for pumping stations. The city has also developed regional sheltering plans to address sheltering and evacuation need.

3.0 HAZARD ASSESSMENT

3.1 FLOODING (COASTAL, INLAND, AND ICE JAMS)

3.1.1 Setting

The potential for flooding exists across Norwalk, 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 experience during extremely high tide events. The frequency of flooding in Norwalk 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 Norwalk River, Silvermine River, Fivemile River, and Stony Brook. 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. The Fourteen Acre Pond and Woods Pond distribute these traits. Floodplain and floodway designations have also been established along the rivers with AE designations. Refer to Figure 2-4 for the areas of Norwalk susceptible to flooding based on FEMA flood zones.

In general, potential flooding problems in Norwalk are concentrated along the multiples rivers, and the coastline. City officials have noted that Water Street and surrounding areas in South Norwalk continue to be of flooding concern. In addition, the Taylor Pond area is also a concern. While the city has made upgrades to pipes in the area, there is concern as to what this area will look like under elevated sea levels.

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 city and residential properties. Figure 3-1 shows hurricane storm surge inundation zones.

3.1.2 Capabilities

The City 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 City has consistently participated in the NFIP since April 3, 1978 and intends to continue participation in the NFIP. SFHAs in Norwalk are delineated on a Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS). The FIS and FIRMs for the city were most recently revised in 2013.

The city has historically participated in the FEMA Community Rating System (CRS) program, which recognizes and rewards more stringent floodplain regulations. While the City has since been unenrolled from the program, it submitted paperwork to FEMA in the spring of 2020 requesting reentrance. By participating in the program, city residents will receive a discount on flood insurance.

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

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

Ordinances, Regulations, and Plans

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

- ***Zoning Regulations***:
  - Article 110, Flood Hazard Zone: Outlines general development requirements for all flood zones including 1 foot of freeboard for all new and substantially improved construction.
  - Article 110, Flood Hazard Zone (C)(5) and (6): Flood provisions for AE, VE and Coastal AE zones, including 1 foot of freeboard for all new and substantially improved construction.

- ***Inland Wetland and Watercourse Regulations***:
  - Defines "Significant Regulated Activity": as any activity which substantially diminishes the natural capacity of an inland wetland or watercourse to; support desirable fisheries, wildlife, or other biological life; prevent flooding; supply water; assimilate waste; facilitate drainage; provide recreation or open space; or perform other functions.
  - 60A-10(B)(1): The standards and criteria for decisions include potential effects on the capacity for the inland wetlands or watercourses to prevent flooding.
- ***Subdivision Regulations:***
  - Section 3.01: Land shall not be subdivided if it cannot be safely used because of a flood danger
  - Section 3.30 (b): If a subdivision is proposed in a flood prone area, it shall be constructed to minimize flood damage, locate utilities to minimize flood damage, drainage should be provided to minimize flood hazards, base flood elevation will be provided with all proposals.
- ***Norwalk Harbor Management Plan***
  - Identifies the need to protect coastal resources including tidal ponds.

- ***Norwalk River Watershed Action Plan***
  - Developed by the Norwalk River Watershed Initiative (NRWI) in 1998, and updated in 2012, the City of Norwalk supports the various goals outlined within the plan, including those directed toward floodplain protection and flood hazard mitigation.

Drainage and Street Flooding

The Norwalk Department of Public Works (DPW) oversees the maintenance of the city's drainage systems and performs clearing of bridges and culverts and other maintenance as needed. Drainage concerns are addressed in conjunction with road pavement projects.

Drainage complaints are routed to the DPW through an online work-order system called Cityworks. The reports can then be used to monitor and track flood prone areas. City staff noted Water Street and surrounding areas to be of concern.

Public Information

The city 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 stream gauge on the Norwalk River in South Wilton, and a tidal gauge in Bridgeport, helps city officials watch for flooding conditions and respond accordingly.

Actions Completed and New Capabilities

The city is currently in the process of installing back-up generators at all sanitary sewer pumping stations. This is critical for flooding and other natural hazard events. The city is also currently working to elevate the Keeler Brook pump station.

3.1.3 Vulnerabilities and Risk Assessment

Repetitive Loss Properties

There are 227 repetitive loss properties (RLPs) located in the City of Norwalk; 218 are residential and 9 are commercial. There is 1 property along Stony Brook, 3 properties along the Norwalk River, 4 properties along the Fivemile River, 207 properties within coastal zones, and the remaining 3 properties are along smaller tributaries or not adjacent to a significant stream

Critical Facilities

There is one facility located within the 100-year flood zones. This facility is critical to police response water capabilities during an event.

The at-risk facilities include:

- Norwalk Police Marine Patrol Station

At-Risk Areas

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

- Taylor Pond
- Water Street and adjacent areas

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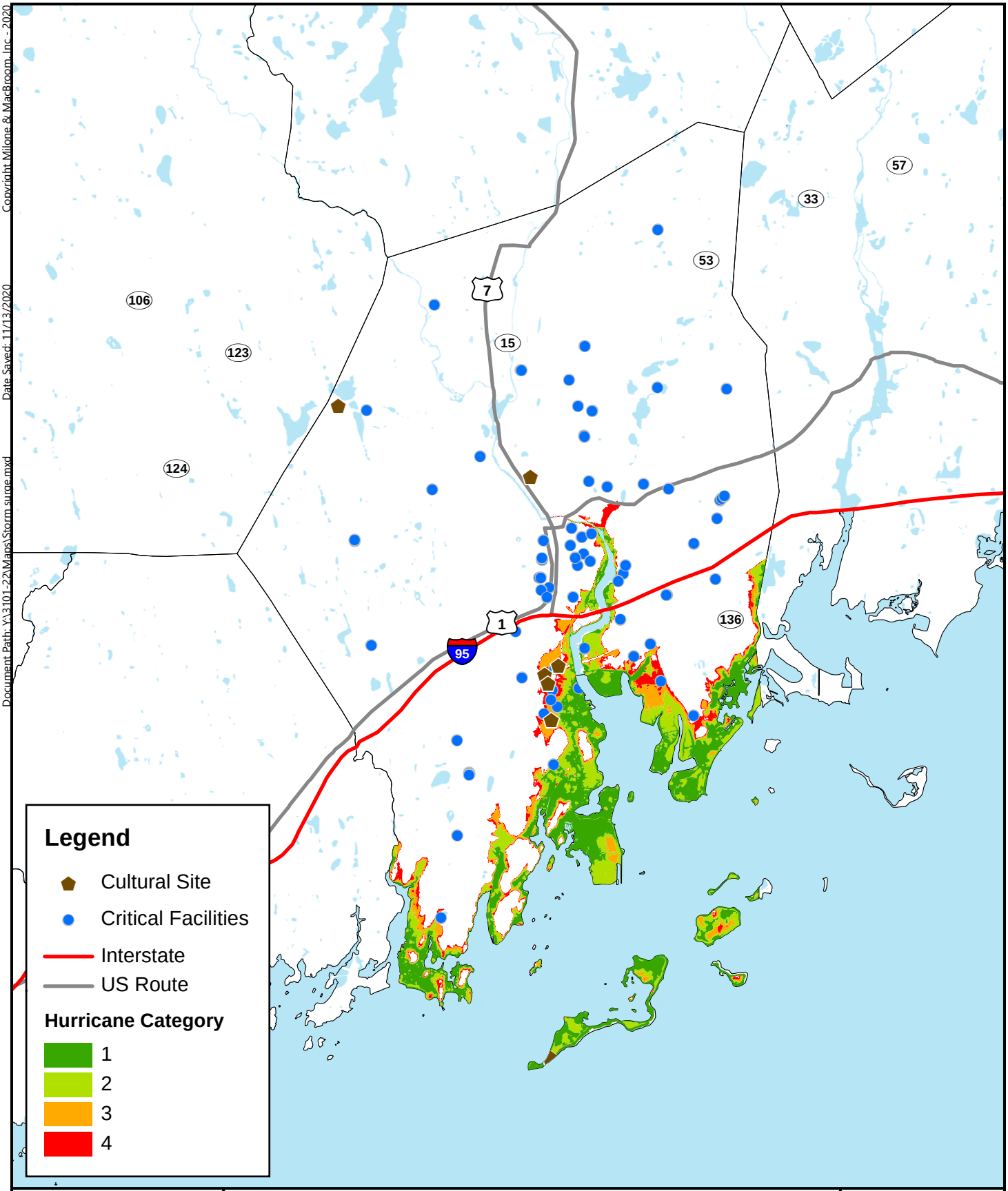

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Hurricane Storm Surge Inundation Areas

WestCOG Hazard Mitigation Plan
City of Norwalk

NPS: Cultural Resources
DEEP: Storm Surge Areas

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SCALE 1 " = 6,333 '
DATE 11/13/2020
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FIG. 3-1

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

Norwalk River

Southern reaches of the river have the large delineated floodplains, in addition to a large floodway area delineated at the convergence point of the Norwalk and Silvermine Rivers. Therefore, these may be considered to be the most at-risk areas along the Norwalk river. While there are only 3 RL properties along the river, there is potential for flooding in some areas, The Norwalk River flows directly into Long island Sound; there are numerous repetitive loss properties located at the mouth of the river along the Norwalk Harbor.

Long Island Sound Coastline

The shoreline of Norwalk is primarily residential, with commercial activity along the Norwalk Harbor. The entire coastline, specifically southern areas of Rowayton, Wilson Point, Manressa Island, and the southern areas of East Norwalk are particularly at risk of storm surge during an event under future sea level rise scenarios.

Changes and Improvements

The city utilizes Cityworks, an asset management software, which allows the city to track and update flooding areas of concern. Also, to aid in flood mitigation, the city is constantly addressing drainage concerns when re-pavement projects are done.

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 high hazard dams that could potentially have an impact on the city if there were to be a failure are Chasmar Pond dam, Popes Pond Dam in Wilton, and the John D. Milne Lake and Grupes Reservoir dams located in New Canaan

Actions Completed and New Capabilities

Norwalk 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 35 DEEP-inventoried dams within the City of Norwalk. These dams are shown in Figure 2-4. One of these dams is a Class C, or high hazard dam, and five others are a Class B, or significant hazard dam. As shown in Table 3-1, the high hazard dams located in the City pose a risk to the City of Norwalk, along with some portions of the Town of Darien.

Table 3-1: High Hazard Dams with Potential to Affect the City of Norwalk

#	Name	Location	Class	Owner
10312	Chasmars Pond Dam	Chasmars Pond, Norwalk	C	Private
10302	Millard Pond Dam	Millard Pond, Norwalk	B	Private
10305	Hams Pond Dam	Upper Pond, Norwalk	B	Private – Orchard Lake Condominium
10307	Chestnut Hill Pond Dam	Chestnut Hill Pond, Norwalk	B	Private
10308	Perry Pond Dam	Perry Pond, Norwalk	B	Private – The Whitman Co.
10313	Florsheim Pond Dam	Florsheim Pond, Norwalk	B	Private -Opale Metals & Trading Company Limited

Failure of a high hazard dam can affect properties downstream of the impoundment both in and outside of the city, with potential large inundation zones traveling along each respective waterway.

The Chasmars Pond Dam is 72 feet in length, with a maximum height of 11 feet. It is a masonry structure and impounds roughly 26.5 acres at normal water levels with a contributing watershed of 11.80 square miles. The primary purpose of the dam is "unidentified"; however, the pond is

adjacent to the Metro-North track, making this impoundment likely the product of railway construction.

Millard Pond Dam, located along the Fivemile River, is 75-foot-long masonry dam with a height of 17 feet. The dam impounds a pond of roughly 4.2 acres, and has a total watershed area of 6.85 square miles. The recreational dam is privately owned.

The Hams Pond Dam is an earth and masonry dam that is 175 feet long with a height of 9 feet. The dam is recreational and locate on Silvermine Brook. The dam impounds a pond of 1.5 acres, with a drainage area of 0.9 square miles.

Chestnut Hill Pond Dam is an earth and masonry dam located on the Stony Brook. The dam is 250 feet long, with a height of 5 feet, and is classified as recreational. The dam impounds a 2.0-acre pond with an associated drainage area of 0.5 square miles.

Perry Pond Dam, located along the Silvermine River, is a 60-foot-long masonry dam with a height of 15 feet. The recreational dam impounds a pond of 1.0 acre, with a watershed area of 19.8 square miles.

The Florsheim Pond Dam is 100 feet in length with a height of 6 feet. The masonry recreational dam impounds a pond of 3.0 acres, with a watershed drainage area of 7.46 square miles. This dam is located on the Fivemile river.

Changes and Improvements

Norwalk continues to be at low risk from dam failure.

3.3 HURRICANES AND TROPICAL STORMS

3.3.1 Setting

A hurricane striking Norwalk is considered a possible event each year and could cause critical damage to the city and its infrastructure. Wind damage from a hurricane can occur anywhere in the city, 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 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 Norwalk is 110 miles per hour for a Category 1, 120 miles per hour for a Category 2 and 130 for Category 3 or greater. Norwalk has adopted the Connecticut Building Code as its building code. The city website provides links to the State Building Codes so that developers are able to find design standards for wind.

The city has a robust tree maintenance program, with a budget that allows for maintenance, along with the equipment and machinery necessary for this maintenance. The city's tree warden also maintains a tree asset identification system which identifies trees as their maintenance issues are addressed. This system also allows the city to track the state of the tree canopy.

Actions Completed and New Capabilities

Two districts in the city have electric assets located underground.

3.3.3 Vulnerabilities and Risk Assessment

Most of the damage to the city 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

The City of Norwalk is vulnerable to hurricane damage from wind, flooding, storm surge, and from any tornadoes accompanying the storm. In fact, most of the damage to the city from historical tropical cyclones has been due to the effects of flooding. Factors that influence vulnerability to tropical cyclones in the city include building codes currently in place, local zoning and development patterns, and the age and number of structures located in highly vulnerable areas of the community.

Changes and Improvements

Norwalk continues to mitigate hurricane and tropical storm impacts with flood mitigation efforts and tree maintenance.

3.4 SUMMER STORMS AND TORNADOES

3.4.1 Setting

Summer storms and tornadoes have the potential to affect any area within the City of Norwalk. 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 city without harming another.

Based on the historic record, it is considered highly likely that a summer storm that includes lightning will impact Norwalk 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 City'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. Norwalk's emergency communication capabilities are described in Section 2.5.

Actions Completed and New Capabilities

Norwalk's tree trimming and maintenance capabilities, and its emergency communication capabilities continue to mitigate impacts from summer storms.

3.4.3 Vulnerabilities and Risk Assessment

The entire City of Norwalk 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 city. Most damages are relatively site specific and occur to private property (and therefore are paid for by private insurance). For municipal property, the city budget for tree removal and minor repairs is generally adequate to handle summer storm damage.

According to the 2019 State Natural Hazard Mitigation Plan Update, Fairfield County has a moderate to high risk of tornado activity based on historical occurrences. Therefore, by virtue of its location in Fairfield County, the City of Norwalk has moderate to high potential to experience tornado damage. In general, thunderstorms and hailstorms in Connecticut are more frequent in the western and northern parts of the state and less frequent in the southern and eastern parts.

Thunderstorms are expected to impact Norwalk 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 Norwalk area is very high during any given thunderstorm although no one area of the city is at higher risk of lightning strikes. The risk of at least one hailstorm occurring in Norwalk is considered moderate in any given year.

The risk of downbursts occurring during such storms and damaging the City of Norwalk is believed to be low for any given year. All areas of the city are susceptible to damage from high winds although more building damage is expected in downtown and surrounding areas, while more tree damage is expected in the less densely populated areas of the city.

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 Norwalk 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.

Changes and Improvements

Norwalk continues to mitigation summer storms and tornadoes.

3.5 WINTER STORMS AND NOR'EASTERS

3.5.1 Setting

The entire City of Norwalk is susceptible to winter storms and, due to its variable elevation, can have higher amounts of snow in the northern neighborhoods of the city than in the downtown area. 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 city.
According to the 2019 Connecticut State Natural Hazard Mitigation Plan the state can expect to experience at least two or more major snow events each year, with an average of 14 winter events in a season. It is estimated that Norwalk's average annual snowfall is about 2.5 to 4 feet.

3.5.2 Capabilities

Prior to a winter weather event, the city 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 city 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 city has robust road-clearing capabilities with regard to snow events. There are 255 miles of roadway in Norwalk that need to be plowed during an event, which is covered by 26 different plow routes. The city has prioritized streets for plowing and salt treatment, with special attention paid to those main roadways with steep hills and difficult intersections. The Norwalk DPW has developed a snow removal policy which clearly outlines the methods used by the city, and additional information for residents and their responsibilities during an event.

The public works department has several resources located on their website including snow emergency routes, a guide to understanding snow removal operations, and winter storm safety tips.

Actions Completed and New Capabilities

Norwalk'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 City of Norwalk is at relatively equal risk for experiencing damage from winter storms although some areas (such as icing trouble spots and neighborhoods with a high concentration of flat roofs) are more susceptible. The public assistance reimbursement from Winter Storm Alfred was over $89,000, proving that winter storms can be very costly. However, many damages are relatively site specific and occur to private property (and therefore are paid for by private insurance) while repairs for power outages are often widespread and difficult to quantify to any one municipality.

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

The structures and utilities in Norwalk 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.

Changes and Improvements

Norwalk has upgraded some drainage infrastructure, and worked to get electric assets below ground, helping to mitigate outages and flooding associated with winter events.

3.6 WILDFIRES AND DROUGHT

3.6.1 Setting

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

In addition, Norwalk, 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.

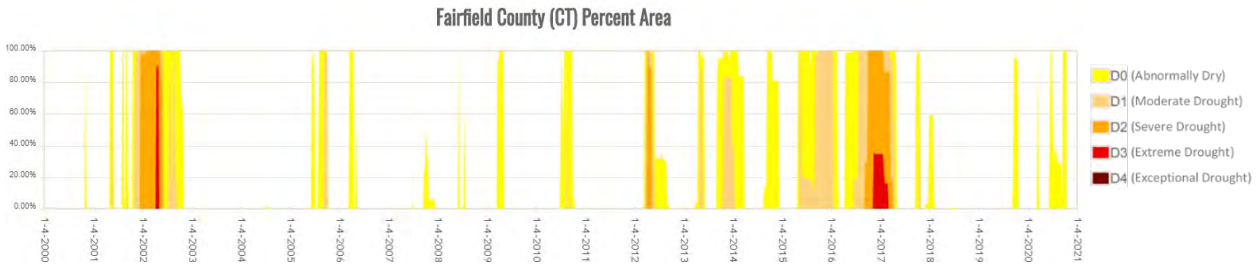

Figure 3-2: USDM Drought Time Series for Fairfield County

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 Norwalk are outlined in the city *Code of Ordinances:*

- Chapter 42A Fire Prevention: Outlines the purpose of these codes as safeguarding life and property from storage or use of materials that pose a fire hazard.
- Chapter 42A-8 Abatement of Fire Hazards: Materials located in a building or upon any premises that re combustible, pose as obstructions, or violate the statutes must be removed and remedied.

The city's Fire Department is comprised of five stations located throughout the city, all of which are staffed by career firefighters. The career department has 148 employees, including uniformed and civilian professionals.

Actions Completed and New Capabilities

The city continues to mitigate wildfires.

3.6.3 Vulnerabilities and Risk Assessment

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

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

Wildfires are more common in rural areas than in developed areas as most fires in populated areas are quickly noticed and contained. The likelihood of a severe wildfire developing is lessened by the vast network of water features in the state, which create natural breaks likely to stop the spread of a fire. During long periods of drought, these natural features may dry up, increasing the vulnerability of the state to wildfires. Wildfire Risk Areas are mapped in Figure 3-3.

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

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. A small portion of the northern area of Norwalk, specifically along the Wilton border, could be considered at risk due to moderate to high levels of development intermixed with fire prone vegetation. However, given the small size of this at-risk area, and firefighting capacity and water availability, it is likely that the city has effective capabilities to minimize damage from fires that may occur.

Changes and Improvements

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

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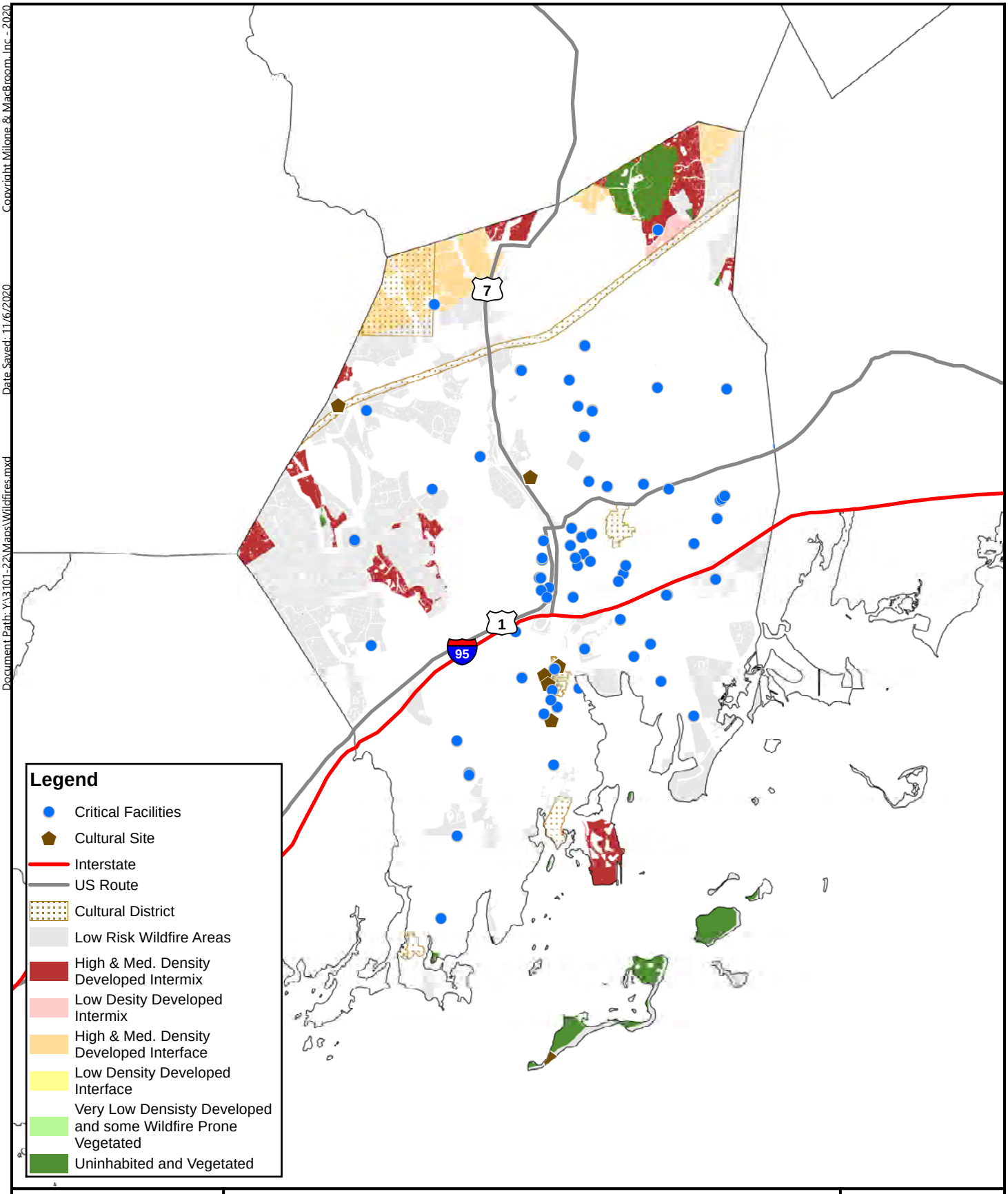

MILONE & MACBROOM
99 REALTY DRIVE
CHESHIRE, CT 06410
203.271.1773
WWW.MMINC.COM

Wildland-Urban Interface: Wildfire Risk Areas

WestCOG Hazard Mitigation Plan
City of Norwalk

NPS: Cultural Resources
Wildland-Urban Interface:USFA

N

0 3,000 6,000
Feet

SCALE	1 " = 6,328 '
DATE	11/13/2020
PROJ. NO.	3101-22

FIG. 3-3

3.7 EARTHQUAKES AND LANDSLIDES

3.7.1 Setting

The entire City of Norwalk is susceptible to earthquake damage. However, even though earthquake damage has the potential to occur anywhere both in the city 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 city.

3.7.2 Capabilities

The city 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 city do not directly address earthquake hazards. However, various documents do indirectly discuss areas susceptible to earthquake damage and regulations that help to minimize potential earthquake damage.

- Subdivision Regulations:
  - Encourage the conservation of natural features to the maximum feasible extent, and take into consideration erosion problems.

- Zoning
  - Article 112 outlines regulations to minimize soil erosion throughout the city.

Actions Completed and New Capabilities

Norwalk continues to have appropriate capabilities for mitigating earthquake events.

3.7.3 Vulnerabilities and Risk Assessment

Some areas in Norwalk are underlain by sand and gravel, such as along the Norwalk and Fivemile Rive, and artificial fill, particularly within the more urban neighborhoods like South Norwalk. Structures in these areas are at 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 City of Norwalk. Results are presented in Table 3-1 below.

Table 3-1: Probability of a Damaging Earthquake in the Vicinity of Norwalk

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 city's vulnerability to earthquakes continues to be low.

3.8 SEA LEVEL RISE AND SHORELINE CHANGE

3.8.1 Setting

The coastal areas of Norwalk are susceptible sea level rise and shoreline change. With most of the shoreline being residential, and commercial and water dependent activity in pockets throughout, 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 city has begun to see an increase in nuisance flooding, and has experience the impacts of extreme storm surge; leaving city officials aware of the potential impacts of an extreme storm with elevated sea levels.

City 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

Norwalk continues to build its sea level rise and shoreline change capabilities.

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 marshes of Manressa Island and in East Norwalk are at an increased risk, while some areas such as Taylor Pond and Water Street are already seeing flooding issues during high water events. 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 pars of Rowayton, Manressa Island, coastline in East Norwalk, and South Norwalk and Spring Hill along the river.

With much of the commercial areas at risk of flooding during a 100-year event with elevated sea levels, there is a large economic factor at risk. There are several large-scale companies, historic resources, and tourist attractions are in these vulnerable areas.

Changes and Improvements

The city has begun to elevate infrastructure, and is continuing to work on elevating pump stations.

4.0 MITIGATION STRATEGIES AND ACTIONS

4.1 Goals and Objectives

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

4.2 Status of Mitigation Strategies and Actions from Previous HMP

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

#	Description	Responsible Party	Status	Notes
1	Provide adequate back-up generators at sanitary sewer pumping stations (in progress)	DPW	Complete	Action is Completed
2	Provide adequate back-up generators at storm water pumping stations	DPW	Carry Forward	This has been an ongoing effort. Backup power has not been installed at all locations due to time and planning constraints.
3	Provide adequate back-up generators at shelters.	EMD	Complete	Both shelters have standby power.
4	Ensure the ability of Departments to function beyond first 24 hours by executing pre-positioned contracts for logistical support.	OEM Purchasing/ Finance	Carry Forward with Revisions	The Deputy EMD believes there is room for progress here and would like to evaluate the needs and capabilities.
5	Encourage development (especially higher density) to be located outside flood-prone areas wherever possible, including increased setbacks to account for sea level rise.	P&Z	Carry Forward with Revisions	Action has not yet been completed.
6	Improve coordination with CL&P for emergency response efforts	OEM, CL&P	Carry Forward with Revisions	Add "PW" to responsible party. Also, there is a lack of consistency with Eversource, not only coordination. The city would like to focus on improving both consistency of communication, and coordination.
7	Work to identify a suitable site to store DPW communications and vehicles out of harm's way, during flood events.	OEM, DPW, WPCA	Carry Forward	The city has inquired about several sites; however, none have been suitable thus far.
8	Request that FEMA and Army Corps of Engineers reevaluate the Flood Insurance Rate studies for riverine sections.	P&Z, ZEO	Drop	The city no longer believes this action is necessary.
9	Conduct mitigation at WWTP/DPW center.	DPW	Carry Forward with Revisions	Flooding is a concern at the WWTP; however, the city is currently unsure of what type of mitigation action is appropriate. Modify this action to include an evaluation of the needs of the WWTP. Omit the DPW as the risk does not require a mitigation evaluation.

#	Description	Responsible Party	Status	Notes
10	Evaluate municipalities' sheltering and evacuation needs and how these needs can be met through local and regional sheltering concepts.	OEM	Carry Forward with Revisions	The city has developed regional sheltering plans and addressed those needs; however, evacuation concerns need to be addressed. When evacuation actions are presented to the community, the city sees pushback. Revise this action to include more education and outreach on evacuation procedures versus signage and high-water marks.
11	Provide outreach and education to all residents of their vulnerabilities to natural hazards. Ensure outreach is targeted to those with limited English proficiency, and those with visual/auditory impairments. Including preparedness, mitigation and recovery	OEM	Carry Forward with Revision	The city works closely with non-profit agencies and would like to modify education and outreach to include identifying, and taking advantage of, opportunities to present hazard mitigation information through these non-profit organizations.
12	Increase harbor shore communication and create an individual resiliency plan that assists in making at-risk residents more resilient to natural hazards. For example, teaching residents how to do a flood audit to protect/safeguard against flooding	OEM	Carry Forward with Revisions	Incorporate action into #11, non-profit educational opportunities.
13	Build a barrier system to prevent debris associated with flooding from impacting King Industries and associated chemical storage	Private (King Chemical)	Drop	The city is unsure of any progress on this and will follow up with King Industries.
14	Raise at-risk pump stations to make them more resilient to natural hazards.	DPW, OEM	Carry Forward with Revisions	All sanitary pump stations have elevated generators. The city is currently working to elevate Keeler Brook pump station; however, time and planning has prevented the elevation of remaining stations.
15	Raise and expand levee protecting Wastewater Treatment Plant.	DPW, OEM	Drop	This addresses the above action #9

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

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

Action NWK-05	
Improve consistency of communication and coordination with Eversource for emergency response efforts, with a goal of at least one improved coordinated response during an event in the lifespan of this plan.	
Lead	OEM, PW, Eversource
Cost	$0 - $25,000
Funding	Operating Budget
Timeframe	2022
Priority	Med

Action NWK-06	
Collaborate with CIRCA on the "Resilient Connecticut" project	
Lead	BOS
Cost	$0 - $25,000
Funding	Operating Budget
Timeframe	2022
Priority	Med

Action NWK-07	
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, CT SHPO
Timeframe	2022
Priority	Med

Action NWK-08	
Conduct outreach and education to the public regarding evacuation routes and procedures.	
Lead	OEM
Cost	$0 - $25,000
Funding	Operating Budget
Timeframe	2022
Priority	Low

Action NWK-09	
Encourage development (especially higher density) to be located outside areas of flood risk wherever possible, including increased setbacks to account for sea level rise. This should be accomplished through changes to regulations as well as through close coordination with developers.	
Lead	P&Z
Cost	$0 - $25,000
Funding	Operating Budget
Timeframe	2022
Priority	Low

Action NWK-10	
Evaluate the needs and abilities of departments to function beyond first 24 hours in case of loss of power, access, or other hazard impacts.	
Lead	OEM Purchasing/ Finance
Cost	$0 - $25,000
Funding	Operating Budget
Timeframe	2023
Priority	Low

Action NWK-11	
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 NWK-12	
Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.	
Lead	EM, BOS
Cost	$0 - $25,000
Funding	Operating Budget, FEMA Grant
Timeframe	2023
Priority	Low

Action NWK-13	
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 NWK-14	
Develop a natural hazards outreach and education program. Ensure outreach is targeted to those with limited English proficiency, and those with visual/auditory impairments. Identify and take advantage of opportunities to present hazard mitigation information through the non-profit organizations with which the city has relationships.	
Lead	OEM
Cost	$25,000 - $50,000
Funding	Operating Budget
Timeframe	2024
Priority	Low

Action NWK-15	
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 NWK-16	
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 NWK-17	
Identify a suitable site to store DPW communications and vehicles out of harm's way, during flood events.	
Lead	OEM, DPW, WPCA
Cost	$50,000 - $100,000
Funding	Capital Improvement Plan, FEMA Grant
Timeframe	2025
Priority	Med

Action NWK-18	
Determine the risks, needs, and mitigation options for the WWTP.	
Lead	DPW
Cost	$50,000 - $100,000
Funding	Operating Budget, Grant
Timeframe	2025
Priority	Low

Action NWK-19	
Provide adequate back-up generators at storm water pumping stations	
Lead	DPW
Cost	$100,000 - $500,000
Funding	Capital Improvement Plan, FEMA Grant, Other Grant
Timeframe	2025
Priority	Med

Action NWK-20	
Elevate the Keeler Brook Pump Station above flood elevations.	
Lead	DPW, OEM
Cost	More than $500,000
Funding	Capital Improvement Plan, FEMA Grant, Other Grant
Timeframe	2026
Priority	Med

APPENDIX A

Appendix A: STAPLEE Matrix

#	Action Description	Regional Theme	Lead Department	Cost Estimate	Potential Funding Sources	Timeframe for Completion	Weighted STAPLEE Criteria														Total STAPLEE Score
							Benefits							Costs							
							Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	
NWK-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
NWK-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
NWK-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
NWK-04	Register as a Sustainable CT community and make progress with the hazard mitigation goals associated with registration.	Sustainable CT	BOS	$0 - $25,000	Operating Budget	2021	1	1	1	1	0	1	1	0	0	0	0	0	0	0	8
NWK-05	Improve consistency of communication and coordination with Eversource for emergency response efforts, with a goal of at least one improved coordinated response during an event in the lifespan of this plan.	Energy Resiliency & Backup Power	OEM, PW, Eversource	$0 - $25,000	Operating Budget	2022	1	1	1	1	1	1	0	0	0	-1	0	0	0	0	7
NWK-06	Collaborate with CIRCA on the "Resilient Connecticut" project	ResilientCT	BOS	$0 - $25,000	Operating Budget	2022	1	1	1	0	0	1	1	0	0	0	0	0	0	0	7
NWK-07	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
NWK-08	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
NWK-09	Identify a suitable site to store DPW communications and vehicles out of harms way, during flood events.	Critical Facility Mitigation	OEM, DPW, WPCA	$50,000 - $100,000	Capital Improvement Plan, FEMA Grant	2025	0	1	1	1	1	1	0	0	0	0	0	0	0	0	7
NWK-10	Provide adequate back-up generators at storm water pumping stations	Energy Resiliency & Backup Power	DPW	$100,000 - $500,000	Capital Improvement Plan, FEMA Grant, Other Grant	2025	1	1	1	0	1	1	0	0	0	0	0	0	0	0	7
NWK-11	Elevate the Keeler Brook Pump Station above flood elevations.	Critical Facility Mitigation	DPW, OEM	More than $500,000	Capital Improvement Plan, FEMA Grant, Other Grant	2026	0	1	1	1	1	1	0	0	0	0	0	0	0	0	7
NWK-12	Conduct outreach and education to the public regarding evacuation routes and procedures.	Outreach and Education	OEM	$0 - $25,000	Operating Budget	2022	1	0	1	1	0	1	1	0	0	0	0	0	0	0	6
NWK-13	Encourage development (especially higher density) to be located outside areas of flood risk wherever possible, including increased setbacks to account for sea level rise. This should be accomplished through changes to regulations as well as through close coordination with developers.	Floodplain Management Regulations	P&Z	$0 - $25,000	Operating Budget	2022	1	1	1	0	1	1	1	-1	0	0	-1	0	0	0	6
NWK-14	Develop a natural hazards outreach and education program. Ensure outreach is targeted to those with limited English proficiency, and those with visual/auditory impairments. Identify and take advantage of opportunities to present hazard mitigation information through the non-profit organizations with which the city has relationships.	Outreach and Education	OEM	$25,000 - $50,000	Operating Budget	2024	1	0	1	1	0	1	1	0	0	0	0	0	0	0	6
NWK-15	Determine the risks, needs, and mitigation options for the WWTP.	Critical Facility Mitigation	DPW	$50,000 - $100,000	Operating Budget, Grant	2025	0	1	1	1	1	1	1	0	-1	0	0	0	0	0	6
NWK-16	Evaluate the needs and abilities of departments to function beyond first 24 hours in case of loss of power, access, or other hazard impacts.	Emergency Response	OEM Purchasing / Finance	$0 - $25,000	Operating Budget	2023	1	1	1	0	1	0	0	0	0	0	0	0	0	0	5
NWK-17	Compare local floodplain regulations with Revised State Model Flood Regulations to identify any remaining opportunities for improvement	Floodplain Management Regulations	Planning	$0 - $25,000	Operating Budget	2023	0	1	1	0	1	1	0	0	0	0	-1	0	0	0	5

#	Action Description	Regional Theme	Lead Department	Cost Estimate	Potential Funding Sources	Timeframe for Completion	Weighted STAPLEE Criteria														Total STAPLEE Score
							Benefits							Costs							
							Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	
NWK-18	Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.	RLPs	EM, BOS	$0 - $25,000	Operating Budget, FEMA Grant	2023	0	1	1	0	1	1	0	0	0	-1	0	0	0	0	5
NWK-19	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
NWK-20	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

APPENDIX B

Appendix B: SVI Summary

City of Norwalk
Climate Vulnerability Assessment
A Component of Sustainable CT Action 5.4

The City of Norwalk, for this Climate Vulnerability Assessment (CVA) is considered an urban coastal community, resulting in various climate change vulnerabilities. Sea level rise, inland flooding, and extreme temperatures 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 City of Norwalk is currently experiencing increased occurrences of coastal flooding, both nuisance and storm related, with impacts to neighborhoods and critical infrastructure. Certain areas, such as Taylor Pond, are vulnerable to nuisance and costal events. Nuisance flooding tends to recede quickly, however, with rising sea levels, water may begin to linger for longer periods of time. There are also highly commercialized areas that may be increasingly impacted under a future climate. For example, South Norwalk is a large, urbanized area located at the mouth of the Norwalk River. With sea levels rising, and storm intensity increasing, infrastructure and homes are vulnerable to inundation.

Inland Flooding

With FEMA flood zones along a few rivers in Norwalk, such as the Norwalk River and the Fivemile River, there is continuously concern for riverine flooding. West Norwalk and Cranbury also have several streams running through the area, presenting the possibility for small scale flooding during heavy rain events. With precipitation expected to increase due to climate change, in addition to highly impervious areas, flooding events may occur more frequently.

Drought and Extreme Temperatures

Most of the City is serviced by public water supply, with pockets of West and North Norwalk likely serviced by private wells. Therefore, impacts to water supply may be an issue to the City as temperatures rise in the near future, resulting in isolated issues with water scarcity for private well owners. With historic impacts to public water supply availability during droughts, and temperatures expected to rise, the challenge of maintaining adequate supply during these times may also increase.

In addition to water scarcity, increased temperatures can also increase the urban heat island effect throughout the urban, highly impervious areas. This increase in heat island can have impacts on both water quality and human health.

When considering these impacts from climate change, the primary vulnerabilities for the City of Norwalk include:

- Coastal municipal infrastructure and neighborhoods
- Riverine and coastal flooding
- Water scarcity & urban heat island effect

Secondary Impacts

Economic Impacts

With vulnerable homes and infrastructure, the City faces an economic challenge of mitigating or relocating city-owned facilities and assisting residents with mitigation efforts. There is also a potential economic impact to local businesses during inland and coastal flooding 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 City level, down to building level.

Social Impacts

To identify social impacts to the City, the Center for Disease Control and Prevention (CDC) Social Vulnerability Index (SVI) was used to identify any vulnerable populations within the City. 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.

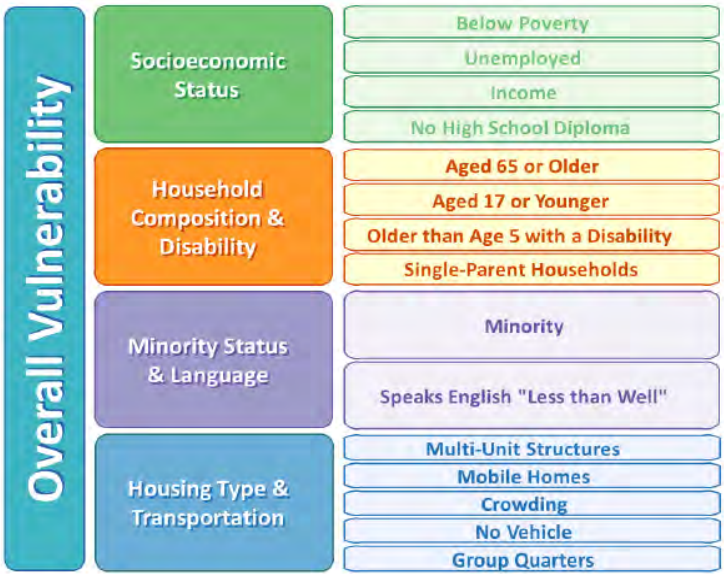

Figure 1: The CDC SVI Index Factors. Graphic: svi.cdc.com

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 Norwalk.

Table 1: Norwalk SVI Factor Rankings

	Overall SVI	Socioeconomic	Household Composition & Disability	Minority Status & Language	Housing Type & Transportation
NORWALK	.49	.42	.34	.63	.51

The City of Norwalk is considered to have a low to moderate level of vulnerability, with their most vulnerable social aspect being minority populations and those that do not speak English well. In addition, there are socioeconomic concerns, as well as high density housing populations and transportation disparities. These vulnerable populations are concentrated in the south-central tracts centered around the Interstate 95 and route 7 interchange, and along the Norwalk River. It is important to note that the South Norwalk tract is considered highly vulnerable, with a ranking 0.82 on the SVI scale.

These populations may be vulnerable to impacts from drought and extreme heat, and inland or coastal flooding 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.

Urban heat islands can also impact human health and water quality. Increased precipitation, in conjunction with high imperviousness, can move pollutants found on these surfaces into nearby water bodies. These water bodies may ultimately flow into drinking water supply or be used for recreation. Also, increased temperatures coincide with reduced air quality. Poor air quality can result in respiratory health concerns for those living in these effected areas.

Inland flooding, or poor drainage flooding, also 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 City 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 seven facilities in Norwalk that are a 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. Also, elderly

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

populations may be more vulnerable to the health impacts of poor air quality associated with urban heat islands.

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.

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.