

## natural hazard mitigation plan update

Bridgeport

Easton

Fairfield

Monroe

Stratford

Trumbull



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Town of Stratford, Repetitive

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#### LIST OF REVISIONS

Made during public comment period ending June 28th, 2024

#### Purpose & Regional Overview

I.3 Development Trends: I.3.iii City of Bridgeport section, removed "New residential uses are not proposed for flood zones" (15)

#### Planning Process & Coordination

II.2 Public Involvement: Documentation of 2nd series of public meetings (3-4), added stakeholders to NGO list (5).

## Hazard Identification & Risk Assesment

III.1 General Description of the MetroCOG Region: expanded "III.1.ix Historic & Cultural Resources" (18-20) to provide a summary of resources and potential vulnerabilities for each municipality.

#### Mitigation

V.1 Problem Statements, "V.1.v Town of Stratford", added the following: "Drainage-related flooding during intense precipitation is a concern townwide, and areas of emerging flood risk are located in Lordship. One of the typical areas of risk is lower Washington Parkway in the vicinity of West Hillside Avenue. Other areas may emerge, including Third Avenue and Fifth Avenue, as well as individual streets and groups of streets not yet identified." (4)

V.4 Review of Prior Hazard Mitigation Actions: revised V.4.iii, Town of Fairfield, text and update column table:

Added "Fairfield is about to embark on a major townwide Flood, Erosion and Resilience plan (2024 Town of Fairfield Flood, Erosion and Resilience Plan) which will be used to

- inform future mitigation and adaptation strategies for the Town." (23)
- #7 (added in italics): The study has been completed, but nothing has been implemented. Fairfield tried to break up the project, but it would not be possible. It is estimated at 1 billion dollars. This will be explored in the upcoming 2024 Master Flood Erosion and Resilience Plan. (24)
- #8 (added): Profiles for four of the five town beaches have been developed and preliminarily reviewed. The town plans to add Penfield Beach once the FEMA NOV has been satisfied and secure approval for all five engineered beach profiles. (24)
- #15 (added in italics): DEEP Permitting has been acquired in 2024. This will be explored in the upcoming 2024 Master Flood Erosion and Resilience Plan. (24)
- #16 removed "Project completed" and added "A study was completed by CIRCA outlining a series of possible solutions for underpass flooding, this will be finalized in the upcoming 2024 Master Flood Erosion and Resilience Plan." (24)
- #18 removed "Outreach conducted" and added "An expanded study for this section will be explored in the upcoming 2024 Master Flood Erosion and Resilience Plan."
   (25)
- 21 (added): "The 2024 Master Flood Erosion and Resilience Plan will determine if the road needs to be raised." (25)

#### V Implementation

VI.6 Top 5 Local Priorities: revised VI.6.v Stratford Top 5 Priorities to the following: "Pursue funding to mitigate existing/future risks to the South End, the adjacent commercial and industrial area, and Lordship. as identified in POCD based on findings/ feedback from Phase III of Resilient CT. Funds may be used to reconstruct drainage systems, install flood control systems and/or elevate/extend seawalls as necessary." (7)

VI.7 Mitigation Action & Implementation Tables

#### VI.7.i, Bridgeport

- Minor revisions to responsible departments, cost, and funding.
- #5 (added in italics): Support the creation and exploration of resiliency centers/hubs for each neighborhood in the city (10)
- #13 (added to action): "Seek funding to implement habitat restoration and nature based solutions/living shoreline in Ash Creek tidal estuary, examine feasibility of thin layer deposition to address erosion and ecosystem collapse at Sand Spit and Great Marsh Island." (12)
- #55 (new action): "Examine feasibility of dredging and beach nourishment at Seaside Park to ensure resilience and sustaiability of the cultural and environmental resource."
   (19)
- #56 (new action): "Conduct focus groups to determine emergency preparedness for and notifying the City's unhoused population of natural hazard events." (19)
- #57 (new action): "Review evacuation routes and update based on new development, daytime/nightime population needs, and/or changes to the street network." (19)

VI.7.ii, Easton, new action: "Conduct a townwide hydrologic analysis that addresses flooding, stormwater, and water conveyance needs to identify projects that can be implemented to reduce risks to infrastructure and people. Based on this analysis, evaluate long-term mitigation strategies." (22)

#### VI.7.iii, Fairfield

- Minor revisions to responsible departments, cost, and funding.
- #13: Revised Implementation Process "On hold, will be reviewed as part of 2024 Town of Fairfield Flood, Erosion and Resilience Plan Update. The initial conceptual drawings for flood protection indicate the plan would not have been impactful. CT DEEP coordination is needed for meaningful implementation.
- #52 (new action) "Conduct study of Ash
   Creek sedimentation to determine if sedimentation will enhance longevity, stability,
   and sustainability of the ecosystem.
   Seek funding to implement habitat restoration
   and nature based solutions/living shoreline
   in Ash Creek tidal estuary, examine feasibility of thin layer deposition to address erosion
   and ecosystem collapse at Sand Spit and
   Great Marsh Island." (33)
- #53 (new action) "Continue to identify areas of erosion along Ash Creek that may require mitigation and secure funding for feasibility studies." (33)

#### VI.7.v, Stratford

- #1 (revised, see VI.6.v, Priorities) "Pursue funding to mitigate existing/future risks to the South End, the adjacent commercial and industrial area, and Lordship. as identified in POCD based on findings/ feedback from Phase III of Resilient CT. Funds may be used to reconstruct drainage systems, install flood control systems and/or elevate/extend seawalls as necessary." (39)
- #41 (new action): Conduct a drainage study

- of Washington Parkway in the vicinity of West Hillside Avenue to identify options for reducing road and property flooding and minimize disruptions to daily life of nearby residents. (48)
- #42 (new action): "Upgrade drainage systems as identified in the study of Washington Parkway in the vicinity of West Hillside Avenue." (48)
- #43 (new action): "Conduct drainage studies in other areas as needed, including other parts of Lordship.." (48).

## PURPOSE & REGIONAL OVERVIEW

## I.1 About the Plan & this Update

The purposes of the update to the multijurisdictional Natural Hazard Mitigation Plan (NHMP) are to reduce the loss of life, personal injury and damage to property, infrastructure, and natural, cultural, and economic resources from a natural disaster to the municipalities that make up the Connecticut Metropolitan Council of Governments: Bridgeport, Easton, Fairfield, Monroe, Stratford, and Trumbull. The Plan emphasizes actions that can be implemented now to reduce or prevent damage from a future natural disaster. The assessments and evaluations are based on extensive data collection and outreach efforts to obtain information on the physical setting of the region, existing hazards, and the occurrence, frequency, duration, and strength of probable hazards.

#### **AUTHORITY**

The Plan is authorized under the federal Disaster Mitigation Act of 2000 (DMA), also known as the 2000 Stafford Act amendments. The purposes of the DMA are to establish a national program for pre-disaster mitigation and streamline administration of disaster relief. The Act encourages the development of disaster preparedness and mitigation plans and the implementation of measures to reduce the effects of natural hazards. Under DMA, communities are required to develop and submit a Natural Hazard Mitigation Plan as a condition of eligibility for certain funding opportunities offered by the Federal Emergency Management Agency (FEMA), including

the Building Resilient Infrastructure and Communities (BRIC) Program, Flood Mitigation Assistance Grant Program (FMA), and post-disaster Hazard Mitigation Grant Program (HMGP).

#### **BACKGROUND**

This plan update builds on the 2014 and 2019 updates to the original 2006 NHMP for the former Greater Bridgeport Regional Planning Area, developed in cooperation with the City of Bridgeport and the Towns of Easton, Fairfield, Monroe, and Trumbull. The NHMP was adopted and approved by FEMA in January 2007. Subsequent to its adoption, the Plan was amended to include the NHMP for the Town of Stratford (Annex, 2008).

FEMA requires that all local and multi-jurisdictional (regional) plans be updated every five years to remain effective. The original NHMP for the Greater Bridgeport Region expired on January 29, 2012. A NHMP Update was prepared by the Greater Bridgeport Regional Council (GBRC) and was approved by FEMA on July 22, 2014, with an expiration date of July 2019. The renamed GBRC, the Connecticut Metropolitan Council of Governments (MetroCOG) and consulting firm Milone & MacBroom, Inc., prepared the 2019 plan, which has an expiration date of August 8, 2024. The 2024 update is being led by MetroCOG, with assistance from consulting firm Resilient Land & Water.

#### **ORGANIZATION**

This NHMP is divided into six sections.

Chapter One describes the purpose of the plan, the MetroCOG Region and municipalities of the MetroCOG Region. Chapter Two summarizes the planning process. Chapter Three provides an identification and assessment of risks. A new Chapter Four reviews and assesses

each community's capabilities. **Chapter Five** describes development of mitigation strategies and documents the progress on previous mitigation strategies for the Region. Concluding the NHMP, **Chapter Six** presents current mitigation strategies for the Region, addresses how mitigation actions will be implemented, and describes the process of maintaining the plan. The Plan's appendices provide further details and data.

The NHMP addresses only natural hazards and disasters and does not directly address pandemics such as the COVID-19 pandemic, terrorism, sabotage, human induced emergencies (structure fires, hazardous material spills, contamination, and disease) or disaster response and recovery.

## CHANGES TO PLANNING PROCESS & NHMP DOCUMENT

The 2024 NHMP integrates FEMA's April 2022 "Local Mitigation Planning Policy Guide" requirements, which became effective April 19, 2023. The policy guide detailed the following:

- Defines who to include in the planning process, including representatives from a broad range of sectors, community lifelines, the public and community-based organizations that support underserved communities.
- Inclusion of the effects of climate change and other future conditions in the risk assessment.
- Recognizes the role of adopting and enforcing building codes and land use and development ordinances to improve mitigation capabilities.
- Facilitates stronger alignment with other FEMA mitigation programs such as the National Flood Insurance Program (NFIP), Community Rating System and flood risk mapping program.
- Emphasizes equity in the planning process.

Community Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function. The integrated network of assets, services and capabilities that provide community lifeline services are used day to day to support recurring needs. Lifelines enable the continuous operation of critical government and business functions and are essential to human health and safety or economic security.

-National Response Framework, 4<sup>th</sup> Edition

In addition to integrating revised FEMA policies, numerous modifications were incorporated into the update of the NHMP. The following is a list of the key changes. Each is addressed in the appropriate section of the document.

- Incorporates components from the State of Connecticut's 2023 Natural Hazard Mitigation Plan (NHMP).
- Summarizes the planning process and public outreach process conducted in the region, with details in Appendices C and D.
- Expands on the previous hazard identification and risk assessments. In addition to incorporating potential impacts due to climate change, impacts from drought and extreme temperatures are also incorporated.
- Updates historical records of many hazards, including federally declared disasters between 2018 and 2023.
- Updates the exposure analysis, which tabulates parcels, structures and other assets vulnerable to the risks profiled in the plan. The current version of HAZUS-MH was utilized as part of this update.

- Updates data and utilizes new data sources: including 2020 Census population and housing data, 2017-2021 American Community Survey data, loss estimates, and resources for risk, climate, vulnerability, and equity.
- A Chapter was added to detail and assess existing federal, state, and local capabilities.
- Reassesses the goals, objectives, and activities presented in the 2019 NHMP.
  - ♦ Assesses current mitigation measures included in the 2019 NHMP to determine which have been implemented and whether or not they have been effective in reducing vulnerabilities and risks. See Tables V.4.i.1 to V.4.vi.1.
  - Oldentifies and evaluates potential mitigation measures that could be implemented to reduce risks and vulnerability. Tables VI.7.i.1 to VI.7.vi.1 list actions proposed for 2024-2029, including some actions carried forward and/or updated from the 2019 NHMP.
  - Develops and prioritizes recommendations for future mitigation actions, as well as response strategies to address hazard mitigation.
- Updates FEMA's grant programs, as well as other potential funding sources.
- Updates the "Critical Facilities," Appendix A.
  In 2019, this data provided a starting point
  for municipalities to check and amend every
  5 years. Critical facility information is often
  vital for developing mitigation actions and
  completing FEMA benefit-cost analysis.
- Updates the "Historic Resources" Appendix
   B with the State Historic Preservation Office's recently released <u>ConnCRIS</u>. In 2019, this data provided a starting point for municipalities to understand where to focus resources

on risk assessments and new historic resource surveys in accordance with new mitigation actions about historic resources.

## I.2 Profile of theMetroCOG Region &Jurisdictions

The MetroCOG Region is located in in Southwestern Connecticut, entirely within Fairfield County, about fifty miles east of New York City and 150 miles west of Boston, Massachusetts. The NHMP is a multi-jurisdictional plan, encompassing the six municipalities of the region. Each community, including municipal staff and residents, actively participated in the preparation of the NHMP Update. The six municipalities are:

- City of Bridgeport
- Town of Easton
- Town of Fairfield
- Town of Monroe
- Town of Stratford
- Town of Trumbull

This section presents demographic information for the Region and its communities. The demographic information presented herein represents 2020 United States Census data where more recent estimates developed from the 2017-2021 American Community Survey (ACS) were not available. Occasionally other estimates are presented such as from the Connecticut Data Collaborative (CTDC) for comparison purposes.

#### I.2.i REGIONAL PROFILE

Together, the MetroCOG communities encompass about 145 square miles with a combined population of 325,985 people. The population density is the highest of any planning region in

Connecticut. This density is reflected in the fact that almost all the land lies within the designated urbanized area and about 98% of the residents live in the urban area. Bridgeport, Fairfield, and Stratford are coastal communities, situated along Long Island Sound. The inland communities of Easton, Monroe, and Trumbull make up the northern portion of the region.

The Region is ethnically diverse as about 41.9% of the population is estimated as belonging to an ethnic minority. Approximately 20.2% of the population is classified as African American.

Persons of Hispanic or Latino ethnicity account for about 25% of the Region's population. Al-

I.2.i.1 Demographic Profile: Region			
	Count	Percent	
Population			
Total Population	325,985		
White	156,098	47.9%	
Black or African American	61,475	18.9%	
Hispanic or Latino	82,130	25.2%	
Asian	13,273	4.1%	
Other Race	2,740	0.8%	
Two or More Races	8,023	2.5%	
Age			
< 18 Years Old	73,893	22.7%	
> 65 Years Old	47,209	14.5%	
Housing			
Total Housing Units	124,438		
Owner Occupied	74,886	60.2%	
Renter Occupied	40,576	32.6%	
Total Occupied Housing Units	115,462	92.8%	
Vacant Units	8,976	7.2%	
Seasonal Units	566	0.5%	
Income			
Households with Income < \$25,000	55,296	44.4%	
Population below Poverty Level	43,462	34.9%	

though this data suggests diversity throughout the Region, minority populations are concentrated in Bridgeport and parts of Stratford. About 22.9% of the Region's population is younger than 18 years old and 14.9% are 65 years or older [2017-2021 ACS].

There are 115,462 occupied housing units in the Region, with the majority (64.9%) owner occupied. About 7.2% of the Region's housing units are vacant. Seasonal or recreational units account for 6.3% of vacant units (2017-2021 ACS).

Despite the overall urban character of the Region, land use patterns vary. The coastal communities, especially along the I-95 corridor, are the most densely developed and most urban in character. The inland communities and the northern part of Fairfield are primarily made up of lower density residential development and exhibit rural characteristics. Overall, 40% of the region is developed and 38% is forested, with the inland communities, especially Easton and Monroe, having greater forest cover. Agriculture is present, but it represents less than 2% of the land use of the entire region. Land cover statistics were derived from data provided by the UConn Center for Land Use Education and Research (CLEAR).

The following sections describe the physical setting, population, demographics and generalized land use of each jurisdiction involved in the NHMP.

#### I.2.ii CITY OF BRIDGEPORT

The City of Bridgeport is the most populous city in Connecticut with a population of 148,529 people. Bridgeport is the central city in the MetroCOG region and is bordered by Fairfield to the west, Trumbull to the north and Stratford to the east. Long Island Sound serves as the city's

southern border. The city has a land area of 16 square miles, a waterfront of 22 miles, and an elevation that reaches to 310 feet in the northwest corner. Bridgeport is the most urban, densely populated, and diverse municipality in the Region, accounting for 45.6% of the Region's population. The city is home to the majority of the Region's non-white population and persons of Hispanic or Latino ancestry. African American residents make up 34.7% of the city's population and 47% of the city's population is another, non-white race which includes residents of Hispanic or Latino descent who comprise 41.7% of Bridgeport's population (2017-2021 ACS).

The median age of people living in Bridgeport is about 34.9 years old, making the city a relatively young place. The proportion of residents younger than 18 years old is not significantly higher than the Region or state, indicating that the lower median age is partly due to a higher number of people between the ages of 20 and 40 years old, as well as the lower proportion of elderly residents living in Bridgeport (12%) than that of the Region as a whole (2017-2021 ACS).

The city has a total of 58,625 housing units, with about 9.8% listed as vacant. A slight majority of housing units are renter occupied, at 51.7%. Although owner-occupied housing accounts for only about 38.5% of the total, this proportion is higher than the cities of Hartford and New Haven. A total of 245 units, 0.4% of the total, are considered seasonal or recreational (2017-2021 ACS).

The entire city meets the definition of an economically distressed area. The median per capita income for Bridgeport workers is approximately \$26,635 per year. About 27% of the city's households earn less than \$25,000 per year, with 23.2% of the population living below the poverty line The median household income for

I.2.ii.1 Demographic Profile: Bridgeport			
	Count	Percent	
Population			
Total Population	148,529	100.0%	
White	27,218	18.3%	
Black or African American	47,734	32.1%	
Hispanic or Latino	61,917	41.7%	
Asian	6,375	4.3%	
Other Race	1,769	1.3%	
Two or More Races	3,379	2.3%	
Age			
Median Age	34.9	-	
< 18 Years Old	33,807	22.7%	
> 65 Years Old	17,370	12.0%	
Housing			
Total Housing Units	58,625	100.0%	
Owner Occupied	22,571	38.5%	
Renter Occupied	30,343	51.7%	
Total Occupied Housing Units	52,914	89.8%	
Vacant Units	5,711	9.8%	
Seasonal Units	245	0.4%	
Income			
Median Household Income	\$50,597	-	
Per Capita Income	\$26,635	-	
Households with Income < \$25,000	40,103	27.0%	
Population below Poverty Level	34,459	23.2%	

Source, 2017-2021 ACS

Bridgeport is about \$50,597 per year (2017-2021 ACS).

Bridgeport has a rich history as a manufacturing center and experienced rapid industrialization due to its deep-water harbor and the construction of railroad lines and good harbor access. The city experienced rapid growth in the late nineteenth and early twentieth centuries, increasing from approximately 29,000 residents in 1880 to 143,000 in 1920. The population

peaked in the 1950s, then steadily decreased throughout the late twentieth century as a result of suburban growth and the decline of industry in the area. This declining trend was reversed between 2000 and 2010, as the current population increased by about 3%.

Today, land use in the city reflects its industrial past. While many of the industrial plants have been demolished or left vacant, remnants of this legacy endure. Residential neighborhoods are close-knit and retain historic configurations. Many residential areas were built in proximity to factories to attract and retain the workers needed by industry, and commercial activity is interspersed within the residential mix of many neighborhoods. Downtown Bridgeport is home to federal, state, and county courthouses. The city serves as a regional center for medical care due to St. Vincent's Medical Center and Bridgeport Hospital. Two colleges are located in Bridgeport: the University of Bridgeport in the South End (just north of Seaside Park and Long Island Sound) and Housatonic Community College in the Downtown. Although Sacred Heart University is technically located in Fairfield, the college is located on upper Park Avenue which serves as the border between Bridgeport and Fairfield.

Bridgeport also serves as a major transportation hub. Commuter (Metro North) and intercity (Amtrak) rail service is provided at the Bridgeport rail station, located at the Bridgeport Intermodal Transportation Center in Downtown. Connected to the rail station by an overhead, covered walkway, Greater Bridgeport Transit's main bus terminal is also located in the Downtown. Bus service radiates from the downtown terminal throughout Bridgeport and into Fairfield, Stratford, and Trumbull. Interstate 95 traverses the southern half of the region and has an interchange with the Route 8/25 Expressway in Bridgeport.

The Port of Bridgeport, classified as a commercial harbor, is one of three deep water ports in Connecticut. Activities within the harbor include recreational boating and support facilities, commercial fishing, dry docks and boat repair facilities, tugboat docking, and passenger and vehicle ferry service. The Bridgeport and Port Jefferson Steamboat Company operates the ferry service to Long Island and leases the Water Street Dock for loading and unloading. The Water Street Dock is strategically located in Downtown and is functionally connected to the Intermodal Transportation Center.

Future land use in Bridgeport is anticipated to reflect existing land uses, with potential mixed-use development on large vacant and underutilized parcels of land that had previously supported industrial uses.

#### I.2.iii TOWN OF EASTON

The Town of Easton's population of 7,602 people is the lowest in the Region (2017-2021 ACS). The Town is located in the Region's northwest and is bordered by the MetroCOG communities of Fairfield (to the south), and Monroe and Trumbull (to the east). The towns of Redding and Newtown (to the north) and Weston and Westport (to the west) are served by the Western Connecticut Council of Governments (WestCOG).

Easton is one of the Region's three inland communities. With a land area of 28.8 square miles, the Town largely consists of rolling, hilly terrain. Elevations range from 110 feet at the Fairfield border to approximately 740 feet at the northern boundary with Newtown.

11.4% of the Town's residents report an ethnicity other than white; 2.9% of residents are of Hispanic or Latino ancestry. Easton's population has the highest median age of the Region at 47.9

I.2.iii.1 Demographic Profile: Easton			
	Count	Percent	
Population			
Total Population	7,602	100.0%	
White	6,593	86.7%	
Black or African American	244	3.2%	
Hispanic or Latino	223	2.9%	
Asian	90	1.2%	
Other Race	150	2.0%	
Two or More Races	302	4.0%	
Age			
Median Age	47.9	-	
< 18 Years Old	1,774	23.3%	
> 65 Years Old	1,419	18.7%	
Housing			
Total Housing Units	2,741	100.0%	
Owner Occupied	2,275	83.0%	
Renter Occupied	444	16.2%	
Total Occupied Housing Units	2,719	99.2%	
Vacant Units	22	0.8%	
Seasonal Units	0	0.0%	
Income			
Median Household Income	\$165,469	-	
Per Capita Income	\$72,660	-	
Households with Income < \$25,000	117	4.3%	
Population below Poverty Level	487	6.4%	

Source, 2017-2021 ACS

years old, as the proportion older than 65, slightly higher than the Region as a whole at 8.7% (2017-2021 ACS).

The total number of occupied housing units in Easton is 2,719, 83% of housing units are owner-occupied. Rental units account for 16.2% of the Town's housing. About 0.8% of the housing stock is vacant (2017-2021 ACS); no units are classified as seasonal or recreational. (2017-2021 ACS).

Easton is a wealthy community, as indicated by the annual median household income of \$165,469. The Town's median per capita income of \$72,660 per year is among the higher income levels in the state. 4.3% of households in the Town of Easton earned less than \$25,000 per year, with 6.4% of the population below poverty level (2017-2021 ACS).

The Town is almost exclusively residential and is primarily composed of single-family houses on large lots. About 0.1% of land in Easton is used for commercial purposes. The Town does not have a specific concentrated commercial area and no industry is located within the town limits. However, Easton has a strong agricultural history and agricultural activities continue to play an important role in the community, including the leasing of farmland at the Easton Elementary School.

Over one third of Easton is preserved as either current water company owned lands or former water company property. Four public supply reservoirs (Easton, Aspetuck, Hemlock and Saugatuck) are either partially or wholly located in the town. About 2,300 acres of the Centennial Watershed State Forest are located in Easton. Made up of a patchwork of hundreds of parcels of varying sizes scattered throughout mostly Fairfield County, this state forest was formed in 2002 with the primary purpose of protecting water quality, wetlands, and woodlands. The State of Connecticut, in partnership with The Nature Conservancy (TNC), has also acquired ownership of roughly 6,000 acres of public supply watershed lands, as well as conservation and public access easements on an additional 9,000 acres.

As Easton is devoted to maintaining a pure water supply for the region, future land development will be limited and focused on preservation.

#### I.2.iv TOWN OF FAIRFIELD

The Town of Fairfield has a population of 61,737 people (2017-2021 ACS). Fairfield is bordered by the MetroCOG communities of Easton (to the north), and Bridgeport and Trumbull (to the east). The western border is with the Town of Westport, which is located in the WestCOG Region. Long Island Sound makes up the Town's southern border. The Town has a land area of 30.6 square miles, rising to the north from its shoreline to an elevation of approximately 450 feet at Hoyden Hill near the northern border with Easton.

Fairfield's population is predominately white, with 87.2% of residents reporting to be white. Approximately 12.8% of the Town's residents report a race other than white. Persons of Hispanic or Latino descent comprise 7.2% of the population. The median age of Fairfield residents is 40.4 years old, with the proportion older than 65 years old accounting for about 15.6% of the population (2017-2021 ACS).

The total number of occupied housing units is 21,086; 79.2% are owner-occupied. The 16.3% of renter occupied units account for a higher proportion of housing units as compared to Easton, Monroe and Trumbull. Vacant housing units comprise 4.5% of the total housing stock with 0.3% of the units classified as seasonal or recreational (2017-2021 ACS).

Fairfield is a wealthy community, as indicated by an annual median household income of \$149,621, only slightly less than the median family income in Easton. The median per capita income is \$53,368 per year. Households earning less than \$25,000 per year accounted for 8.4% of all households and 5.7% of the population live below the poverty line. (2017-2021 ACS).

Fairfield is a town with two distinct development patterns. Although the Town is predominantly res-

idential, more intense development patterns are concentrated in the eastern and southern areas of the Town and along the Metro-North New Haven Line and the Interstate 95 corridor. The major business and industrial areas are located along US Route 1 and the southern portion of Route 58 (Black Rock Turnpike and Tunxis Hill Road). The northwestern part of town is relatively rural and is predominantly made up of large lot, single family homes. Residential distribution is denser in the eastern portion of the community.

I.2.iv.1 Demographic Profile: Fairfield			
	Count	Percent	
Population			
Total Population	61,737	100.0%	
White	51,906	84.1%	
Black or African American	1225	2.0%	
Hispanic or Latino	4,425	7.2%	
Asian	2,575	4.2%	
Other Race	332	0.5%	
Two or More Races	1274	2.0%	
Age			
Median Age	40.4	-	
< 18 Years Old	14,019	22.7%	
> 65 Years Old	9,112	15.6%	
Housing			
Total Housing Units	22,075	100.0%	
Owner Occupied	17,483	79.2%	
Renter Occupied	3,603	16.3%	
Total Occupied Housing Units	21,086	95.2%	
Vacant Units	989	4.5%	
Seasonal Units	67	0.3%	
Income			
Median Household Income	\$149,621	-	
Per Capita Income	\$53,368	-	
Households with Income < \$25,000	5,186	8.4%	
Population below Poverty Level	2,519	5.7%	

Source, 2017-2021 ACS

Coastal development is primarily residential and includes beaches and private marinas. Two colleges are located in Fairfield: Fairfield University and Sacred Heart University (on the border of Bridgeport).

Fairfield is served by three commuter rail stations on the Metro-North New Haven Line: Fair-field Metro Center, Fairfield Center, and Southport. Local bus service, oriented to and from Downtown Bridgeport is provided along the US Route 1 (Kings Highway East to the Post Road) and Route 58 corridors. In addition to Interstate 95, the Merritt Parkway (Route 15) passes through the northern part of Fairfield.

#### I.2.v TOWN OF MONROE

The Town of Monroe has a population of 18,927 people (2017-2021 ACS). Monroe is located in the northern part of the Region and is bordered by of Easton to the west and Trumbull to the south. To the east, the Town shares a border with Shelton, which is represented by the Naugatuck Valley Council of Governments (NVCOG). Monroe has a northeast border with the Town of Oxford (NVCOG) along Lake Zoar and the Housatonic River. The land area of Monroe is 26.4 square miles, and the Town's highest elevation is approximately 600 feet.

The ethnic mix of Monroe's population is similar to that of other suburban communities in the Region. The population is predominately white at 82.8% of residents while approximately 17.2% of the Town's residents report a race other than white. Persons of Hispanic or Latino descent comprise 8.8% of the population. The median age of Monroe's residents is 41.4 years old. The proportion of the population older than 65 accounts for about 14.9% of the population and is lower than other communities in the region (2017-2021 ACS).

1.2.v.1 Demographic Profile: Monroe			
	Count	Percent	
Population			
Total Population	18,927	100.0%	
White	12,912	78.8%	
Black or African American	640	3.4%	
Hispanic or Latino	1,659	8.8%	
Asian	1021	5.4%	
Other Race	0	0.0%	
Two or More Races	695	3.6%	
Age			
Median Age	41.4	-	
< 18 Years Old	4,863	25.7%	
> 65 Years Old	2,815	14.9%	
Housing			
Total Housing Units	6,607	100.0%	
Owner Occupied	5,768	87.3%	
Renter Occupied	506	7.6%	
Total Occupied Housing Units	6,274	94.9%	
Vacant Units	333	5.1%	
Seasonal Units	0	0.0%	
Income			
Median Household Income	\$127,995	-	
Per Capita Income	\$47,991	-	
Households with Income < \$25,000	1,552	8.2%	
Population below Poverty Level	606	3.2%	

Source, 2017-2021 ACS

The total number of occupied housing units in Monroe is 6,274, with 87.3% of units occupied by the owner. This percentage is comparable to other similarly sized towns in the Region, such as Easton and Trumbull. Rental units account for 7.6% of all units. Vacant housing units comprise 5.1%; no units are classified as seasonal or recreational (2017-2021 ACS).

The annual median household income for Monroe is \$127,995 and the per capita income is

\$47,991 per year. About 3.2% of the population earns an income below the poverty line and 8.2% of the households earn less than \$25,000 per year (2017-2021 ACS).

Monroe is a predominantly residential community comprised of single family, detached units on one to three acre lots. Several condominium complexes provide a higher concentration of housing. Commercial activities are concentrated along the Route 25 and Route 111 corridors, and several industrial parks are located along Pepper Street in the northern part of town.

Future land use in Monroe is anticipated to be consistent with existing development patterns.

#### I.2.vi TOWN OF STRATFORD

The Town of Stratford has a population of 52,360 people (2017-2021 ACS). Stratford is bordered by the MetroCOG communities of Bridgeport and Trumbull to the west. The Town borders the City of Shelton (NVCOG) to the north and the City of Milford (South Central Region Council of Governments) to the east. The Housatonic River flows along the border between Stratford and Milford. Long Island Sound makes up the town's southern border. The land area of Stratford is 19.6 square miles. Rising north from the Town's shoreline, the Oronoque section of town has an elevation of approximately 240 feet.

Stratford's population is more ethnically diverse than the Region's other suburban communities. Although the population is predominately white at 64.9% of residents, 35.1% of the population is made up of ethnic minorities. Persons of Hispanic or Latino descent comprise about 20.1% of the population. The median age of Stratford's residents is 43.4 years old, similar to other communities in the Region and the state average. The

proportion of those over 65 is higher than and accounts for 19.7% of the population. Similarly, the percentage of residents aged 18 and under comprise 19.2% of the population, the lowest in the region (2017-2021 ACS).

The total number of occupied housing units in Stratford is 20,187 with 73.9% owner-occupied. This percentage is lower than the Region's northern communities but comparable with that of Fairfield. Rental units account for 19.3% of

I.2.vi.1 Demographic Profile: Stratford					
	Count	Percent			
Population					
Total Population	52,360	100.0%			
White	29,456	56.3%			
Black or African American	10,308	19.7%			
Hispanic or Latino	10,541	20.1%			
Asian	735	1.4%			
Other Race	176	0.3%			
Two or More Races	1,135	2.2%			
Age					
Median Age	43.4	-			
< 18 Years Old	9,929	19.2%			
> 65 Years Old	10,092	19.7%			
Housing					
Total Housing Units	21,675	100.0%			
Owner Occupied	15,981	73.9%			
Renter Occupied	4,206	19.3%			
Total Occupied Housing Units	20,187	93.2%			
Vacant Units	1,488	6.8%			
Seasonal Units	205	1.0%			
Income					
Median Household Income	\$86,113	-			
Per Capita Income	\$40,406	-			
Households with Income < \$25,000	5,760	11.0%			
Population below Poverty Level	3,770	7.2%			

Source, 2017-2021 ACS

total occupied units. Vacant housing units comprise 6.8% of all units. 205 units are classified as seasonal or recreational and make up about 1% of the housing stock (2017-2021 ACS).

The annual median household income for Stratford is \$86,113, the second lowest income in the Region. The median per capita income is \$40,406 annually, lower than that of Fairfield County and slightly lower than the state-wide median family income. 11% of families earn less than \$25,000 per year, with 7.2% of the population below the poverty line. (2017-2021 ACS).

Stratford provides a range of housing options. Medium density housing is prevalent in the central and southern areas of town, while the northern part is typically characterized by low density development.

Although Stratford is a predominantly residential community, the Town has significant commercial and industrial corridors. Commercial activities are concentrated along U.S. Route 1 (Barnum Avenue), Route 113 (Main Street), in the vicinity of Route 110 (East Main Street, Barnum Avenue Cutoff, and Ferry Boulevard) and Route 130 (Stratford Avenue). Industrial areas are located in the south end of Stratford: in Lordship and near Sikorsky Memorial Airport. The Sikorsky Aircraft plant (Lockheed Martin) is located along the northern section of Route 110.

Stratford is served by one commuter rail station on the Metro-North New Haven Line, located in Stratford Center. Local bus service is provided throughout the Town and enables access to most areas of activity. Interstate 95 traverses the southern half of Stratford; the Merritt Parkway is located in the north. Sikorsky Airport, the Region's only airport, is located in the Lordship neighborhood. The airport is owned by the City of Bridgeport and is classified as a General Avi-

ation airport, serving primarily private aircraft.

Future land use plans include transit oriented and mixed-use development, as well as light industrial and office park development.

#### 1.2.vii TOWN OF TRUMBULL

Trumbull's population is made up of 36,830 people (2017-2021 ACS). The Town is located in the center of the Region, bordered by the City of Bridgeport to the south, the Town of Easton to the west, the Town of Monroe to the north, and the Town of Stratford to the east. In the east, Trumbull is bordered by the City of Shelton (NVCOG). The land area of Trumbull is 23.3 square miles and consists of low hills and steep ridges that rise above well-defined valleys. The highest elevation in the Town is approximately 520 feet, recorded at both Tashua and Booth Hill.

The ethnic mix of Trumbull's population is similar to that of the Region's other suburban communities. The population is predominately white at 79.2% of residents while 20.8% of residents report a race other than white. Persons of Hispanic or Latino descent comprise 9.1% of the Town's population. The median age of Trumbull residents is 42.3 years, similar to other communities in the Region. The proportion of the population older than 65 is among the highest in the Region, accounting for about 17.7% of the population. The number of residents younger than 18 years old makes up about 25.9% of the population (2017-2021 ACS).

The total number of occupied housing units in Trumbull is 12,282; 85% housing units are owner-occupied. Renter occupied units make up about 11.6% of all units. These rates are comparable to other similarly sized towns in the Region. Approximately 3.4% of units in the Town are vacant and there is a total of 49 seasonal or

recreational housing units. (2017-2021 ACS).

The annual median household income for Trumbull is \$138,801, higher than the average for the Region. The median per capita income is at \$54,961 per year. 7% of all households earn less than \$25,000 per year and 4.4% of the population lives below the poverty level. (2017-2021 ACS).

I.2.vii.1 Demographic Profile: Trumbull						
	Count	Percent				
Population						
Total Population	36,830	100.0%				
White	28,013	76.1%				
Black or African American	1,324	3.6%				
Hispanic or Latino	3,365	9.1%				
Asian	2,477	6.7%				
Other Race	313	1.1%				
Two or More Races	1,238	3.4%				
Age						
Median Age	42.3	-				
< 18 Years Old	9,501	25.9%				
> 65 Years Old	6,401	17.7%				
Housing						
Total Housing Units	12,715	100.0%				
Owner Occupied	10,808	85.0%				
Renter Occupied	1,474	11.6%				
Total Occupied Housing Units	12,282	96.6%				
Vacant Units	433	3.3%				
Seasonal Units	49	0.1%				
Income						
Median Household Income	\$138,801	-				
Per Capita Income	\$54,961	-				
Households with Income < \$25,000	2,578	7.0%				
Population below Poverty Level	1,621	4.4%				

Trumbull is a predominantly residential community, comprised mostly of single-family housing on one half to one acre lots; the smaller lot sizes are mostly located in the older parts of town. Several condominium complexes are scattered throughout the town. Commercial, office and industrial activities are concentrated in large parks generally with a single access point from main road corridors. The two largest shopping malls in the Region are located in Trumbull. Local bus service is provided along main road corridors and is oriented to and from the Trumbull–Westfield Shopping Mall. The Merritt Parkway and Routes 8 and 25 pass through Trumbull.

Future land use in Trumbull is expected to maintain and enhance the existing colonial New England residential character of the Town with some limited and managed vertical growth in industrial areas and zones.

#### I.3 Development Trends

As mentioned earlier, the MetroCOG Region has the highest population density in the State of Connecticut. The majority of the population (45.5%) lives in the City of Bridgeport. Following the previous 2019 NHMP, estimates suggest that most of the region's towns have had slight increases in population (Table I.3.1), with development trends occurring at a pattern similar to the 2019 plan. As in the 2019 plan, the majority of new housing permits were in the coastal commu-

I.3.1 Population Change, 2010-21					
	Population Totals			2010-2021	
Municipality	2010 Census	2013-17 ACS	2017-21 ACS	%	Number
Bridgeport	144,229	147,586	148,529	1.03%	4,300
Easton	7,490	7,607	7,602	1.01%	112
Fairfield	59,404	61,611	61,737	1.04%	2,333
Monroe	19,479	19,766	18,927	0.97%	-552
Stratford	51,384	52,529	52,360	1.02%	976
Trumbull	36,018	36,455	36,830	1.02%	812
Region	318,004	325,554	325,985	1.03	7,981

Soutce: US Census, American Community Survey (ACS)

I.3.2 Annual Building Permits, 2017-22							
Municipality	2017	2018	2019	2020	2021	2022	Total
Bridgeport	31	54	45	71	62	57	320
Easton	7	8	1	9	11	7	43
Fairfield	111	77	232	144	94	191	849
Monroe	17	8	9	7	9	30	80
Stratford	84	25	75	39	70	2	295
Trumbull	6	8	1	98	66	110	289
Region	256	180	363	368	312	397	1876

Soutce: CTDECD, US Census

nities of Fairfield, Bridgeport, and Stratford (see Table I.3.2). There was a large increase in new housing permits in Trumbull from 2020 to 2022. Between 2012 and 2019, the Town issued a total of 53 housing permits; from 2020 to 2022, the Town issued 274 permits. Increased development has exposed more people to natural hazards, but all development id in accordance with the State Building Code and the local flood regulations has ensured safer and more resilient development than in the past.

From 2010 to 2021 the Region's population in-

creased by an estimated 7,981 people. Bridgeport and Fairfield had the largest increase in population, making up well over half of this population increase. There was a slight decrease in Monroe during this same period.

#### 1.3.iii CITY OF BRIDGEPORT

The previous NHMP noted that the primary land use objective for the City of Bridgeport was redevelopment and for infill at former manufacturing lots that have been left vacant, of which many are Brownfield sites. The City has continued to focus on redevelopment over the past five years and for ongoing development to reduce environmental and climate-induced hazards, such as through low impact development best practices. Notable projects include:

#### Citywide

Aspetuck Land Trust has helped to repair riparian corridors by installing buffers and Miyawaki forests. Miyawaki Forests are dense, biodiverse pocket forests that aim to recreate the relationships and succession of a natural forest.



#### Brooklawn/St. Vincent

The Wakeman Boys and Girls Club on Madison Avenue is a new community facility near Central High School; the site is not within a floodplain.

#### Downtown

- Harbor Yard was successfully converted from a Ballpark into an outdoor amphitheater. There are plans for another music hall in the same area.
- Public Service Enterprise Group
   (PSEG) site: funding has been awarded for
   demolition and abatement of the decommissioned coal plant and a planning reuse study
   to examine the best use of the site. The current
   direction of development is for mixed-use
   and luxury housing, which would be developed to resilient standards as it is along the
   waterfront
- 60 Main Street (former Remington site)
   and the ferry terminal site are key waterfront
   redevelopments and the City has an oppor tunity to support innovative design and flood
   resilience.
- The AT&T building is being rehabilitated into a new housing development; the site is not in a floodplain.

Sliver by the River: A partnership between the City of Bridgeport, Groundwork Bridgeport, Trust for Public Land, Bridgeport's Waterfront Advisory Board, and the Downtown Special Services District, this project will transform this waterfront site into a socially and environmentally vibrant public park. Nature-based solutions, including a salt marsh structure, will expand access to the waterfront while supporting local ecosystems and improving the water quality of the Pequonnock River.

#### East End

- The Civic Block is in construction and should be completed soon. Newfield library has been open and welcoming visitors. The "Civic Block" refers to an entire block on Stratford Avenue which is being redeveloped with a new library, grocery store, retail, and other uses.
- Mount Growmore is a hydroponics grow farm in a flood-prone area. The site is raised and there are plans underway (and funding secured) to develop a living shoreline that will strengthen resilience at the Mount Growmore site and neighboring properties.

#### East Side

- Steele Point continues to be built out on land that is protected by new bulkheads and an elevated ground surface that exceeds the base flood elevation. The mixed-use "Dockmaster Building" was completed in 2019. The first phase of construction is set to begin soon for a planned 420-unit mixed-use development. The site is within the floodplain and the development will be constructed to address environmental vulnerabilities/hazards.
- A soccer stadium is planned on the former dog racing track/AGI site.
- The SquashBridge Community Facility is being developed on Main Street.
- Historic buildings on East Main Street are being rehabilitated; properties are not within the floodplain.
- Phase II of Crescent Crossing (HUD housing project) is in construction.

#### South End

- The first phase of Windward Apartments
  was completed through a public/private
  partnership in the City's South End. These 54
  units are the first step in the replacement of
  Marina Village, a 400-unit public housing
  complex which was demolished in 2018.
  Windward Village is in compliance with
  floodplain development standards, as the site
  is partially in the SFHA. Windward Apartments will ultimately consist of 100 units.
- Bassick High School has been undergoing construction in the South End, next to the
  University of Bridgeport. This site is in the .2%
  floodplain and the school is being constructed in accordance with State Building Code requirements for critical facilities in 0.2% chance flood zones.

#### Potential development in the South

- **End:** Nanoramic Laboratories is planning to create a battery manufacturing facility in Bridgeport, which will bring over 200 local jobs. The development is under consideration in the South End near the waterfront any future development will mitigate vulnerabilities and flooding risk.
- Resilient Bridgeport is an effort to protect
  the South End neighborhood from chronic
  and acute flooding. Its two pieces include the
  Rebuild by Design Stormwater Park and its
  Flood Risk Redution Wall. Rebuild by Design
  is expected to have a finalized design in
  May 2024, a notice to proceed in December
  2024, and a two-year construction duration. The Flood Risk Reduction is pending on
  receiving additional funds to proceed.

#### West End/West Side

- The Flow Project: A partnership between Save the Sound, The Nature Conservancy, Groundwork Bridgeport and the City of Bridgeport, this project is assessing site feasibility for bioswale installations. The project continues to work with community members to plant trees, make street art, and find ways to use nature-based solutions to help address water pollution while providing an improved habitat for wildlife and neighborhood residents.
- Wastewater treatment plant upgrades: incorporate flood resilience measures.

In summary, while development and redevelopment in Bridgeport are desired and ongoing, all projects are being designed consistent with the requirements for the flood zone present (if present). New residential uses are not proposed for flood zones\*.

#### 1.3.iv TOWN OF EASTON

The previous NHMP noted that the Town of Easton continued to preserve low-density residential character and ample amounts of public water supply watershed lands. It continued to encourage commercial and service growth in central areas while preserving open space. The Town of Easton noted that major development is not underway as of 2024. The Town remains rural and wishes to retain its rural character. The town has made strides in land preservation through their partnership with Aspectuck Land Trust. Since the 2019 iteration of the NHMP, Easton helped preserve Gilbertti's Farm, Lakeview Orchards, and continued to lease farmland at the elementary school, increasing the amount of land stewarded in the community.

In summary, development is not increasing risks to natural hazards. in the town of Easton as a direct result of the town's desire to limit development in hazard areas.

#### 1.3.v TOWN OF FAIRFIELD

Since the 2019 NHMP update, Fairfield has pursued concentrated **transit-oriented development** within the vicinity of two of its three train stations. Several mixed use, transit oriented development projects have been completed near the Fairfield Metro Center train station, including **Trademark** (101 units) and **Alto** (160 units).

New Jersey-based developer Accurate Builders purchased the **Crossings at Fairfield Metro Center** site in 2022. The site has been approved for 357 residential units, a 118-key hotel, as well as ancillary retail and commercial office space. Accurate broke ground on the first residential building (#4), which includes 70 units, but is planning to seek modifications to the approved master plan to increase the number of residential units and size of the hotel.

Post Road Residential (PRR) recently received approval for a 245-unit mixed use transit-oriented development at **81 Black Rock Turnpike**, a 5-acre, brownfield site sandwiched between the Fairfield Metro Center station and **Elicit Brewing Company.** Elicit is a craft brewery, restaurant, bier hall, and entertainment complex at 111 Black Rock Turnpike and opened in February 2024.

Post Road Residential is also the developer of the **Anchorage**, a 90-unit luxury residential community located on the former Knights of Columbus site at 333 Unquowa Road.

Fairfield University and Sacred Heart Universities have embarked on ambitious capital project campaigns in recent years to add to their campus facilities and meet growing enrollments. Fairfield University has replaced the former Alumni Hall with a new state of the art 4000-seat basketball arena. SHU built a new 4000-seat hockey arena on the former GE site, and added several new residence halls, totaling 475 beds, with another 484 beds under construction. Fairfield University has also added new on-campus housing, with 165-beds at Regis West and a 118-bed addition to Faber Hall presently under construction, with still more planned. Downtown, SHU has leased an abandoned theater and renovated it into a new performing arts and entertainment venue.

Hartford Healthcare is constructing a new 25,000 square foot medical office building across from the Hotel Hi-Hi on the former Plant Factory nursey site.

Near SHU's main campus, a new 100-unit residential apartment building opened in May.

Fairfield expects to see continued development in and around Fairfield Metro, with smaller infill and redevelopment projects elsewhere in Town.

In summary, while development and redevelopment in Fairfield is desired and planned, all projects are being designed consistent with the requirements for the flood zone present, if applicable.

#### I.3.vi TOWN OF MONROE

Since the 2019 NHMP update, Monroe has continued progressing with minor development projects which included completing a two-lot subdivision, a three-lot subdivision, and a bulk propane storage facility. Recently, there has been an application submitted to the town for a mixed-use residential development at Bart Center, with apartment dwellings proposed above ground floor retail spaces. Currently the zoning regulations would not allow for the proposed development and the town is engaging in public conversations on how the regulations may be altered. Additionally, the construction of **new** athletic fields is currently underway at Wolfe Park, which contains a floodplain that will not be disturbed by this new development. Similarly, a 99-unit condo's driveway will not be built into the floodplain. The longstanding Pepper Street roadway and multi-use trail project is nearing completion and is anticipated to finish in the near future.

In summary, recent development has not increased risks to natural hazards, due to lack of development in the floodplain .

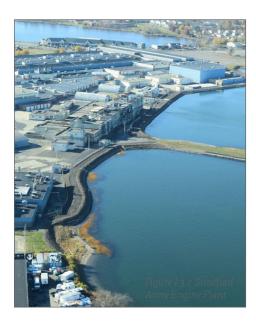
#### 1.3.vii TOWN OF STRATFORD

Stratford remains for the most part, built-out. The majority of future development will be in-fill residential development and redevelopment of existing industrial and commercial areas. The Town has also developed an updated Open Space Inventory, designed to highlight potential open space acquisitions over the next several years.

Resilient Connecticut, funded by Housing and Urban Development (HUD) and administered by the Community Development Block Grant (CDBG) Program, aims to make housing and related infrastructure more resilient. Currently in Phase III, the program is focused on flood mitigation in Stratford's South End neighborhoods and is discussed later in this section.

There is an increasing demand for multifamily housing in Town, similar to the rest of Connecticut. During Stratford's POCD workshops, residents supported a few areas in Town as potential multifamily sites. These areas include Stratford **Center** and adjacent areas proximate to the train station, Ella Grasso Center (on Armory Road), neighborhoods accessible to CT-15/Merritt Parkway, and Lordship Boulevard. Development in the Transit Oriented Development (TOD) District (i.e., Stratford Center area) for mixed-use is a significant focus of the town. Over the past decade, 754 units of housing have been built in the TOD Zone, with nearly 500 units in  $\frac{1}{4}$  mile radius of the Zone. The Town believes this momentum will continue, but acknowledges the promotion of climate resiliency in floodplains plays a critical role in identifying suitable locations for multifamily housing.

In 2019, the State of Connecticut conducted a study to identify and protect historic structures in special flood hazards areas in the state, including Stratford, and the study placed great emphasis on preserving historic housing in floodplains. This study will be used as a guide to protect and preserve historic structures in floodplains. For example, the former Shakespeare property is located partially in the flood zone and is planned for redevelopment into an arts and entertainment destination known as the **Stratford Performing Arts Complex.** The Town was awarded \$3 million by the State Bond Commission for



construction dollars to support the project. The Town is currently reviewing development proposals to redevelop this property.

Since the 2019 NHMP, the Town has made progress on the redevelopment of the former **Stratford Army Engine Plant (SAEP)**, which sits entirely in the coastal flood zone. In April 2024, the site was conveyed from the U.S. Army Corps of Engineers (USACE) to Point Stratford Renewal (PSR). In 2013, PSR was chosen as the preferred developer. PSR will be entering into an Environmental Service Cooperative Agreement which will allow them to manage remediation of the mudflats at the same time as the upland property. As the site is remediated, any future redevelopment of this large parcel will require compliance with regulations that control development in flood zones.

The Town continues with remediation of the of sites impacted by the former Raymark Industries. In 2023, over 11,000 cubic cards of contaminated sediment and fill were removed from portions of the Birdseye Marine Complex. After remediation, the site was elevated and riprap was enhanced to strengthen resilience. A fishing pier and picnic area were reconstructed and a portion of parking lot was

pulled back from the wetlands. As vegetation was cleared, native species were replanted.

Contract Plating on Honeyspot Road has been demolished and will be redeveloped. It is a 10.5-acre parcel located in Stratford's Transit Oriented District. In 2014, the Town of Stratford foreclosed on this property and obtained a DECD Brownfields grant in the amount of \$2,850,000 with additional funds from EPA to remediate the property. At this time, the property requires further remediation. The Town of Stratford and MetroCOG are working with DECD to obtain additional grant funds to clean up the property in order to develop this long vacant and underutilized property. DECD has agreed to fund further remediation once the Town of Stratford has secured a developer for the property.

The Town is also making significant progress in improving stormwater infrastructure in coastal flood zones, which would further support responsible development in floodplains. The Town received \$4.1 million in federal funds to upgrade the stormwater pump station and pipes at the Water Pollution Control Facility (WPCF) in 2023. These upgrades will proactively help Stratford's sewage plant to remove treated wastewater from sewage pipes and prevent them from backing up during a rainstorm.

The Town is currently in the process of implementing a flood mitigation berm along the eastern shoreline, by the WPCF, which was supported by FEMA funding in 2020. This berm will help protect residential and commercial properties along the eastern shoreline. A **Repetitive Loss Area Analysis (RLAA)** is also being conducted currently for flood prone properties that are repeatedly flooded in special flood hazard areas so that short- and long-term solutions can be figured out to mitigate flooding on these properties.

In 2023, the Town partnered with Connecticut Institute for Resilience and Climate Adaptation (CIRCA) to conduct the **Resilient Stratford South End study.** This planning effort focused on detailed review of flood mitigation strategies proposed for the South End neighborhood, as identified in the Coastal Community Resilience Plan (2016) and provided an assessment of ongoing implementation challenges and alternative mitigation strategies to protect the South End neighborhood. The Town is currently planning to partner with the U.S. Army Corps of Engineers for further study of the CIRCA findings and the Town's flood-protection plan.

In summary, while development and redevelopment in Stratford is desired and planned, all projects are being designed consistent with the requirements for the flood zone present, when applicable.

#### 1.3.viii TOWN OF TRUMBULL

Development in Trumbull since the last NHMP has focused on expanding existing structures, future planning, and creating new building opportunities. Recently, the Town completed the first Phase of the Trumbull Mall Area market feasibility and land use study which seeks to reimagine the Trumbull Mall as a dense, mixed-use district. The study team is evaluating opportunities for housing on the Main Street side of the mall. There is a stream that runs through that area which the team is exploring as incorporating as greenspace. Currently, the mall owner has leased numerous vacant spaces. The development team is aiming to attract a grocery store tenant, and they have engaged the appropriate parties towards this goal.

The Town recently approved a **mixed-use development project at Trumbull Center** which includes a 5-story building with ground

floor commercial and 52 residential units on floors two through five. Part of the development is in the Pequonnock River floodplain. The associated FEMA flood maps are to be updated later in 2024. **As mitigation strategies**, the town will require a pump station, inclusion of a larger green space, and invasive species removal as part of the development.

An old grocery store, the **Porcelli site in Trumbull Center**, will likely be up for redevelopment in the next 5 years.

There have been numerous housing developments proposed in town, including a potential mixed-use development project at White Plains and Reservoir Road.

In summary, while development and redevelopment in Trumbull is desired, future projects are being designed consistent with the requirements for the flood zone present, when applicable.

Additionally, the town offers information related to floodplain hazards and flood prone areas to interested parties. Information includes, identification of a flood hazard zone via current Flood Insurance Rate Map (FIRM), additional flood insurance data, guidance on the mandatory purchase of a Flood Insurance policy, and information regarding available property protection measures, as well as regulations that affect floodplain properties and areas of special concern.

## PLANNING PROCESS & COORDINATION

This Chapter summarizes the process of preparing the NHMP, municipal coordination, community outreach, and stakeholder involvement. Detailed documentation of the planning process can be found in Appendices C (Coordination) and D (Public Involvement).

In the 2019 NHMP, this chapter included details of existing plans, policies, programs, and government structures. This content has been moved to a standalone chapter, IV: Community Capabilities, which provides insight into the capacity of each community to plan for natural hazards and implement mitigation strategies.

The Planning Process for the NHMP began on August 1, 2023 and ended on June 28th, 2024. This chapter, and the two appendices were finalized at the end of the planning process.

- Prior to August, the NHMP update was a topic at the July 19th, 2024 meeting of the Transportation Technical Advisory Committee. This committee is primarily composed of municipal planning and engineering staff.
- E-mails were sent to Chief Elected Officials and local staff to serve on the Planning Team/Advisory Committee.

#### **II.1 Local Coordination**

At the onset of the planning process, Metro-COG contacted municipal staff to assemble local Planning Teams/Advisory Committees tasked with coordination, directing the update of the NHMP, and providing input into the plan, such as data, studies, reports, and observations. Table II.1.1 present the Planning Teams from each

II.1.1 PL	anning Team/Advisory Committee	
Bridgeport	Emergency Management: Scott Appleby Engineering: Chris Daniele, Josh Hannant, & Jon Urquidi Finance: Kenneth Flatto Planning/Economic Development: William Coleman & Cathy Fletcher Sustainability: Chadwick Schroeder	
Easton	Engineering: Edward Nagy Land Use: Justin Giorlando, Police/Emergency Management: Rich Doyle	
Fairfield	Mark Barnhart, Economic Development Planning: Emmeline Harrigan & James Wendt Engineering: Bill Hurley, & Megha Jain	
Monroe	Building: John Morris Economic & Community Development: Bill Holsworth Engineering: James DiMeo Fire/Emergency Management: Bill Davin Health: Amy Lehaney Police/Emergency Management: Keith White Public Works: Chris Nowacki Zoning/Land Use: Dylan Willette	
Stratford	Conservation: Kelly Kerrigan Engineering: John Casey Planning: Susmitha Attota & Jay Habansky Public Safety: Lawrence A. Ciccarelli Jr.	
Trumbull	Emergency Management: Andy Kingsbury, Engineering: Bill Maurer & Tatiana Smoritskaya Fire/Emergency Management: Megan Murphy Planning: Rob Librandi Public Works: George Estrada	

community. The teams typically included municipal engineers, planners, public safety officials, chief elected officials, and other applicable staff essential to identifying priority areas for hazard mitigation.

Details of municipal coordination can be found in Appendix C.

#### REGIONAL PLANNING TEAM/ ADVISORY COMMITTEE

The planning process was conducted through a Planning Team/Advisory Committee composed of MetroCOG and municipal staff with expertise in planning, land use, economic development, engineering, and emergency management. Regional level meetings were held at MetroCOG's offices in Bridgeport with a virtual option. Meetings occurred at key milestones in the planning process and are documented in Appendix C.

- Assess the Hazard: August 22nd, 2023, meetings held at 10 am and 2:30 pm
- Assess the Problem: October 25th, 2023
- Set Goals: January, 25th, 2023
- Review Possible Activities: April 17, 2024
- Draft an Action Plan: May 29, 2024

The Planning Team/Advisory Committee assisted in raising local awareness of the plan and the different opportunities available for residents and stakeholders to participate in the plan. These outreach efforts included posting updates on municipal websites and newsletters. Member expertise offered both qualitative and quantitative insights at public meetings, which greatly contributed to their utility.

#### LOCAL PLANNING TEAM/ ADVISORY COMMITTEE

Local consultation occurred throughout the planning process. In addition to the regional meetings, local meetings were held to review hazard data and problem statements, as well as to review and update the 2019 goals, objectives, and actions. The majority of meetings with local staff were held in February, March, and April of 2024. Attendees and bullet points from these meetings can be found in Appendix C.

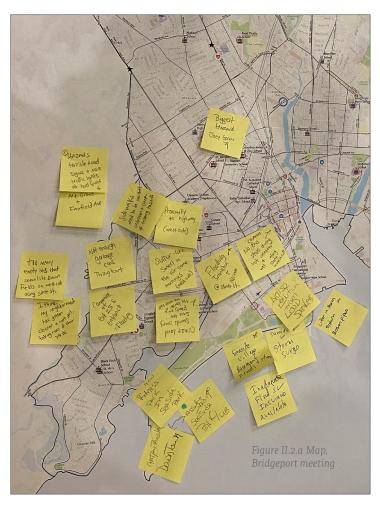
### CONSERVATION TECHNICAL ADVISORY COMMITTEE (CTAC)

The Conservation Technical Advisory Committee (CTAC) is an advisory body to MetroCOG. Throughout the planning process, MetroCOG staff provided updates on the NHMP at each CTAC meeting. Members and attendees provided comments, feedback, and guidance as the NHMP update was being drafted. Members typically commented on the progress, but also suggested points of contact and areas of specific concern. Once the update was in draft, CTAC was provided an opportunity to review the narrative and mitigation strategies, while members submitted feedback and other potential mitigation strategies. A detailed description of membership and responsibilities are found in Chapter IV. Appendix C provides a list of meetings where the NHMP was discussed.

#### II.2 Public Involvement

In an effort to develop a comprehensive and publicly supported multi-jurisdictional NHMP, MetroCOG followed a proactive public involvement process. This included a press release, posts to the MetroCOG website, developing an online survey, periodic email blasts, and holding two series of public information meetings. MetroCOG's website presented an overview of the purpose of the NHMP and a summary of the plan development process. MetroCOG also posted the Press Releases, a Survey link, and Public Meeting Information. The assistance of member municipalities was critical in spreading the word about the plan and ways to participate in the NHMP update.

Details of public involvement, including how outreach materials were distributed, can be found in Appendix D.



#### **PUBLIC MEETINGS**

Public meetings were promoted by both Metro-COG and municipal staff. A press release and graphic were provided to each Chief Elected Official and the local Planning Team/Advisory Committee. These representatives were asked to post the information to their municipal websites, at visible locations in each City/Town Hall, and at other key locations. Some communities distributed email blasts via their email lists and/or included information in a local newsletter.

Times, dates, and locations of the public meetings were listed on MetroCOG's News and Events boxes on the agency's homepage. These efforts were enhanced by MetroCOG email blasts via mailchimp.

#### September 2023

The first series of public meetings occurred in September 2023. The purpose of these meetings was for residents, businesses, and stakeholders to learn about the plan and share their knowledge of, experiences with, and concerns about natural hazards, vulnerabilities, and opportunities for mitigation.

MetroCOG, consultant, and municipal staff presented on the process of updating the Regional Natural Hazard Mitigation Plan and impacts from recent events. Hazard profiles and the likelihood of events happening in the future were also discussed. The primary focus of the public meetings was to solicit information and comments from the public on how the community should address natural hazards and what actions, strategies, and projects should be implemented to reduce the effects of future natural hazards. At many meetings, attendees indicated areas of concern on a map, as well as potential mitigation actions.

• Fairfield: September 6th, 2023

Easton, Monroe, and Trumbull: September 19th, 2023 (held in Trumbull)

Stratford: September 25th, 2023Bridgeport: September 18th, 2023

#### June 2024

The second series of public meetings occurred during the public review period of the draft. The purpose of these meetings was for residents, businesses, and stakeholders to provide feedback on the plan, and for attendees to learn about the plan's recommendations. The locations of actions were indicated on maps, with policy, regulatory, and/or municipal-wide actions indicated as a separate handout.

Materials, notes, and sign-in sheets for the public meetings are in Appendix D.

#### power community power outages house impacted roof home electricity

## loss caused property roads trees days flooding power lines damage street basement Property damage

water sidewalk Loss power yard storms Safety property basement flooding

Figure II.2.b Word cloud from survey

Meetings occurred\*:

• Easton, Monroe, and Trumbull: June 24th, 2024 (held in Trumbull)

• Bridgeport: June 25th, 2024

Virtual: June 26th, 2024 (12 pm - 2 pm)

• Fairfield: June 26th, 2024 • Stratford: June 27th, 2024

#### **PUBLIC SURVEY**

The primary purpose of the survey was to facilitate a way for the region's population (residents, workers, and other stakeholders) to provide their experiences, concerns, and priorities regarding natural hazard mitigation. The survey also served as a mechanism to inform the public of ongoing planning efforts, emergency procedures, and natural hazard risks. The guiding principles of the survey can be organized within the categories of experience, concerns, priorities, and awareness.

The survey was available from August 31st, 2023 to March 11, 2024. MetroCOG's Public Participation Plan and Title VI/Limited English Proficiency Plan were used to inform the distribution of the survey, which included municipal departments (such as planning, engineering, conservation, and health), non-profits, local service organizations, and individuals who had requested inclusion in MetroCOG's email distribution list. The survey was also promoted at in-person events, via MetroCOG's website, social media, and

email blasts. Municipalities were encouraged to share the survey with their constituents. The survey was translated into Spanish and a paper version was available.

While these methods allowed for participation from members of the public interested in hazard mitigation and planning, it is important to note that the survey was not distributed through a random or scientific sampling process. MetroCOG did not receive any requests for the paper survey and no participation occurred via the Spanish language version.

200 people participated in the survey, with a 67% rate of completion. Responses are summarized in Appendix D. Highlights include:

- 71% of respondents were not aware that the region had a natural hazard mitigation plan.
- The majority of respondents lived in the region. Stratford, Bridgeport, and Easton had the highest levels of participation.
- 75% of respondents thought that natural hazards were increasing in frequency and intensity.
- The majority of respondents had been impacted by one or more natural hazards. Hurricanes/tropical storms and winter storms/ blizzards impacted the most people.
- 86% of respondents indicated that "protecting critical facilities" was a very important mitigation strategy.

 "Restore utilities" was a high priority for recovery.

## II.3 Additional Stakeholder Outreach

The involvement of other communities and regions was accomplished through direct contact with the municipal staff of adjacent cities and towns. The MetroCOG region is bordered by seven municipalities detailed in Table II.3.1.

Table II.3.2 provides details of the regional Councils of Governments/Metropolitan Planning Organizations that MetroCOG notified of the plan update and offered opportunities to participate.

The state agencies and NGOs contacted are listed in Tables II.3.3 and II.3.4, respectively. Copies of letters mailed to many stakeholders are in Appendix C.

II.3.1 AD	JACENT COMMUNITIES	
City of Milford	Borders Stratford along the Housatonic River.	
Town of Newtown	Borders Easton & Monroe. The watersheds of the Aspetuck River, Halfway River & Pootatuck River overlap the Town's boundaries. The Housatonic River forms the eastern border of Newtown.	
Town of Oxford	Borders Monroe along the Housatonic River.	
Town of Redding	Borders Easton. The watersheds of the Aspetuck River & the Saugatuck River overlap the town boundaries.	
City of Shelton	Borders Monroe, Trumbull & Stratford. The watersheds of the Booth Hill Brook, Farmill River, Means Brook, & Pumpkin Ground Brook overlap the town boundaries. The Housatonic River forms the eastern border.	
Town of Weston	Borders Easton. The watersheds of the Aspetuck River & Saugatuck River overlap the town boundaries.	
Town of Westport	Borders Fairfield. The watersheds of the Aspetuck River & Sasco Brook overlap the town boundaries.	

II.3.2 REGIONS	
Naugatuck Valley Council of Goverments	Borders Monroe, Stratford, & Trumbull.
South Central Regional Council of Goverments	Borders Stratford.
Western Connecticut Council of Goverments	Borders Easton & Fairfield.

#### **II.3.3** STATE AGENCIES

Department of Emergency Services and Public Protection (DESPP): Division of Emergency Management and Homeland Security (DEMHS)

Office of Policy and Management (OPM)

CT Rides (commuter services)

Department of Economic and Community Development (DECD) State Historic Preservation Office (SHPO)

Department of Energy & Environmental Protection (CTDEEP)

#### II.3.4 NGOs

#### AAA

### Ash Creek Conservation Association\*

Aspetuck Land Trust

Avangrid

Barnum Museum

Beardsley Zoo

Bridgeport Economic

Development Corporation

(BEDCO)

Bridgeport Regional Business Council (BRBC)

Bridgeport Downtown Special

Services District (DSSD)

Connecticut Institute for
Resilience and Climate

Adaptation (CIRCA)

CT Land Trust

Fairfield Chamber of Commerce

Greater Bridgeport Transit

Goodwill of NW Connecticut

Groundwork Bridgeport LIS Futures

Livegreen CT

Save the Sound

Regional Plan Association (RPA)

Sustainable CT

Jastailiable C1

Southwest Connecticut Agency on Aging (SWCAA)

#### The Mary & Eliza Freeman Center for History & Community\*

The Housing Collective
The Kennedy Collective

The Nature Conservancy (TNC)

(INC)

Trout Unlimited

Trust for Public Land

\* Addition during public comment period

# HAZARD IDENTIFICATION & RISK ASSESMENT

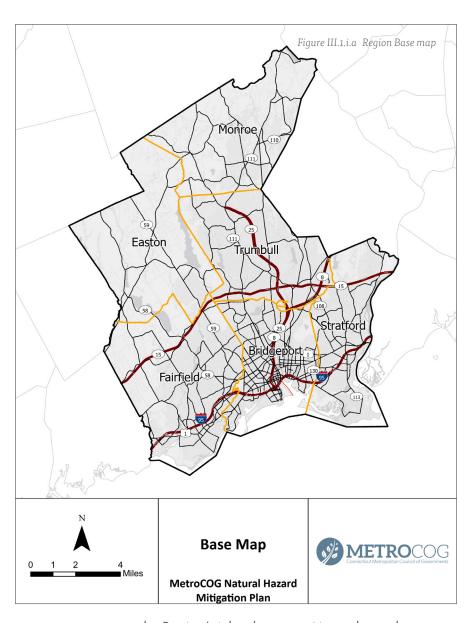
This risk assessment provides information and a data-driven analysis for each jurisdiction to identify and prioritize mitigation actions appropriate to reducing their vulnerabilities and lessen the adverse impact of natural hazards. The natural hazards that have the potential of affecting the region were identified through rigorous data analysis and a comprehensive planning process.

This chapter describes the location, extent, intensity, history, impacts, and probability of the region's natural hazards. Information on previous occurrences of hazard events was collected through a review of NOAA and FEMA databases, state resources, interviews with municipal staff, and research of historical records and archives

## III.1 General Description of the MetroCOG Region

#### III.1.i PHYSICAL SETTING

The MetroCOG Region consists of six communities located in Fairfield County, within Southwestern Connecticut. The City of Bridgeport, the Town of Fairfield, and the Town of Stratford are located along the coast of Long Island Sound and are the most populated communities in the Region. The Towns of Easton, Monroe and Trumbull make



up the Region's inland communities. shows the Region and corresponding road network.

#### III.1.ii GEOLOGY

There are four main geologic forces that have shaped the terrain within the MetroCOG Region: tectonic, volcanic, glacial, and human activity. Glacial and human activities have been significant drivers of changes in the geography of the region, with lasting effects on the potential impact of natural hazards. Tectonic and volcanic activity currently have only minor significance as natural hazards in the region.

#### Bedrock Geology

The region is currently within a stable portion of the North American tectonic plate. As a result, the region does not experience significant earth moving events that generate earthquakes or volcanic activity. In the region's geologic history, evidence of past instability is visible in the bedrock geology consisting of two major geologic terranes.

The primary terrane is the lapetos Terrane, active during the Ordovician, Silurian, and Devonian periods (360-500 million years old). The predominant direction of faults, bedrock contacts, and rock cleavage trends northeast to southwest. These faults are no longer active and thus pose little earthquake hazard.

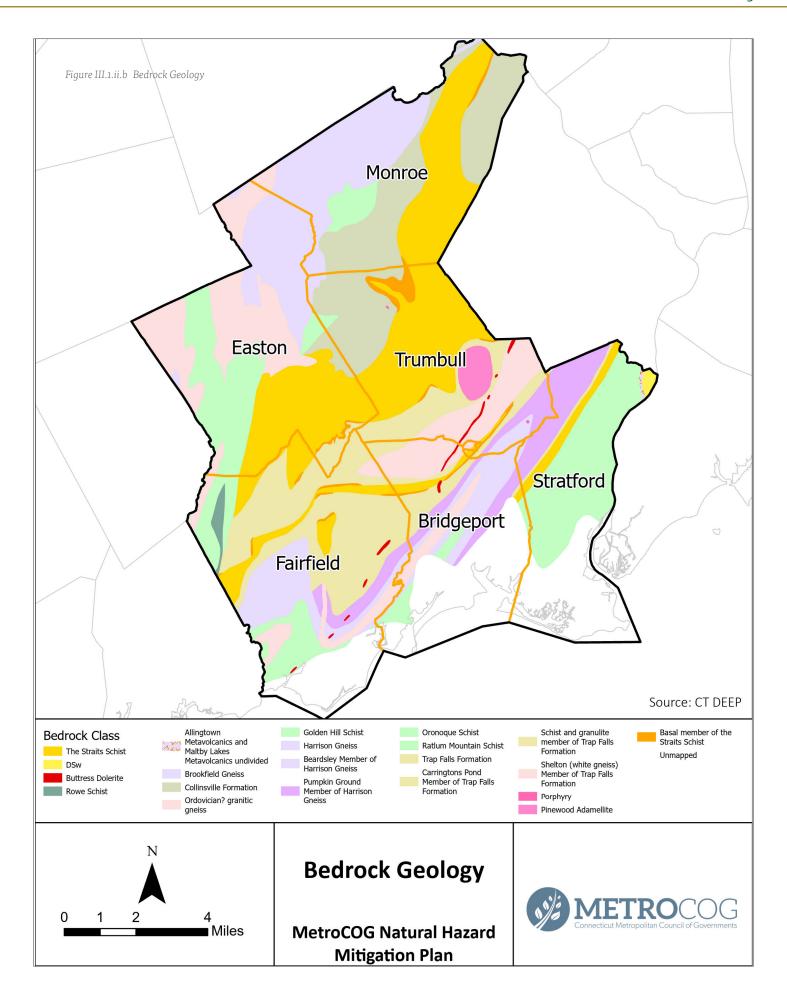
There is one bedrock outlier within the metamorphic gneiss and schist dominated lapetos Terrane: the Pinewood Adamellite formation in Trumbull. This is a light gray granite with a chemical makeup that tends to produce high levels of radon. The other terrane is the product of volcanic activity that formed the large trap rock ridges of central Connecticut. The Buttress Diorite dike is a northeast to southwest trending Jurassic age (140-205 million years ago) formation created by the remnants of the cooling magma that was once fed by the major volcanic activity that occurred in the present-day central Connecticut valley. The bedrock in the Region can be seen in Figure III.1.ii.b. Town maps of bedrock can be found in Appendix E.

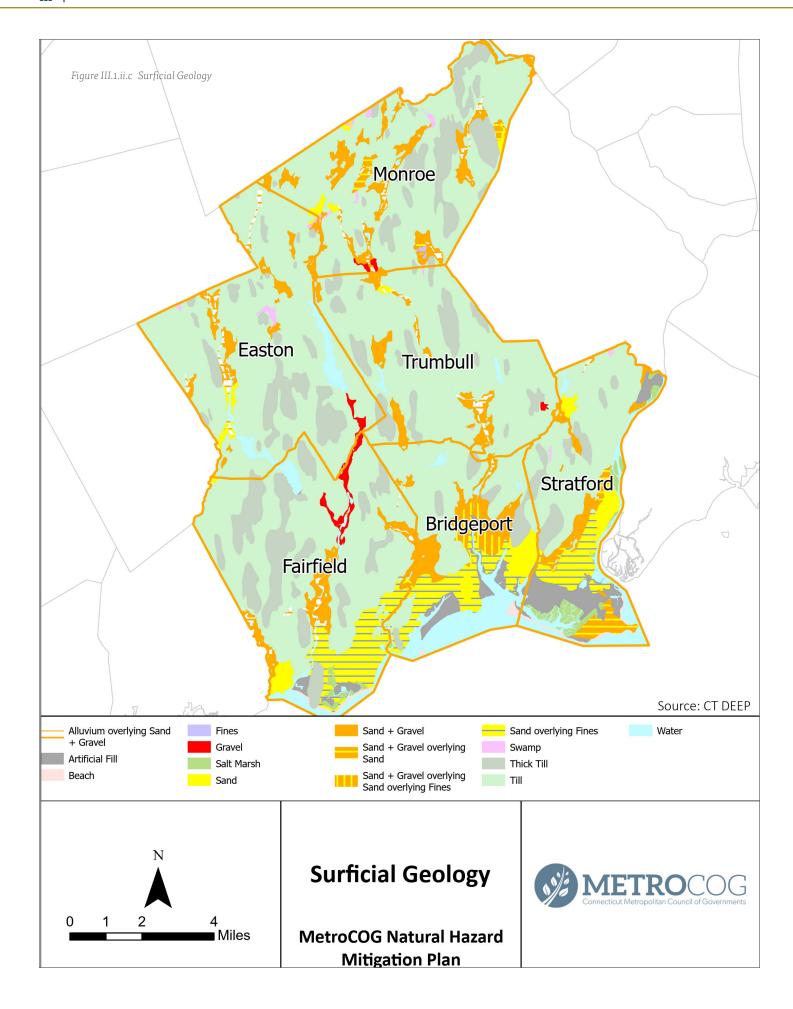
The occurrence of radon bearing rocks has a significant risk factor over extended periods of exposure, but the threat can be mitigated. Radon (chemical symbol Rn) is a colorless, odorless, heavy gas that seeps up to the surface out of the rocks of the earth. Radon is a product of the decay of uranium (U), which is present in most

rocks in small amounts, but is concentrated in areas of granite, pegmatites, and mineral veins in Connecticut. Although radon is radioactive, it is not very dangerous itself because it has a neutral electromagnetic charge (not ionic), so it does not stick well to other molecules, thus it can be inhaled and exhaled in shorter time frames without significant threat. However, long-term exposure is a considerable health risk as radon has a short half-life (3.8 days), meaning it rapidly breaks down into radioactive isotopes of lead, bismuth, and polonium, which are ionic and stick to lung cells. Exposed to lung cell DNA, the radioactive particles can cause damage that eventually leads to tumors.

Radon causes many of the non-smoking related lung cancer deaths. The National Academy of Science concluded in 1998 that about 15,400 to 21,800 lung cancer deaths per year in the United States are caused by breathing high levels of indoor radon. In addition, radon can also cause stomach and esophagus cancer. It is difficult to predict indoor radon levels based off regional tests, thus it is recommended that every dwelling undergoes the relatively inexpensive and succinct radon testing process.

Over the course of history, glaciers and the polar ice caps have grown and contracted with changes in climate and geological conditions. The advance and retreat of the continental glaciers created new glacial landforms, overwriting those formed by the previous glacial epochs. The glaciers acted as a bulldozer, breaking down bedrock, pushing debris on its forward moving side, and incorporating debris into the glacier. Beneath this process, bedrock is plucked and scraped, then broken down into fine sediment. When combined with melting glacial water, the sediment and debris became layers of hard-pan and glacial till. Larger glacial till formations can





create spoon shaped hills called drumlins. There are drumlins throughout the region, with prominent examples along the shoreline including Sasco Hill in Fairfield and Grover Hill in Bridgeport. The raised elevation of the drumlins helps to protect those areas from rising tides and storm surges.

After a glacier reaches its peak size and begins to retreat, glacier meltwaters flow from below, above, and from the interior of the glacier. The melting waters contain the glacial debris that form the stratified sand and gravel formations commonly found along current rivers and waterways. These outwashes led to present day Long Island Sound, once a freshwater lake called Glacial Lake Connecticut. Sea level rise roughly 8,000 years ago resulted in seawater overflowing into the glacial lake basin, eventually turning it into Long Island Sound. Tidal action reworked existing glacial deposits and outgoing fluvial sediments, forming post-glacial beach deposits at Southport Harbor, Fairfield Beach, Black Rock Harbor, and Pleasure Beach. Important Salt Marshes developed in conjunction with the post-glacial beach building. Figure III.1.ii.c shows the surficial geology of the Region. Town maps of surficial geology can be found in Appendix E.

#### III.1.iii HUMAN ACTIVITY

Humans have shaped the environment and terrain for centuries: local Native American tribes had minimal impact but significant changes were made to the landscape in the early 1600s with the settlement of European colonists. These changes have included the construction of dams and the filling in of salt marshes, wetlands, and other low-lying areas. Unfortunately, these changes have come at a price, resulting in compromised fisheries with the closure of spawning habitat from dam construction and the

loss of valuable flooding buffers and habitat for coastal species provided by salt marshes. Land reclamation through the destructive filling of salt marshes and wetlands are displayed by the USGS Topographic Quadrangles, starting with the initial set produced around 1893 through various versions in 1950s, 1960s, 1970s, 1980s, up until the current GIS information. These show salt marshes and open water being transformed into land for development purposes. Much of the filling occurred prior to the 1970s and enactment of the National Flood Program.

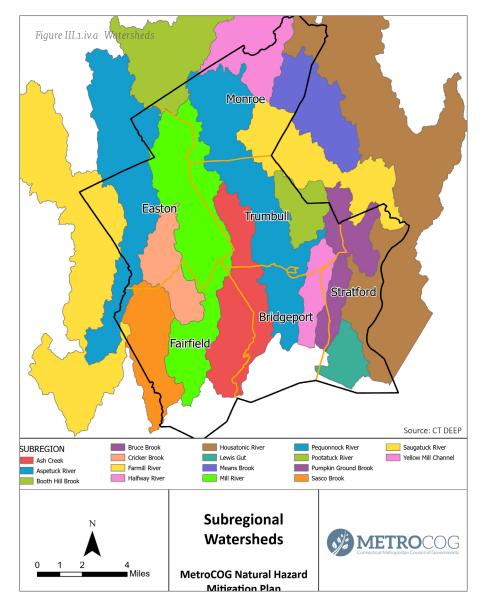
#### III.1.iv HYDROLOGY

The MetroCOG region lies within four regional drainage basins: the Housatonic River, the Saugatuck River, the Southwest Shoreline, and the Southwest Eastern basin. The basins drain the numerous rivers and streams that flow through the Region, primarily in a north-to-south direction, and eventually empty into Long Island Sound.

Four subregional drainage basins cover the City of Bridgeport, relating to the Ash Creek/Rooster River, Pequonnock River, Yellow Mill Channel, and Bruce Brook/Johnsons Creek. Bridgeport's coastal areas lie within the direct drainage basin of Long Island Sound, referred to as the Southwest Shoreline subregional drainage basin. It includes the Cedar Creek inlet, Black Rock Harbor, Bridgeport Harbor, Lewis Gut and Johnsons Creek.

The Town of Easton lies primarily within three sub-regional drainage basins corresponding to the Aspetuck River, Saugatuck River, and Mill River. Very small areas of the town are within the drainage basins of the Pootatuck River, in the north part of town, and Sasco Brook, in the southwestern part.

The Town of Fairfield is drained by the Saugatuck



River, Sasco Brook, Mill River, and Ash Creek/ Rooster River. Coastal areas are within the direct drainage basin of Long Island Sound, which includes Pine Creek.

Seven sub-regional drainage basins flow through the Town of Monroe. River systems include the Pootatuck River, Halfway River, Mill River, Pequonnock River, Farmill River, Means Brook, and Housatonic River. A large portion of Monroe (approximately 8.4 square miles) is drained by the Pequonnock River and comprises much of the developed part of the Town.

Much of the land area of the Town of Stratford

drains towards the Housatonic
River, including the sub-regional
drainage corresponding to the
Farmill River and Pumpkin Ground
Brook. The other drainage basins
are associated with Bruce Brook,
the Yellow Mill Channel, and Lewis
Gut. The immediate shoreline along
Long Island Sound is part of the
Southwest Shoreline basin.

The Town of Trumbull lies within seven sub-regional drainage basins corresponding to the Mill River, Ash Creek/Rooster, Pequonnock River and its tributaries, the unnamed tributaries of the Yellow Mill Channel, Booth Hill Brook, Farmill River, and Pumpkin Ground Brook.

The regional drainage basins are comprised of sub-regional and local basins. Details of each regional basin and summaries of past impacts/vulnerabilities, are discussed next. Additional information can be found in Tables

III.1.iv.1-III.1.iv.4 as well as Figure

III.1.iv.a. Town maps of drainage basins can be found in Appendix E.

### Housatonic River Main Stem Regional Basin

The Housatonic River is one of Connecticut's largest rivers, extending ± 139 miles from its source in Massachusetts to its mouth at Long Island Sound. The watershed and its component river systems are classified as a Major drainage basin, draining an area of about 1,939 square miles in Connecticut, Massachusetts, and New York. The regional Housatonic River basin is about 932.66 square miles. The drainage basins associated

III.1.iv.1 Housatonic Basin					
Basin	MetroCOG Municipalities	Size (sq. miles)			
Farmill River	Monroe & Trumbull	15.09			
Halfway River	Monroe	10.68			
Housatonic River	Monroe & Stratford	623.54			
Means Brook	Monroe	10.95			
Pootatuck River	Monroe & Easton	20.78			
Pumpkin Ground Brook	Trumbull & Stratford	5.94			

III.1.iv.2 Saugatuck Basin					
Basin	MetroCOG Municipalities	Size (sq. miles)			
Aspetuck River	Easton &	48.5			
Saugatuck River	Fairfield	23			

Source: CTDEEP

with the Pootatuck River, Halfway River, Farmill River, Pumpkin Ground Brook, and Means Brook flow into and are sub-regional basins of the Housatonic main stem (Table III.1.iv.1). The lower sections of the Housatonic River are designated as a sub-regional drainage basin. Formed by the Stevenson Dam, Lake Zoar acts as the northeast boundary between Monroe and the Town of Oxford; downstream of the dam, the Housatonic flows in a southerly direction through the City of Shelton and Stratford before entering Long Island Sound. The lake provides flood control, recreational opportunities, and hydroelectric power to the area. The Stevenson Dam is one of the largest dams in the Region.

**Farmill River:** The area drained by the Farmill River comprises much of the developed part of Monroe. As a result, a number of chronic flooding problems occur along the river and its tributaries.

#### Saugatuck River Regional Basin

The Saugatuck River regional basin is a part of the Southwest Coastal Major Basin that drains most of Fairfield County and lies along the western edge of the Region. The basin mostly covers the towns of Redding, Weston and Westport and drains 89.5 square miles. The drainage areas associated with the Aspetuck River and Saugatuck River are two of the three sub-regional basins comprising the Saugatuck River Regional Basin. The Saugatuck River drains into the Saugatuck Reservoir, which lies along the western edge of Easton. Adjacent land in Easton drains either directly into the reservoir or into the Saugatuck River downstream of its dam; most of this land is preserved as open space.

The Aspetuck River: The Aspetuck River forms the southwest border between the Town of Easton and the Town of Weston as well as the northwest border of the Town of Fairfield with the Town of Weston. The river flows through the Aspetuck Reservoir, a public water supply reservoir, and joins the Saugatuck River downstream of Easton in the Town of Westport. The areas drained by the Aspetuck River are very rural, and flooding problems are infrequent. See Table III.1.iv.2 for additional details.

### Southwest Eastern Regional Complex Basin

The Southwest Eastern Regional Complex is a part of the Southwest Coastal Major Basin that drains most of Fairfield County. The regional complex covers most of the Region, except for the eastern half of Monroe and northeast part of Stratford. It is associated with Ash Creek/Rooster River, Booth Hill Brook, Bruce Brook, Cricker Brook, Lewis Gut (Great Salt Marsh), the Mill River, the Pequonnock River, Sasco Brook and the Yellow Mill Channel. The drainage area is about 98.5 square miles. See Table III.1.iv.3 for additional details.

The Ash Creek/Rooster River sub-regional drainage basin is made up of the Rooster River, the Ash Creek tidal estuary) and the Ox Brook and Horse Tavern Brook tributaries. The Horse Tavern Brook watershed is densely developed in Trumbull, and it flows in a culvert under the Westfield/Trumbull Shopping Mall. Ox Brook has been modified along its entire length; many sections of the brook are underground in culverts, and exposed portions have been heavily channelized. The lowest section of the brook is directed into a nine-foot diameter culvert beneath Capitol Avenue that joins the Rooster River culvert under Laurel Avenue. To bypass a bend in the channel and reduce flooding, the flow of the Rooster River has been redirected into a culvert which rejoins the river a short distance downstream and leaves the channel dry except during storms.

**Bruce Brook:** A densely developed watershed, Bruce Brook forms the border between Bridgeport and Stratford from about US-1 to a

III.1.iv.3 SW Eastern Regional Basin						
Basin	MetroCOG Municipalities	Size (sq. miles)				
Ash Creek/ Rooster River	Bridgeport Fairfield Trumbull	15.33				
Booth Hill Brook	Trumbull	5.09				
Bruce Brook/ Johnsons Creek	Stratford & Bridgeport	3.44				
Lewis Gut	Stratford & Bridgeport	3.98				
Mill River	Monroe, Easton & Fairfield	32.02				
Cricker Brook	Easton & Fairfield					
Pequonnock River	Monroe, Trumbull & Bridgeport	24.03				
Sasco Brook	Fairfield	10.21				
Yellow Mill Channel	Trumbull, Stratford & Bridgeport	4.52				

Source: CTDEEP

small dam immediately upstream of the New Haven rail line crossing. Downstream of the railroad tracks, the outlet is protected by a tide gate maintained by CTDEEP. At this point, Bruce Brook becomes Johnson's Creek, which flows into Bridgeport Harbor and is the tidal estuary of Bruce Brook.

Lewis Gut: The Lewis Gut watershed is located in the South End of Stratford and consists of land draining directly to or through unnamed streams to the Great Salt Meadows, a component of the Stewart McKinney National Wildlife Refuge. The area is densely developed and includes the Sikorsky Airport and Lordship section of town. Besides the Lordship area, which is higher in elevation, a majority of this watershed is below the base flood elevation and subject to coastal flooding.

**Mill River:** Beginning in the vicinity of the town line between Monroe and Easton, the Mill River forms the Easton Reservoir, a public water supply.

**Cricker Brook:** Cricker Brook begins in the center of Easton and is considered a tributary of the Mill River. The impoundment of Cricker Brook created the Hemlock Reservoir, a public water supply reservoir. The northern half of this reservoir is located in Easton and the southern half in Fairfield.

#### Pequonnock River

Much of the area drained by the Pequonnock River and its tributaries are highly developed, including the central part of Monroe and most of Bridgeport. As a result, a number of chronic flooding problems occur along the river and its tributaries. In north-central Bridgeport, a dam on the river forms Bunnells Pond, a 33-acre lake. The dam has been reinforced and is designed to safely overtop during peak flows. The pond is relatively small in relation to the flow rate of the riv-

er. The Island Brook tributary has been modified along its entire length; some upstream sections of the brook are underground in culverts, as well as a lower section between Park Cemetery and its outlet to the Pequonnock River. Several exposed portions have been channelized.

The Pequonnock River floodplain is largely undeveloped in Trumbull, as the river flows through a steep-walled valley and several town parks.

#### Southwest Shoreline Complex Basin

The Southwest Shoreline basin consists of the lands immediately adjacent to and along the coastline. It stretches from the Town of Greenwich at the New York state line to Housatonic River. A part of the Southwest Coastal Major Basin, the drainage area is about 41.5 square miles. Along the coast in the Region, the Southwest Shoreline basin includes a range of land uses, from conserved, undeveloped areas to highly developed commercial, industrial, and residential uses. See Table III.1.iv.4.

Southport Center & land west of Southport Harbor: predominantly residential with commercial uses in the Center and adjacent to the harbor.

Fairfield Town Center & lands associated with Pine Creek. Pine Creek is a tidal estuary. Although the area remains relatively undeveloped, the Pine Creek tidal wetlands area has been extensively modified by drainage canals, tide gates and dikes. Where the creek flows parallel to and behind a barrier beach, the floodplain has been extensively altered with bulkheads due to dense residential development.

Black Rock & South End neighborhoods in Bridgeport: Land use is highly developed with medium-to-density housing and commercial strips along the main road arteries.

III.1.iv.4 SW SHORLINE BASIN				
Basin	MetroCOG Municipalities	Size (sq. miles)		
Pine Creek (Local)	Fairfield	2		
Southwest Shoreline	Fairfield, Bridgeport & Stratford	7.8		

Source: CTDEEP

Steele Point peninsula in Bridgeport. This area juts into Bridgeport Harbor and is surrounded by the Pequonnock River on the west and the Yellow Mill Channel on the east. The site continues to undergo redevelopment into a mixed-use complex and a marina.

Lower East End in Bridgeport. The area is adjacent to Bridgeport Harbor and is bordered by the Yellow Mill Channel on the west and Johnson's Creek on the east. The eastern half of the area is predominately medium density housing and the western half is controlled by the Bridgeport Port Authority.

East side of Johnson's Creek in Stratford is an industrial area.

Long Beach, including Pleasure Beach in Bridgeport& the Lordship section of Stratford. Comprised of the barrier beach that separates Long Island Sound from the Great Meadows Salt Marsh, the eastern part of the drainage area is comprised mainly of residential units. Most of this area of Lordship is located on high ground and less susceptible to storm surge flooding. However, coastal properties were initially built as seasonal dwellings, and many have been converted to year-round use.

#### III.1.v CLIMATE

Climate is defined as the expected frequency of specific states of the atmosphere, ocean, and land including variables such as temperature, salinity, soil moisture, wind speed and direction, current strength and direction, etc. Climate en-

Source National Weather Service, NOWData

compasses the weather over different periods of time and relates to mutual interactions between the components of the earth system. Weather is defined as the state of the atmosphere at a given time and place, with respect to variables such as temperature, moisture, wind speed and direction, and barometric pressure.

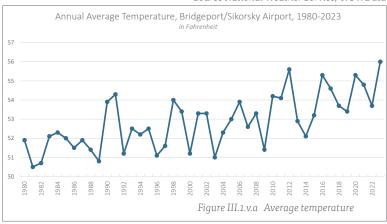
The Region has a moderate climate with distinct seasons. Based on observations at the weather station located at Bridgeport/Sikorsky Airport (pulled from the National Weather Services's NOWData), the average temperature between 1980 and 2023 was approximately 52.9 degrees Fahrenheit (F), with summer temperatures averaging up to 73.9 degrees in July and winter temperatures down to 38.7 in February.

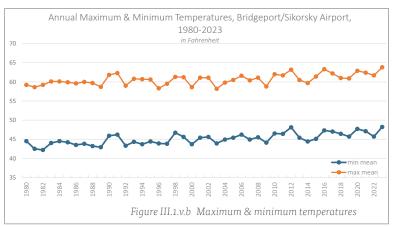
Extreme conditions may raise summer temperatures to nearly 100 degrees and winter temperatures to below zero. However, the Region averages only about nine days a year with temperatures 90 degrees or greater and one day a year with temperatures at zero degrees or below.

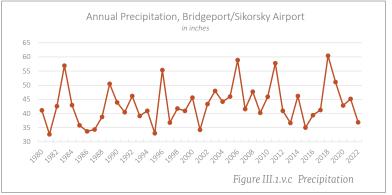
Figure III.1.v.a plots the annual average temperature from 1980 to 2023 and shows an increasing temperature trend. The range in annual temperatures was between 50.5 degrees and 56 degrees. Figure III.1.v.b plots the average maximum and minimum temperatures over the same period.

By comparison, the statewide annual average temperature over the same time period was 49.7 degrees, or three degrees cooler on average. As is the case with the data from the Bridgeport-Sikorsky Airport, annual average temperatures for Connecticut are trending upwards.

Over the course of a year, the region receives,







on average, 43.2 inches of precipitation. Annual totals have ranged from a low of 32.67 inches in 1981 to a high of 60.2 inches in 2018. Mean snowfall amounts are approximately 30.3 inches per year, with a high total recorded in 2003 of 68.5 inches. Figure III.1.v.c charts the annual precipitation.

The average precipitation total for Connecticut was 48.68 inches per year - over five inches more precipitation fell statewide than on the Region.

#### III.1.vi CLIMATE CHANGE

The 2019 NHMP provided a general overview of the impacts that climate change would have on the region, with references to the Connecticut Natural Hazard Mitigation Plan Update and State Water Plan. FEMA's updated guidelines now require that the impacts of climate change are discussed relative to the probability, type, location, and range of intensities of each natural hazard presented. Therefore, this update has added an assessment of climate change to each individual natural hazard risk assessment. The following is a general overview of anticipated impacts to the region, based on the state's Government Council on Climate Change, NOAA's State Climate Summaries for 2022 and the 5th National Climate Assessment.

In 2021, the Connecticut Governor's Council of Climate Change adopted a number of findings and recommendations regarding the impact of climate change on sea-level, temperature, and precipitation in Connecticut, which are summarized below:

- High confidence in projected changes through the mid-century, but after the mid-century they will depend on mitigation actions taken in the state and globally. As understanding of the processes that determine climate is advancing rapidly, and data is being continuously collected, a comprehensive review should be undertaken at five-year intervals.
- Mean sea level in Long Island Sound could be up to 20 inches above the National Tidal Datum Epoch (1983-2001) by 2050 (O'Donnell, 2018).
- Changes in mean sea level will significantly impact the frequency of flooding along the Connecticut coast, but the flood zone will not

- expand much in most areas. With 20 inches of sea-level rise, coastal flood risk could increase by a factor of 5 to 10 with no change in storm conditions. High water levels, like those during Superstorm Sandy, would be expected every 5 to 10 years.
- Sea level rise will continue after 2050.
   Recent simulations indicate that the mean sea level could be up to 80 inches higher by 2100 if CO2 emissions are not reduced soon.
- 5. Average temperatures in could increase by 5°F (2.7°C) by 2050 compared to the 1970-1999 baseline.
- 6. All indices of hot weather are expected to shift toward more frequent and higher temperature events. For example, by mid-century, the number of days per year with temperatures above 90 °F (32 °C) could increase. Statewide, from 1970 to 1999, the average number of days was 5; this is projected to increase to an average of 25 days between 2040-2069. The number of days with frost could decrease from 124 to 85.7.
- 7. Drought risk is expected to increase. The probability of unusual events (extremely low annual and summer water availability, and extremely high 1-day and 5-day precipitation) are projected to increase by a factor of between 2 and 4 by mid-century.
- 8. Though it is unclear whether the frequency or intensity of extratropical storms in Connecticut will change, they will likely bring more precipitation. Warmer temperatures will result in less snow and more rain, but increased humidity will yield high snowfall events when temperatures permit.
- Projection of changes in the frequency of tropical cyclones in a warmer climate are

uncertain. However, they will likely have stronger winds and more precipitation. Since 1980 there has been an increase in the frequency of hurricanes in category three or greater.

These findings align with the key takeaways from NOAA's State Climate Summary for Connecticut (2022):

- Temperatures in the state have risen almost 3.5°F since the beginning of the 20th century. Under higher emissions scenarios, warming is projected to continue with increases in heat wave intensity and decreases in cold wave intensity.
- Although highly variable, slight increases in annual precipitation have occurred since 1895. The highest number of extreme precipitation events occurred during 2005-2014. Increases in frequency and intensity are projected, as are increases in winter and spring events.
- Sea level has risen at a rate of 10-12 inches per century along the state's coast, faster than the global rate. As global sea level is projected with a range of 1-4 feet by 2100. Connecticut may experience even greater rises

The 5th National Climate Assessment has advanced and presented similar findings, with the following additional considerations for the Northeast:

Ocean and Coastal Impacts Are Driving Adaptation to Climate Change: The ocean and coastal habitats in the Northeast are experiencing changes that are unprecedented in recorded history, including ocean warming, marine heatwaves, sea level rise, and ocean acidification. Changing ocean conditions are causing significant shifts in the

- distribution, productivity, and seasonal timing of life-cycle events of living marine resources in the Northeast. These impacts have spurred adaptation efforts such as coastal wetland restoration and changes in fishing behavior.
- Disproportionate Impacts Highlight the Importance of Equitable Policy **Choices:** Extreme heat, storms, flooding, and other climate-related hazards are causing disproportionate impacts among certain communities in the Northeast, notably including racial and ethnic minorities, people of lower socioeconomic status, and older adults. These communities tend to have less access to healthcare, social services, and financial resources and to face higher burdens related to environmental pollution and preexisting health conditions. Social equity objectives are prominent in many local-level adaptation initiatives, but the amount of progress toward equitable outcomes remains uneven.

According to many sources, climate change may cause an increase in invasive species in Connecticut. These species can include insects, mammals, plants, or aquatic animals. The impacts of invasive species can lead to severe impacts on the landscape and to native populations. Hazards may become more prevalent and impactful due to the risk of invasive species, such as increased risk of tree mortality due to invasive insects, increased risk of flooding due to an increase of invasive plants, as well as invasive species becoming a hazard due to the possibility of invasive species carrying disease, leading to public health concerns and issues.

Preparedness though a comprehensive and evolving list of invasive species that pose risk to the region's ecosystems, public health, and economy is needed to establish early detection and long term management.

Similar to the widespread and sweeping impacts of COVID-19, public health and the prevalence of diseases are important to consider in a way that reduces or mitigates, future disaster losses in all communities, especially those who have limited resources or experience persistent economic or social disadvantages.

The region is committed to ensuring all residents are offered necessary resources in times of public health crises and MetroCOG and its member municipalities will work with necessary organizations to achieve equity in times of disaster. A discussion of socially vulnerable populations in the region is included in this chapter.

## III.1.vii CRITICAL INFRASTRUCTURE & FACILITIES

Numerous public and private facilities and infrastructure are critical to the assessment of risks from natural hazards and are important in mitigating the possible effects of events. Critical structures include facilities that support responses and recovery efforts, such as, police headquarters, emergency management operations centers, fire stations, hospitals, medical centers, and governmental offices. In addition, facilities that house vulnerable populations are considered in this category. This category includes long-term care facilities, as these house populations of

individuals that would require special assistance during an emergency. Educational institutions are often considered critical facilities, as they are often used to house persons displaced from their homes.

The City of Bridgeport is the central city of the Region. It serves as the transportation hub and is home to several essential and critical facilities. The State of Connecticut's Emergency Operations Center (EOC) is located in the Troop G State Police barracks in Downtown. The EOC for the City is the back-up facility for the State EOC and can handle regional emergency response as necessary. The Region's main medical facilities are Bridgeport Hospital and St. Vincent's Medical Center, both located in Bridgeport.

Major transportation infrastructure is critical for evacuation and response, and to ensure that emergencies are addressed while day-to-day management continues. Critical infrastructure located in flood prone areas are subject to flooding and therefore vulnerable to closure in the event of a natural disaster. Flooding is not the only concern, as infrastructure can be impacted by downed powerlines, trees, and other debris.

Commuter rail service offers a vital transportation mode for travel within and beyond Connecticut, especially lower Fairfield County and New York

City. The Metro-North Railroad operates commuter trains on the electrified New Haven Main Line (NHL-ML). The NHL-ML runs east-west along the southwestern shoreline of the state between New Haven and New York City. The Region has five rail stations:

 Stratford Center at 2520 Main Street, Stratford



- Bridgeport at 525 Water Street, Bridgeport
- Fairfield Metro Center at 61 Constant Comment Way, Fairfield
- Fairfield Center at 165 Unquowa Road, Fairfield
- Southport at 400 Center Street, Fairfield

The state also operates the East Bridgeport Rail Yard located at 664 Hollister Avenue. This yard has a two-story facility housing Metro-North Railroad offices for Track, Structures, Communications and Signals, and coach cleaning operations. The Bridgeport yard supports New Haven Line EMU (electric multiple units). Most Main Line and Shore Line East trains are comprised of EMU equipment (2022 State Rail Plan).

Fixed-route and demand responsive public bus service is provided by Greater Bridgeport Transit (GBT) to five of the six towns in the Region. The only town without public transit is Easton. The local, fixed-route bus system consists of 19 routes, with various route extensions and branches to extend coverage. The system is radial in that most routes begin, end, or pass-through Downtown. The downtown terminal, located at 710 Water Street, acts as a pulse point to facilitate transfers between routes and better coordinate operations. The GBT's Maintenance Garage and Administrative Offices are located at 1 Cross Street.

Places where impacted populations can go before, during and while recovery occurs are needed and are essential during an emergency. Most often, schools are used as public shelters, as they have gymnasiums that can accommodate large numbers of residents and are structurally capable of withstanding the forces endured during an event. In addition to structural rigidity, schools maintain the necessary facilities such as lavatories, showers, and food service areas as well as spaces for recreation. Emergency back-

up power generation is usually available, but in some instances may not provide sufficient power for the entire shelter.

The American Red Cross (ARC) has been chartered by the US Congress to respond to all disasters and be the lead agency for mass care and sheltering. It coordinates emergency services at the local level through its regional chapters. The American Red Cross of Connecticut has 6 offices in the state, including an office on 148 Brooklawn Avenue in Bridgeport. The ARC, the Salvation Army, and the local health districts provide services related to mitigation and emergency management. The ARC and the Salvation Army help provide shelter and vital services during disasters and participate in public education activities. The local Health Districts become involved with water supply and sanitation issues that may arise during and after emergencies and natural disasters.

The Region has approximately 44 designated emergency shelters, capable of accommodating approximately 18,200 individuals. Many communities only intend to use these facilities on a temporary basis for providing shelter until hazards such as hurricanes diminish. However, there may be instances that longer term sheltering is required.

The City of Bridgeport has the most emergency shelters and has the capability of housing the highest number of residents. Nearly 30 shelters are located in Bridgeport, mostly in schools. These shelters can accommodate about 13,000 people. In addition, Bridgeport has designated some of its shelters to accommodate persons with special needs. One of the shelters is located within a flood zone.

Critical infrastructure can be found in Appendix A.

### III.1.viii VULNERABLE COMMUNITIES

Updated FEMA guidelines emphasize the importance of planning for the needs of socially vulnerable and underserved communities. Underserved communities are defined by Executive Order 13985 On Advancing Racial Equity and Support for Underserved Communities Through the Federal Government. They are "populations sharing a particular characteristic, as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life."

Social Vulnerability is broadly defined as the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood. Social Vulnerability considers the social, economic, demographic, and housing characteristics of a community that influence its ability to prepare for, respond to, cope with, recover from, and adapt to environmental hazards.

Since the 2019 NHMP, federal and state agencies have developed datasets to assist in identifying socially vulnerable and underserved communities.

FEMA's National Risk Index includes a Social Vulnerability score and rating to represent the relative level of a community's social vulnera-

# CDC Variables for Socioeconomic Vulnerability

Below 150% Poverty Unemployed Housing Cost Burden No High School Diploma No Health Insurance Aged 65 & Older Aged 17 & Younger Civilian with a Disability Racial & Ethnic Minority Status **Multi-Unit Structures Mobile Homes** Crowding No Vehicle **Group Quarters** Single-Parent Households **English Language Proficiency** 

bility compared to all other communities at the same level. A community's Social Vulnerability score measures its national rank or percentile – a higher Social Vulnerability score results in a higher Risk Index score. FEMA utilized a CDC dataset made up of 16 socio-economic variables deemed to contribute to a community's reduced ability to prepare for, respond to, and recover

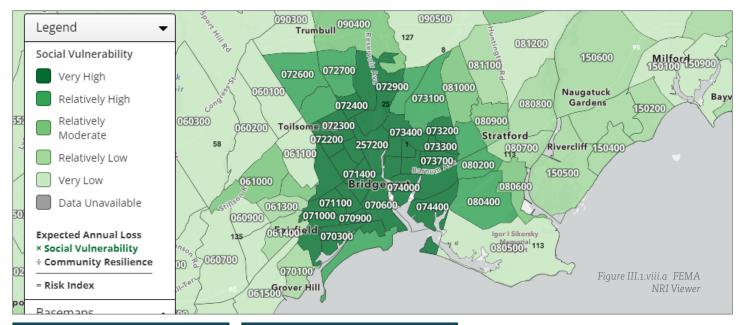
from hazards.

As seen in Figure III.1.viii.a and detailed in Tables III.1.viii.1 through III.1.viii.5, Bridgeport was the only municipality with census tracts in the "very high" category – 31 census tracts with a total population of 117,644 people – the majority of city residents. Six Bridgeport census

III.1.viii.1 Municipal Census Tracts, Socioeconomic Vulnerability Index Scores (SVI)

Municipality	Very High	Relatively High	Relatively Moderate	Relatively Low	Very Low	Total	
Bridgeport	31	6	0	1		38	
Easton	0	0	0	О	2	2	
Fairfield	0	0	2	2	12	16	
Monroe	0	0	0	2	1	3	
Stratford	0	3	4	3	2	12	
Trumbull	0	0	2	2	3	7	
Total	31	9	8	10	20	78	

Soutce: FEMA, National Risk Index



### III.1.viii.2 SVI VERY HIGH,

BRIDGEPORT NEIGHBORHOODS			
Neighborhood	Population		
Brooklawn/St. Vincents	26,993		
Downtown	2,795		
East End	4,673		
East Side	14,092		
Enterprise Zone	4,087		
Mill Hill	17,020		
Reservoir	10,571		
The Hollow	9,937		
Upper East Side	3,882		
West Side/ West End	23,594		
Total	117,644		

# III.1.viii.3 Neighborhoods, SVI Relatively High

Neighborhood	Population
Bridgeport	25,814
North End	17,438
South End	1,712
Upper East Side	6,664
Stratford: South End	15,517
Total	41,331

Soutce: FEMA, National Risk Index

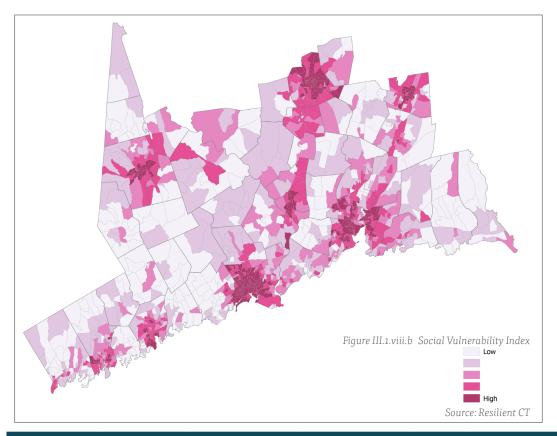
III.1.viii.4	Neighborhoods,
<b>SVI</b> RELAT	ively Moderate

Population
6,402
16,808
4,359
4,897
5,019
2,533
10,019
3,305
6,714
33,229

tracts with a population of 25,814 people fell into the "relatively high" category. Stratford was the only other municipality with census tracts in this category, 3 census tracts made up of 15,517 people. Fairfield and Trumbull both had two census tracts in the "relatively moderate" category, while Stratford had 4 tracts in this category. The region's remaining 29 census tracts were either relatively low or very low – 2 in Easton, 14 in Fairfield, 3 in Monroe, and 5 in Trumbull.

Through Resilient CT Phase II, a
Social Vulnerability Index for Connecticut was developed, which was based on 30 social demographic fac-

tors. For the purposes of Resilient CT, social vulnerability was determined to be the societal conditions that make certain populations vulnerable, or prone to loss, from extreme weather and climate change; understanding social vulnerability trends is critical to increasing community and regional climate resilience. The 30 demographic factors were divided into 5 subgroups to focus on specific vulnerabilities: Minority Status and Language, Socioeconomic Status, Household Composition and Disability, Labor Force, Housing Type and Transportation.



III.1.viii.5 Resilient CT, Vulnerability Index by COG							
Council of Government (COG)	Minority Status & Language	Socioeconomic	Household Composition & Disability	Labor Force	Housing Type & Transportation	Overall	
MetroCOG	0.52	0.64	0.57	0.55	0.60	0.61	
NVCOG	0.46	0.63	0.62	0.53	0.57	0.59	
SCRCOG	0.47	0.58	0.51	0.48	0.49	0.52	
WestCOG	0.46	0.45	0.41	0.41	0.42	0.41	

Soutce: CIRCA, Resilient CT

The Phase II Final Report provided SVI scores from 0-1 for the 4 participating regions: Metro-COG, NVCOG, SCRCOG, and WestCOG. A score of 1 is the greatest vulnerability. The Metro-COG region had the highest overall score (.61) and in 4 of the subgroups. NVCOG had a higher vulnerability score for household composition and disability. Figure Figure III.1.viii.b is a map of the 4 COGs. Similar to FEMA's NRI, Bridgeport (and to a lesser degree Stratford), has a very high concentration of socially vulnerable areas.

## III.1.ix HISTORIC & CULTURAL RESOURCES\*

The region has a diverse range of buildings, sites, structures, districts, and objects that represent its unique historic and cultural heritage. Some of these resources are vulnerable to natural hazards. Historic and cultural resources in natural disaster zones face unique challenges, such as physical damage from natural hazards, which can cause significant structural damage to historic buildings, monuments, cemeteries, landscapes and archaeological sites. Additionally, the destruction of valuable artifacts, artworks, and documents can lead to challenges associat-

ed with resource allocation, obtaining insurance support, and pose a drain on financial resources. Specialized approaches for protection, conservation, and restoration are needed to ensure maintenance and management of the region's cultural resources.

The State Historic Preservation Office (SHPO) recently released the Connecticut Cultural Resources Information System (ConnCRIS), an online viewer of Connecticut's cultural resources, which has a function that can identify cultural resources vulnerable to flooding. Through this viewer, a total of 580 individual resources, or about 12% of the total, are located in the 1% or .02% flood

zones. Bridgeport, followed by Fairfield, had the greatest number of resources in a flood zone, as detailed in Table III.1.ix.1.

#### **Bridgeport**

In Bridgeport, of the 344 cultural and historic resources located in the floodplain, over 130 are listed on the National Register many of these are located in the City's South End neighborhood. The Walters Memorial AME Zion Church and the Mary and Eliza Freeman Houses are both Connecticut Freedom Trail Sites. The Freeman Houses are listed on the National Register, as well as Seaside Park, and two historic districts: the Seaside Village Historic District and the William D. Bishop Cottage Development Historic Districts.

Located in Downtown Bridgeport, the Mary & Eliza Freeman Center for History and Community is a



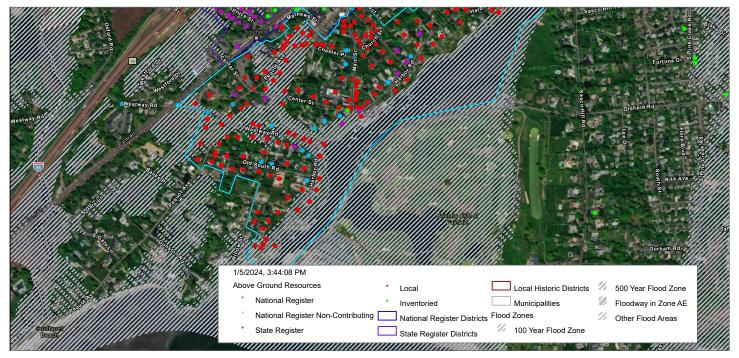
III.1.ix.1 Cultural & Historic Resources in Flood Zones

		Count	Total in	% in Flood		
Municipality	Total 0.2% Flood 1% Flood			Flood Zone	Zone	
Bridgeport	2918	32	312	344	12%	
Easton	53	1	13	14	26%	
Fairfield	613	10	105	115	19%	
Monroe	275	1	15	16	6%	
Stratford	436	0	81	81	19%	
Trumbull	572	4	6	10	2%	
Total	4867	48	532	580	12%	

Soutce: CTDECD/SHPO

<sup>\*</sup>Section revised based on public comment

Figure III.1.ix.b Southport Historic District Source: ConnCRIS



Connecticut Freedom Trail Site and is working to restore the Freeman Houses and create an African American historic site in the South End (see Figure III.1.ix.a for a visualization). The Freeman Center was recently designated as a Resilience Center – in addition to environmental education, the Center will serve as a communications center immediately before and after weather emergencies. Also located in Downtown Bridgeport, the Barnum Museum continues to recover from damage related to a 2010 tornado. In 2023 the National Park Service designated the museum a National Historic Landmark.

Outside of the South End, Bridgeport has additional historic districts designated nationally and/or locally, all of which have small segments located in the floodplain, including the Bridgeport Downtown South and North Historic Districts, Division Street Historic District, Marina Park Historic District, Railroad Avenue Industrial District and the Stratfield Historic District.

#### Easton

As a rural, inland Town, Easton has fewer cultural and historic resources located in the floodplain. However, resources in the floodplain make up 26% of the Town's inventory. The Aspetuck Historic District is partially located in the floodplain, including five residences listed as contributing resources on the National Register. Aspetuck Cemetery is located in the floodplain north of the historic district, with some portions located in the regulatory floodway. Two cemeteries are adjacent to Aspetuck Cemetery: Center Cemetery and Gilbertown. The Bradely Hubbell Complex is also on the National Register and is located in close proximity to the floodplain. The Ida Tarbell House is located in the north of the Town and is a National Historic Landmark.

#### **Fairfield**

In Fairfield, of the 115 cultural and historic resources located in the floodplain, 17 are listed on the National Historic Register. These are primarily located in a nationally and/or locally designated historic district: the Old Post Road Historic

#### **Historic Designations**

(summary, not inclusive of all designations)

The National Register of Historic Places is the nation's official list of cultural resources worthy of preservation due to their significance in American life. The list is part of a federal program that coordinates and supports efforts to identify, evaluate, and protect historic and archaeological assets.

A National Historic Landmark (NHL) is a building, site, structure, object, or district that has been recognized by the federal government for its outstanding historical significance. These landmarks represent important aspects of American history, including momentous events, individuals, architectural styles, and cultural movements. The designation of an NHL is one of the highest honors that can be bestowed upon a historic property in the nation.

The Connecticut Freedom Trail illustrates important aspects of Connecticut's African-American history and state history. The trail highlights places and objects of national, state or local significance including historic districts, churches, residences, government buildings, cemeteries, gravesites, monuments and archaeological sites.

District/Fairfield Historic District or the Southport Historic District (Figure III.1.ix.b). Portions of the Greenfield Hill Historic District are also located in the floodplain. The Town has two National Historic Landmarks: the Birdcraft Sanctuary and the Jonathan Sturges House.

#### Monroe

There are 275 cultural and historic resources located in Monroe, with 16 located in the flood zone. Predominantly, those in the flood zone are dams and are located in the Upper Stepney/Birdseye's Plain district. Many of the resources on the National Register are located in the Monroe Center Historic District, which is located outside of the floodplain.

#### Stratford

The Town of Stratford is home to 81 distinct cultural and historic resources situated within the floodplain, 63 of which are listed on the National Register of Historic Places. Many of these resources are located in the Stratford Center Historic District, added to the National Register of Historic Places in 1983. The District is partially located within the floodplain adjacent to the mouth of the Housatonic River. Within this district, the Asa Seymour Curtis House is a Connecticut Freedom Trail site is directly adjacent to the floodplain.

#### Trumbull

As an inland town, a significantly lower proportion of Trumbull's cultural and historic resources are in the flood plain, equaling just 2% of cultural and historic resources in the Town. Many of the resources on the National Register are located in the Nichols Farm Historic District, which is located outside of the floodplain. The Nero Hawley gravesite near Trumbull Center is designated as part of the Connecticut Freedom Trail.

Municipal lists of resources identified by the State Historic Preservation Office as being located in a flood zone can be found in Appendix B.

# III.2 Methodology & Loss Estimates

#### III.2.i NATURAL HAZARDS

This 2024 NHMP Update includes hazards identified in the 2019 NHMP as well as additional hazards and impacts that were identified during the planning process, including meetings with the local Planning Teams, the Community Resilience Building (CRB) Workshops, and through feedback provided via our online survey and Public Information Meetings.

The first step in assessing risks from extreme weather events or other natural disasters was to identify the hazards that might affect the region and determine which are most likely to occur. The term hazard means "an event or physical condition that has the potential to cause fatalities, injuries, property damage, infrastructure damage, agriculture loss, damage to the environment, interruption of business, or other harm or loss" (Multi-Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy, Federal Emergency Management Agency, 1997).

The original 2006 NHMP identified the following natural hazards that can potentially affect the Region:

- Inland and Coastal Flooding
- Sea Level Rise
- Summer and Winter Storms
- Earthquakes
- Dam Failure

The risk assessment of these hazards was based on the understanding that a single hazard may be caused by multiple events. For example, flooding may occur as a result of heavy rains, a hurricane/tropical storm, or a winter storm. The

extent of the flooding problem may differ within the region depending on the event. The problems of inland and coastal flooding were addressed separately, as the extent, cause and risks associated with each varies.

The 2014 NHMP Update used the above list as a starting point. Additional natural hazards were defined through holding hazard mitigation and resiliency workshops, public outreach (meetings and surveys), and research and documentation of recent events.

Based on the discussions at various workshops, the following natural hazards were assessed:

- Hurricanes
- Inland flooding
- Coastal flooding
- Sea level rise
- Summer storms/tornadoes
- Winter storms (blizzards/ice storms)
- Earthquakes
- Dam failures

As more than 40% of the region is forested, a discussion of wildfires was considered appropriate for the plan. Therefore, a new section was added to discuss the wildland-urban interface and the potential impacts of wildfires in the region. Drought was not included in the previous 2019 plan.

For the 2024 Plan Update, the existing hazards were compared to the 2023 Connecticut NHMP Update. There were several hazards addressed in the State NHMP that were not previously addressed in the MetroCOG Region NHMP. These included drought, extreme cold, and extreme heat. These three hazards have been included in this update.

After reviewing the State 2023 NHMP the following natural hazards were assessed:

- Hurricanes
- · Inland flooding
- Coastal flooding
- Sea level rise
- Summer storms/tornadoes
- Winter storms (blizzards/ice storms)
- Earthquakes
- Dam failures
- Drought
- Extreme Cold
- Extreme Heat
- Wildfires

#### III.2.ii LOSS ESTIMATES

Annualized loss estimates by the community were developed for each natural hazard likely to impact the MetroCOG region. These were developed based on existing loss information collected by the communities, data published by FEMA or other sources, derived from county-wide and COG data developed for the 2023 Connecticut NHMP Update, or developed using HAZUS-MH. Annualized loss estimates were prepared for each hazard using the following methods, with results presented in Table III.2.ii.1.

The HAZUS program is a nationally standardized risk modeling methodology which is managed by FEMA. The program identifies high risk areas for various natural hazards, and develops building, social, and economic loss estimates. Two versions of HAZUS-MH were used to generate loss estimates for the MetroCOG region on a municipal scale. Version 6.0 was used for riverine floods, hurricane wind, earthquakes, and storm surge, and version 6.1 was used for coastal flooding. The updated version was advanced by

FEMA's contractors to address coastal flood data processing inconsistencies that became apparent during the testing and use of version 6.0.

HAZUS is run as an extension in ArcGIS, a Geographic Information System (GIS). For the six municipalities in the region, the default building stock from HAZUS-MH was used for all the HAZUS-MH analyses in this report. According to this database there are an estimated 93,724 buildings in the Region. Bridgeport has the most buildings with an estimated 30,126.

The essential facilities in the region were provided in the HAZUS- MH default dataset. Therefore, there may be some facilities that were not included in this analysis. In the Region, HAZUS-MH models six Emergency Operation Centers (EOC), 33 fire stations, two hospitals (Bridgeport Hospital and Saint Vincent's Medical Center in Bridgeport), 12 police stations and 122 schools.

HAZUS-MH provided data on damage to essential facilities as well as loss of use estimates. The summary tables in the following sections reflect estimated number of essential facilities that experienced at least moderate damage (or greater than 50%). Loss of use refers to the inability of the essential facility to provide its normal function to the community. For example, schools are closed to students.

Economic loss was calculated from both direct property damage and business interruption. Direct property damage includes the estimated costs to repair or replace the damage caused to the buildings and its contents. The business interruption costs are those associated with the inability of a business to function due to the hurricane.

HAZUS analysis was conducted for the following hazards.

#### All Municipalities:

- Hurricane wind loss estimates were prepared using five return period scenarios: 10, 20, 50, 100, 200, 500, and 1000-year.
- Riverine flooding loss estimates were prepared using five return period scenarios: 10, 25, 50, 100, and 500-year.
- Earthquake loss estimates were prepared using a scenario based on a historic event which is a Magnitude 5.7 earthquake with the epicenter in East Haddam.

#### Bridgeport, Fairfield & Stratford:

- Storm surge loss estimates were prepared using the modeled coastal surge inundation from Superstorm Sandy.
- Coastal flooding loss estimates were prepared using five return period scenarios: 10, 25, 50, 100, and 500-year.

FEMA has adopted the 1% annual chance flood hazard as the base flood for flood plain management purposes. During any given year there is a 1% or .2% chance that a storm of sufficient precipitation will occur that will cause flooding that reaches or exceed FEMA's base flood levels. Previously, these had been the 100-year and 500-year flood (respectively), but FEMA adopted the percentage standards to eliminate the idea that a 100-year flood will only occur once every hundred years, or a 500-year flood every 500-years.

In addition to HAZUS, loss estimates were prepared for each hazard using the following methods and data sources, with results presented in Table III.2.ii.1.

FEMA's National Risk Index for Expected Annual Losses: As the data was by census tract, tract data was aggregated to the municipal scale. The Social Vulnera-

- bility Index was also used to identify socially vulnerable communities.
- Requested FEMA Public Assistance
   (PA) grants for each community: PA
   provides grants for debris removal, emergency protective measures, and the repair,
   replacement, or restoration of disaster-damaged, publicly owned facilities and the
   facilities of certain private, non-profit organizations losses due to natural disasters.
- Requested FEMA Individual Assistance grants by community: Homeowners and renters in officially designated counties who sustained damage to their homes, vehicles, personal property, businesses, or inventory may apply for IA.
- NOAA's Storm Events Database: Events in Fairfield County between 2018 and 2023. The estimated amount of damage to property was referenced (estimates were not provided for many events). Only one "event type" could be attributed to an event, thus coastal and/or flash flooding caused by a tropical storm were often classified as coastal flooding or flash flooding, rather than as a hurricane or tropical storm.
- National Flood Insurance Program (NFIP): Annualized loss estimates were developed based on NFIP damage data from 1978 through 2023 for each community.
- Repetitive Loss and Severe Repetitive
  Loss properties: A list of RL properties
  was obtained from FEMA. This data was
  used to identify general areas where properties are susceptible to recurring flooding
  that cause repetitive losses. While disclosure
  regulations prohibit the identification of the
  addresses of RL properties, areas that have
  experienced repeated flooding that has
  resulted in losses have been mapped. These

were then aggregated into Census blocks to maintain property anonymity but allow the aggregated data to be displayed.

- Winter storms annualized loss was based on the requested FEMA Public Assistance grants for each community attributable to winter storms divided by the years of record available.
- Thunderstorm and tornado annualized loss was calculated based on county-wide dam- ages for each hazard presented in the 2023 State NHMP, which was attributed by the percentage of the population of each community to the county.
- Dam failure data was downloaded from the National Performance of Dams (NPDP) for the Region from 1877 through to the present and adjusted for inflation. The regional damage was divided by the number of years of data (146) to develop annualized loss, which was attributed by the percentage of the population of each community to the region.
- Wildfire annualized loss was calculated based on average fire size and number of events per year for Fairfield County in the 2023 State NHMP, an estimated average response cost of

\$2,000 per event, and the population density of each community com- pared to the county.

Drought annualized loss was calculated based on FEMA's National Risk Index which utilized

the risk hazard rating as well as agricultural exposure.

#### III.2.iii EXPOSURE ANALYSIS

In addition to scenario-specific loss estimates an exposure analysis was conducted for the region. This analysis examines which assets are potentially impacted by the various natural hazards. Whereas certain hazards such as hurricanes may affect the entire region, other hazards such as flooding typically affect defined areas. Thus, the extent of exposure to a particular natural hazard may vary depending on the extent of the hazard.

Vulnerable assets were identified by intersecting GIS-based asset inventories and demographic data with hazard risk boundaries to determine the number of parcels, buildings, critical facilities (Appendix A), and historic resources (Appendix B), exposed to each hazard. This results in an estimation of exposure by hazard. Tables III.2.iii.1 through III.2.iii.6 present vulnerable assets for each MetroCOG community. Extreme cold, extreme heat, and drought were not included in the exposure analysis as their impact is not quantifiable on a parcel or property level. The following inventories were used to conduct the exposure analysis:

III.2.ii.1 Ann	iualized <mark>L</mark> os	s Estim	ATES BY $ ho$	latural b	Hazard, in	
Thousands						
Hazard	Bridgeport	Easton	Fairfield	Monroe	Stratford	

Hazard	Bridgeport	Easton	Fairfield	Monroe	Stratford	Trumbull
Dam Failure	\$27	\$1	\$11	3	\$10	\$7
Drought	\$0	\$0.8	\$0	\$0.5	0	0
Earthquake	\$196	\$12	\$158	\$44	\$108	\$42
Flooding	\$336	\$4	\$1,257	\$0.9	\$262	\$24
Hurricane Wind	\$8,417	\$910	\$6,418	\$1,637	\$4,147	\$3,016
Tornado	\$483	\$25	\$201	\$61	\$170	\$120
Thunderstorm	\$1,353	\$69	\$563	172.0	\$477	\$335
Winter Storm	\$201	\$26	\$130	\$87	\$100	\$112
Wildfire	\$0.3	\$0.1	\$2	\$1	\$0.5	\$0.6

- Coastal erosion exposure was mapped using the 2014 publication Analysis of Shoreline Change in Connecticut by DEEP, Sea Grant, and UConn/CLEAR.
- Dam failure exposure was determined based on dam failure inundation mapping available from DEEP for the high hazard dams in the planning area.
- Flooding exposure was based on existing digital flood insurance rate maps (DFIRMs) for each community. Note that the 0.2% annual chance flood areas include the areas mapped under the 1% annual chance flood areas.
- Historic resources were downloaded from the SHPO' online resources, Connecticut Cultural Resource Information System.
- Sea level rise extent was mapped using

- the "bathtub model" methodology, with all land areas below the elevation of Mean Higher High Water (MHHW) plus the sea level rise projections developed by CIRCA (see Section III.5 for projections).
- Storm surge exposure was based on the 2019 Sea, Lake, and Overland Surges from Hurricanes (SLOSH) analysis prepared by the United States Army Corps of Engineers. This GIS data is available from DEEP.
- Wildfire exposure was determined using a methodology that highlights areas within the Wildland – Urban Interface (WUI).
   These areas are where housing and vegetation intermix, therefore exposing the properties to wildfire. Data was downloaded from the University of Wisconsin-Madison, SILVIS lab which identified interface and intermix

III.2.iii.1 Exposure Analysis, At-Risk Locations, City of Bridgeport									
	Par	Parcels		Buildings		Critical Facilities		Historic Assets	
Hazard	Number	Value*	Number	Value*	Number	Value*	Number	Value*	
Dam Failure	549	\$250	393	\$152	3	\$11	14	\$12	
Coastal Erosion	75	\$108	99	\$41	0	\$0	21	\$8.00	
Earthquake	35,889	\$12,401	40,144	\$8,612	182	\$2,638	2,616	\$3,352	
Flooding									
1% Annual	4,630	\$2,714	3,035	\$1,809	35	\$693	274	\$1,183	
0.2% Annual	5,432	\$2,958	3,909	\$1,975	37	\$694	284	\$1,235	
Storm Surge									
Category 1	1,210	\$1,251	438	\$850	5	\$7	57	\$219	
Category 2	2,572	\$2,126	1,839	\$1,457	22	\$658	252	\$1,150	
Category3	4,809	\$3,070	3,990	\$2,115	39	\$859	499	\$1,521	
Category 4	6,868	\$3,887	6,339	\$2,684	57	\$1,055	874	\$1,859	
Hurricane/Tropical Storms	35,889	\$12,401	40,144	\$8,612	182	\$2,638	2,616	\$3,352	
Sea Level Rise	656	\$787	28	\$535	0	\$0	1	\$1	
Thunderstorm	35,889	\$12,401	40,144	\$8,612	182	\$2,638	2,616	\$3,352	
Tornado	35,889	\$12,401	40,144	\$8,612	182	\$2,638	2,616	\$3,352	
Winter Storm	35,889	\$12,401	40,144	\$8,612	182	\$2,638	2,616	\$3,352	
Wildfire	28	\$58	29	\$45	0	\$0	0	\$0	

<sup>\*</sup>in thousands

areas in the WUI. These areas, represented the exposure area for wildfires.

• For the remaining hazards (earthquakes, hurricanes, thunderstorms, tornadoes, and winter

storms), it was assumed that all buildings and populations were equally exposed.

The exposure values are equal to the total exposure of the community.

III.2.iii.2 Exposure Analysis, At-Risk Locations, Town of Easton									
	Pare	Parcels		Buildings		Critical Facilities		Historic Assets	
Hazard	Number	Value*	Number	Value*	Number	Value*	Number	Value*	
Dam Failure	78	54	25	\$40	0	0	0	0	
Earthquake	3,581	\$1,454	5,219	\$880	11	\$39	63	\$30	
Flooding									
1% Annual	564	\$222	131	\$134	0	0	15	\$6	
o.2% Annual	576	\$228	155	\$138	0	Ο	17	\$7	
Hurricane/Tropical Storms	3,581	\$1,454	5,219	\$880	11	\$22	63	\$30	
Thunderstorm	3,581	\$1,454	5,219	\$880	11	\$39	63	\$30	
Tornado	3,581	\$1,454	5,219	\$880	11	\$39	63	\$30	
Winter Storm	3,581	\$1,454	5,219	\$880	11	\$39	63	\$30	
Wildfire	3,549	\$1,449	5,171	\$879	10	\$38	62	\$30	

<sup>\*</sup>in thousands

III.2.iii.3 Exposure Analys	ıs, At-Rı	sk Locat	TIONS, TO	wn of F	AIRFIELD			
	Par	cels	Build	lings	Critical Facilities		Historic Assets	
Hazard	Number	Value*	Number	Value*	Number	Value*	Number	Value*
Dam Failure	2,460	\$2,684	3,405	\$1,208	5	\$25	176	\$365
Coastal Erosion	226	\$898	94	\$268	0	\$0	5	\$22
Earthquake	21,851	\$19,234	29,934	\$7,607	55	\$1,521	562	\$3,545
Flooding								
1% Annual	5,342	\$5,502	5,439	\$1,947	8	\$117	95	\$201
0.2% Annual	6,037	\$6,685	6,248	\$2,178	8	\$117	105	\$210
Storm Surge								
Category 1	2,874	\$3,179	2,826	\$928	2	\$1	20	\$39
Category 2	4,082	\$4,371	4,833	\$1,382	8	\$32	101	\$230
Category3	4,949	\$5,364	6,063	\$1,788	14	\$161	202	\$501
Category 4	5,903	\$6,679	7,209	\$2,088	19	\$183	296	\$652
Hurricane/Tropical Storms	21,851	\$19,234	29,934	\$7,607	55	\$1,521	562	\$3,545
Sea Level Rise	1,396	\$1,863	593	\$518	3	\$12	4	\$10
Thunderstorm	21,851	\$19,234	29,934	\$7,607	55	\$1,521	562	\$3,545
Tornado	21,851	\$19,234	29,934	\$7,607	55	\$1,521	562	\$3,545
Winter Storm	21,851	\$19,234	29,934	\$7,607	55	\$1,521	562	\$3,545
Wildfire	4,665	\$4,018	6,512	\$2,049	9	\$287	38	\$445

<sup>\*</sup>in thousands

III.2.iii.4 Exposure Analysis, At-Risk Locations, Town of Monroe									
	Par	Parcels		Buildings		Critical Facilities		Historic Assets	
Hazard	Number	Value*	Number	Value*	Number	Value*	Number	Value*	
Dam Failure	20	\$37	19	\$31	1	N/A**	4	\$0	
Earthquake	8,485	\$2,135	11,289	\$1,373	20	\$81	275	\$92	
Flooding									
1% Annual	1,535	\$438	218	\$324	0	\$0	16	\$7	
o.2% Annual	1,555	\$441	249	\$326	0	\$0	16	\$7	
Hurricane/Tropical Storms	8,485	\$2,135	11,289	\$1,373	20	\$81	275	\$92	
Thunderstorm	8,485	\$2,135	11,289	\$1,373	20	\$81	275	\$92	
Tornado	8,485	\$2,135	11,289	\$1,373	20	\$81	275	\$92	
Winter Storm	8,485	\$2,135	11,289	\$1,373	20	\$81	275	\$92	
Wildfire	7,293	\$1,822	9,484	\$1,187	17	\$74	249	\$85	

<sup>\*</sup>in thousands \*\*Stevenson Dam

III.2.iii.5 Exposure Analys	is, At-Ri	sk Locat	ions, To	wn of S	TRATFORD				
	Par	cels	Build	Buildings		Critical Facilities		Historic Assets	
Hazard	Number	Value*	Number	Value*	Number	Value*	Number	Value*	
Dam Failure	3,291	\$1,618	3,045	\$950	3	\$42	141	\$162	
Coastal Erosion	297	\$126	144	\$65	0	\$0	2	\$2	
Earthquake	22,204	\$7,326	27,586	\$4,576	32	\$230	402	\$413	
Flooding									
1% Annual	7,062	\$2,662	5,439	\$1,764	5	\$71	77	\$161	
0.2% Annual	7,151	\$2,691	6,248	\$1,783	5	\$71	77	\$161	
Storm Surge									
Category 1	1,693	\$1,139	2,826	\$662	0	\$0	0	\$0	
Category 2	3,176	\$1,620	4,833	\$939	4	\$64	14	\$4	
Category3	4,165	\$1,956	6,063	\$1,136	5	\$71	103	\$46	
Category 4	5,143	\$2,353	7,209	\$1,385	8	\$90	234	\$99	
Hurricane/Tropical Storms	22,204	\$7,326	27,586	\$4,576	32	\$230	402	\$413	
Sea Level Rise	1,028	\$714	593	\$418	0	\$0	1	\$114	
Thunderstorm	22,204	\$7,326	27,586	\$4,576	32	\$230	402	\$413	
Tornado	22,204	\$7,326	27,586	\$4,576	32	\$230	402	\$413	
Winter Storm	22,204	\$7,326	27,586	\$4,576	32	\$230	402	\$413	
Wildfire	1,102	\$456	6,512	\$366	0	\$0	1	\$0.08	

<sup>\*</sup>in thousands

III.2.iii.6 Exposure Analysis, At-Risk Locations, Town of Trumbull									
	Par	Parcels		Buildings		Critical Facilities		Historic Assets	
Hazard	Number	Value*	Number	Value*	Number	Value*	Number	Value*	
Dam Failure	402	\$198	277	\$95	0	\$0	0	\$0	
Earthquake	13,275	\$4,967	18,428	\$2,746	29	\$169	440	\$252	
Flooding									
1% Annual	1,432	\$1,062	487	\$668	0	\$0	2	\$0.80	
0.2% Annual	1,623	\$1,150	811	\$716	0	\$0	4	\$1.50	
Hurricane/Tropical Storms	13,275	\$4,967	18,428	\$2,746	29	\$169	440	\$252	
Thunderstorm	13,275	\$4,967	18,428	\$2,746	29	\$169	440	\$252	
Tornado	13,275	\$4,967	18,428	\$2,746	29	\$169	440	\$252	
Winter Storm	13,275	\$4,967	18,428	\$2,746	29	\$169	440	\$252	
Wildfire	2,160	\$1,361	2,632	\$784	2	\$21	\$26	\$14	

<sup>\*</sup>in thousands

### III.2.iv REPETITIVE LOSS ANALYSIS METHODOLOGY

Repetitive Loss properties are identified as structures that have incurred two or more claims of more than \$1,000 dollars paid by the NFIP within a ten-year period, or two or more claims that exceed or equal 25% of the property's market value. A more severe identifier, called 'Severe Repetitive Loss' is identified as having four or more separative claims of more than \$5,000 dollars each, or two or more claim payments that exceed the property's current value. The goal of the FEMA severe repetitive loss properties strategy is to eliminate the damage caused to residential properties and lessen the disruption to life caused by repeated catastrophe.

A data request to FEMA was made by Metro-COG for the addresses and type of properties defined as repetitive and severe repetitive loss within the region. Based upon the numbers provided, MetroCOG summarized the data by land type; residential versus non-residential.

Fairfield County has the highest number of repetitive loss properties in the state, predominantly

caused by coastal flooding, with 1,395 properties. The MetroCOG region has a total of 382 Repetitive Loss properties, with Bridgeport having 108 total repetitive loss properties and 9 classified as severe repetitive loss. Of the 108 properties, 91 are residential and 17 are non-residential. Fairfield has the highest number of repetitive loss properties, with 162 being residential and 10 being non-residential. There are 19 properties in Fairfield classified as severe repetitive loss.

More information about repetitive loss properties and a detailed table can be found in Section III.4.

### III.3 Hazard Profile: Hurricanes & Tropical Storms

### ASSESSMENT & GENERAL LOCATION

Hurricanes and tropical storm systems threaten Connecticut residents with the possibility of storm surges, powerful winds, and heavy rains. These elements can lead to devastating inland and coastal flooding, loss of power, and structural damage to homes, businesses, and critical facilities. The coastal communities of the Region (Bridgeport, Fairfield & Stratford) are most at risk to inundation from storm surge due to a tropical event. Both coastal and inland communities are vulnerable to inland flooding and wind damage associated with hurricanes and tropical systems. Further repercussions from tropical systems include substantial and widespread property damage and loss of utility services.

Hurricanes and tropical storms fall under the broader class of storm systems known as tropical cyclones. The National Weather Service defines a tropical cyclone as a non-frontal, large-scale, low-pressure system that has developed over tropical or subtropical water and has a definite organized circulation. Tropical cyclones are categorized based on the speed of the sustained (1-minute average) surface winds near the center of the storm. These categories are:

- Tropical Depression: winds less than 39 mph;
- Tropical Storm: winds 39-to-74 mph, inclusive; and
- Hurricanes: winds at least 74 mph.

The geographical areas affected by tropical cyclones are called tropical cyclone basins. The



Atlantic tropical cyclone basin is one of six in the world and includes much of the North Atlantic Ocean, the Caribbean Sea, and the Gulf of Mexico. The official Atlantic hurricane season begins on June 1st and extends through November 30th of each year, although occasionally hurricanes occur outside this period.

#### INTENSITY

Storm Surge: The National Hurricane Center defines storm surge as an abnormal rise of water generated by a storm system that is over and above the predicted astronomical high tide levels. This rapid and occasionally extreme rise in water can cause substantial inundation along coastal areas, especially when it coincides with the astronomical high tide. The combination of a high tide and storm surge can cause a storm tide of up to twenty feet or more.

The storm surge is generated through water being pushed ashore by the force of winds moving cyclonically around the storm system. The magnitude of a storm surge within a coastal basin is governed by both the meteorological parameters

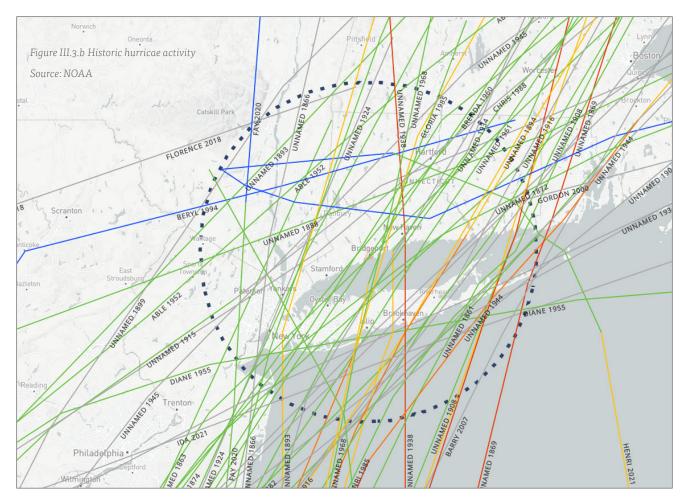
of the hurricane and the physical characteristics of the basin. While Long Island buffers Connecticut from the open ocean, the geomorphology of Long Island Sound causes the basin to be particularly vulnerable to storm surge. The configuration of Long Island and the Connecticut coast causes a natural funneling influence on ocean waters as they are driven east to west into the Sound by a tropical event, amplifying surges.

Wind & the Saffir-Simpson Scale: Although storm surge may have great impact in coastal areas, wind is still the defining characteristic of tropical cyclones. The National Hurricane Center uses the Saffir-Simpson Hurricane Scale to categorizes hurricanes based upon their intensity. The scale is intended as a general guide for public safety officials to use during hurricanes and it does not reflect the effects of varying localized bathymetry, coastline configuration, tides, barriers and/or other local factors that may modify surge heights or storm effects.

The Scale uses the sustained surface winds (1-minute average) near the center of the system to classify hurricanes into one of five categories as detailed in Table III.3.1.

### III.3.1 SAFFIR SIMPSON HURRICANE SCALE

Category	Winds (mph)*	Storm Surge**	Impact to Assets
1	74-to-95	Potential 4-to-5 ft above tide levels.	Well-constructed frame homes may suffer damage to roofs, shingles, vinyl siding, and gutters. Large branches will break and shallowly rooted trees will likely be uprooted. Widespread damage to power lines and poles will likely cause power outages that could last from several days to a week or more. Additionally, minor to moderate coastal flooding is to be expected.
2	96-to-110	6-to-8 ft above tide levels.	Well- constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted, posing a threat to structures, vital infrastructure and making roads impassable. Extensive power outages would be expected, with outages lasting up to a week or more. Low-lying coastal areas could flood 2-to-4 hours before the arrival of the storm. Damage to small craft and moored vessels should also be expected.
3	111-to- 130	9-to-12 ft above tide levels.	Well-constructed frame homes may incur severe damage, including removal of roof decking and gable ends. A large portion of trees will be snapped or uprooted, leading to property and infrastructure damage. Electricity and water could be unavailable for several weeks. Low-lying coastal areas could 3-to-5 hours before the system's landfall. Inundation from flood waters will be extreme, causing damage to structures and property. Shoreline evacuations should be mandated to prevent loss of life.
4	131-to-155	13-to- 18 feet above tide levels.	Well-constructed frame homes will likely incur severe damage, with loss of most of the roof structure along with possible damage or loss of exterior walls. A majority of trees will either be snapped or uprooted. Almost universal power outages and impassable roads will isolate communities. Power could be unavailable for weeks or months, and hard hit areas will not be habitable for the same length of time.
5	Excess of 155 mph	Greater than 18 ft above tide levels.	A majority of framed homes will be destroyed, with roof failure and wall col- lapse. Recovery of utilities could take from several weeks to months, with many areas uninhabitable during that period. Low-lying areas closest to the shore could be inundated by rising waters three– to-five hours before land fall. Major damage to lower floors of all structures located less than 15 feet above sea level and within 500 yards of the shoreline is to be expected. Large scale evacuations of low lying coastal communities within five- to-ten miles of the shoreline should be enforced.



#### HISTORIC RECORD

#### NOAA's Historical Hurricane Tracks website

was utilized to identify all hurricanes that have passed within a 60-mile radius of the Greater Bridgeport Region from 1842 to present. Since 1858, 55 hurricanes and tropical systems have landfall within the radius. The majority of these events (46) have been tropical storms, depressions or extratropical events at landfall. Seven Category 1 hurricanes, three Category 2 hurricanes and three Category 3 hurricanes made landfall. There is no record of Category 4 or 5 storms making landfall proximate to Bridgeport during this 181-year timeframe.

Major Hurricanes and Tropical Storms that occurred prior to 2018 can be found in Table III.3.2. A search of NOAA's Storm Events Database for Connecticut and/or Fairfield County

identified the following major events since 2018:

August 4th, 2020, Tropical Storm Isaias: After making landfall as a Category 1 Hurricane in North Carolina on August 3rd, Isaias weakened to a Tropical Storm by the time it passed through New York. The highest sustained wind speeds ranged from 35 to 55 mph, with gusts of 60 to 70 mph. Isaias brought sustained tropical storm winds with gusts to near hurricane force across Southern Connecticut, as well as an EF-1 tornado in Westport. Bridgeport's Sikorsky Memorial Airport reported a maximum sustained wind of 43 mph and a peak wind gust of 62 mph. One death resulted from high winds in Naugatuck (New Haven County). Widespread wind damage and power outages occurred; statewide power outages peaked to 752,225 the morning of August 5th and the state lost around 1 percent of their tree population. Coastal impacts were

Date, Name, & Category*	Intensity & Impacts
1938, September 21: Great New England Hurricane Category 3	Regarded as the most intense hurricane to ever strike Connecticut in the 20th century. Sustained winds of 91 mph and gusts to 121 mph (Block Island, RI). High winds caused downed power lines in and resulted in two fires in southeastern CT. Three-to-six inches of rain fell across most portions of the state, with isolated rains of 14-to-17 inches in central CT. In Hartford, the Connecticut River rose close to 20 feet above flood stage. Storm tides reached up to 25 feet in portions of eastern CT and western sections saw storm tides of 14-to-18 feet.Many shorelines properties were destroyed; the majority of impacted properties experienced varying degrees of damage.
1944, September 14 & 15: Great Atlantic Hurricane no direct landfall in CT	Hurricane force winds, with a gust of 109 mph reported in Hartford. Heavy rain produced the greatest impacts; over 10 inches of rain fell in Bridgeport which was the highest in the state.
1954, August 31 Hurricane Carol Category 3	Most destructive storm in southern New England since 1938; 48 people lost their lives. Sustained winds of 80-to-100 mph across much of the CT shoreline. Storm surges along coast varied from 5-to-8 feet in the west, to 10-to-15 in eastern portions. Large numbers of uprooted and snapped trees and miles of downed power lines, as well as eavy crop damage in eastern CT. Property damage exceeded \$1 billion (1954 \$\$\$) in the Northeast.
1955, August 11 & 12 Hurricane Connie August 18-20 Hurricane Diane no direct landfall in CT	The 2 hurricanes passed within proximity of the state within 9 days. More than 90 people were confirmed dead and another dozen were missing and presumed dead. Connie caused 4-to-6 inches of rain across southern New England which saturated the ground and caused higher than normal river and reservoir water levels. When Diane impacted Connecticut, watercourses were already inundated and the ground was unable to absorb the additional rainfall. Over 2 days, up to 20 inches of rain from Diane fell in parts of the state and resulted in devastating inland floods. Roads and bridges were washed out across the state, residents lost drinking water and public utilities were inoperable. Damage was estimated to have exceeded \$1.5 billion (1955 \$\$\$).
1985, September 27 Hurricane Gloria Category 2	Heavy wind damage toppled thousands of trees and caused major structural damage and power outages. Relatively light rain from the storm meant that there was little flooding accompanying the wind damage. Downgraded to Category 1 after passing west of Hartford.
1999, September 16 Tropical Storm Floyd Tropical Storm	Record rainfall caused widespread urban, small stream, and river flooding. Serious inland flooding in low elevation and poor drainage areas resulted in the closure of numerous roads and the flooding of many basements. Fairfield, Hartford and Litchfield Counties were declared disaster areas.
2011, August 28 Hurricane Irene Tropical Storm	In Connecticut, Irene had been predicted to make landfall as a strong Category 1 or weak Category 2 hurricane. It was downgraded to a tropical storm by the time it reached the state but created a storm surge of about 4 feet, consistent with a Category 1 or 2. Heavy rains, up to 6 inches, caused widespread coastal flooding. Damage and coastal inundation was worsened by a large wind envelope that pushed water into western LI Sound. Average maximum wind gusts of 52 mph downed approximately 1%-to-2% of the trees in the state and resulted in over 800,000 power outages; with restoration taking up to 12 days in some areas.
2012, October 29 Superstorm Sandy Tropical Storm	In Connecticut, Sandy was responsible for the deaths of 5 people and caused damage to approximately 3,000 homes. The highest storm tide and greatest inundation occurred along western sections of the CT coast. The Bridgeport tide gauge measured the storm surge at 9.83 feet above normal levels. The average surge along the Fairfield County coast was between 4-and-6 feet, with inundation up to 6 feet above ground level. Preliminary estimated value of damage was \$360 million statewide.

<sup>\*</sup>Category upon landfall in Connecticut

minimal and were mainly from high surf; the highest storm surge did not occur during high tide and astronomical tides were also low.

July 9, 2021, Tropical Storm Elsa: In Connecticut, the highest sustained winds measured 30 to 40 mph with peak gusts to 45 mph along the immediate central and southeastern Connecticut coast. Across coastal southwestern Connecticut and the interior of the coast, maximum sustained winds ranged from 20 to 30 mph with gusts to 35 mph. Wind damage and coastal impacts were minimal; heavy rainfall and flash flooding were the main impacts. These impacts are discussed further in Section III.4.ii (Inland Flooding).

August 22, 2021, Tropical Storm Henri: Tropical Storm Henri made landfall on the Rhode Island coast around noon on August 22 with maximum sustained winds of 60 mph. The storm weakened over Connecticut and became a depression by the evening. Tropical storm force winds were limited mainly to southeast Connecticut and resulted in a few reports of tree limbs being downed and power outages. The greatest impact was flooding due to heavy rainfall in and around the New York City, both from a previous rainfall during the evening of August 21, and then with the circulation of Henri throughout much of the day on Sunday, August 22.

#### September 1- 2, 2021, Remnants of Hurricane Ida:

Although not considered a tropical storm by the time it reached New England, the remnants caused extremely heavy rainfall across southern Connecticut during the evening of September 1 and continued into the morning of September 2. Rainfall totals ranged from 5-8+ inches, with much of that rain falling in just a few hours; Bridgeport's Sikorsky Memorial Airport recorded 5.59 inches of rain. Widespread flash flooding and extensive river flooding occurred. These

impacts are discussed further in Section III.4.ii (Inland Flooding).

#### **FUTURE PROBABILITY**

The Connecticut 2024 Natural Hazard Mitigation Plan (draft) states that it is challenging to predict when and where a hurricane will occur. Although hurricane season runs from June 1 to November 30th, a review of historic data found that hurricanes are most likely to impact New England between late August and mid-October. The plan utilized a NOAA-developed series of hurricane return periods for the northeast, which were based on historical events within 65 nautical miles of the storm tracks. A Category 3 hurricane had a calculated return period of 63 to 120 years along the Connecticut coastline; for hurricanes in Connecticut overall, the calculated return period ranges from 17-24 years. Based on historical data for hurricane tracks within 50 miles of Connecticut, the state has a medium-low probability of future events (less than 1 event per year).

The Fifth National Climate Assessment (NCA) notes that severe storm events are becoming more frequent and more intense, with notable shifts in hurricane intensity. The NCA notes tropical cyclone events have been intensifying since the early 1980's, and that due to warming ocean waters storm have been decreased in movement speed since the 1950's. Slower moving systems can result in heavier rainfall and stronger winds. This trend of slower moving, more intense hurricane and tropical storms may continue.

### VULNERABILITIES & RISK ASSESSMENT

Tropical storms and hurricanes impact Connecticut with heavy rains, storm surge, and strong winds. Heavy rains can lead to flooding which

will be covered more in-depth in III.4. FEMA's National Risk Index identifies Fairfield County as having a "relatively high" hurricane risk index compared with the rest of the United States. Further, even if a tropical storm or hurricane does not directly pass through the region, high winds, heavy rains and storm surge should be anticipated. Storm surge and devastating winds, while not unique to hurricanes and tropical storms, have the largest impact when associated with tropical events.

Storm Surge: When a tropical storm or hurricane passes through the Region, it will impact the entire area. However, because these storms have the capability of producing excessive surge of water, inundation of coastal areas is more likely, and, as a result, these areas are more vulnerable and at a greater risk. Hurricane storm surge maps depict the inundation of flood waters that would be expected from a worst-case scenario of different categories of hurricane.

Hurricane surge inundation maps for Bridgeport, Fairfield and Stratford are included in Appendix E. Please note that storm surge zones depicted on these maps are not necessarily cumulative.

#### Loss Estimates – Storm Surge

Based on FEMA mapping products, the National Hurricane Center Storm Surge Risk Maps and other GIS data developed by MetroCOG, the exposure of parcels, buildings, historic resources, and critical facilities has been developed for each storm surge zone. The tables in Section Figure III.11.a presented the exposure for the coastal towns of Bridgeport, Fairfield, and Stratford, respectively. Note that the inland towns of Easton, Monroe, and Trumbull do not have any areas that lie within storm surge zones.

In Bridgeport, most of the South End and West End would be flooded from a Category 1 hurricane. In addition, the shorelines of the Black Rock, East Side, and East End neighborhoods would be inundated with flood waters. Steele Point, which is a peninsula, was previously prone to flood waters but the area has since been raised. The extent of flooding in those areas would be somewhat limited to the immediate shore area. If the City were hit by a Category 3 or 4 hurricane, flooding would extend farther north from the shore and impact neighborhoods and commercial properties along Fairfield Avenue and State Street in the West End and along Route 130 (Connecticut Avenue and Stratford Avenue) in the East End. Flood waters would also extend along the Pequonnock River, reaching as far north as the US Route 1 and Route 8/25 interchange area, and along the Yellow Mill Channel, as far north as US Route 1. Flooding would also occur along the Rooster River.

In Fairfield, a Category 1 hurricane is likely to cause widespread flooding along the shoreline south of Old Post Road between Sasco Hill Road and Ash Creek. Parts of Southport would be inundated by flood waters during a Category 2 or 3 storm. Small areas along the Mill River would be affected by more severe hurricanes and the Town Center area along US Route 1 would become flooded as the result of a Category 3 or 4 hurricane. Although many coastal properties in Fairfield have elevated their homes since Superstorm Sandy in 2012 to mitigate damage from coastal flooding and storm surge, a recent CIR-CA study found that elevated homes are more susceptible to wind shear damage. Potential risks from wind are presented in the next section.

In Stratford, a Category 1 hurricane would cause flooding throughout the majority of the South End, including the industrial areas along Route 113 (Lordship Boulevard and Main Street), the Sikorsky Memorial Airport and the residential neighborhoods bounded by Interstate 95, Lordship Boulevard, Access Road, Main Street and South Avenue. A Category 2 hurricane would expand the extent of flooding in these areas. The only part of the South End unaffected by a Category 1 hurricane would be the Lordship neighborhood, because of its higher elevation. A Category 3 or 4 hurricane would cause flooding north of Interstate 95 and within Stratford Center. Areas in the northern part of Stratford would be flooded by various categories of hurricane, but the extent of the damage would be limited to existing marsh areas. A severe hurricane has the potential to impact the Sikorsky Aircraft Manufacturing Plant.

Storm surge loss estimates were prepared for the region's three coastal municipalities using the modeled coastal surge inundation from Superstorm Sandy in HAZUS-MH 6.0. The previous NHMP did not include a HAZUS analysis for storm surge. The model estimates the following:

- Over 200 buildings would be more than 50% damaged, with the greatest number in Fairfield.
- A total of 23 critical

Ш	.3.3	STORM	SURGE,	Count	of l	Buildings	BY [	DAMAGE	LEVEL
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Municipality	1%- 10%	11%- 20%	21%- 30%	31%- 40%	41%- 50%	>50%
Bridgeport	41	176	48	5	1	3
Fairfield	19	192	357	174	89	157
Stratford	19	121	160	95	58	62

# III.3.4 STORM SURGE, COUNT OF MODERATELY DAMAGED ESSENTIAL FACILITIES

Туре	Bridgeport	Fairfield	Stratford	Region
EOC	0	0	1	1
Fire	1	2	2	5
Hospital	0	0	0	0
Police	1	0	1	2
School	4	7	4	15
Total	6	9	8	23

# III.3.5 STORM SURGE: DEBRIS GENERATED, SHELTER, ECONOMIC LOSS

Municipality	Debris (tons)	Shelter (persons)	Economic (millions)	
Bridgeport	19,702	1,833	\$1,556.78	
Fairfield	731,738	517	\$1,495.61	
Stratford	626,315	646	\$1,402.04	
Total	1,377,755	2,996	\$4,454.43	

HAZUS MH 6.0, Superstorm Sandy modeled surge

facilities would experience moderate damage, with schools making up the majority of damaged facilities.

- Over 1.3 million tons of debris would be generated.
- Almost 3,000 people would be in need of shelter.
- Over \$4.5 billion in total economic losses.

Findings are in Tables III.3.3-III.3.5. Detailed Analyses are in Appendix H.

#### Loss Estimates - Wind

Wind damage from tropical cyclones affects the entire Region. To quantify the impact of these storms the HAZUS-MH 6.0 Hurricane Model was utilized. HAZUS-MH does not estimate damage based on hurricane category but rather runs a probabilistic analysis similar to terminology associated with flooding. For hurricanes, probabilistic scenarios of 10, 20, 50, 100, 200, 500, and 1000 year wind events were separately modeled for each municipality.

**Building Damage:** The default building stock from HAZUS-MH was used for all the HAZUS-MH analyses in this report. According to this database there are an estimated 93,724 buildings in the Region. Bridgeport has the most buildings with an estimated 30,126.

HAZUS-MH uses a hazard-load-resistance-damage-loss methodology to produce loss estimations. Using wind models along with damage probabilities, expected building losses were estimated. The descriptions of damage can be found in Table III.3.6.

In the Region, very few buildings (15 buildings in Fairfield or Stratford) experienced minor damage in a 10-year event. A single severely damaged building (Bridgeport) was estimated for a 20-year event, 13 in a 50-year event, and 84 in a 100-year event. The coastal communities had the highest number, as well as the highest percentage of buildings damaged.

III.3.6 Damage Description from Hazus-MH Hurricane Model Technical Manual										
Damage State	Qualitiative Damage Description	Roof Cover Failure	Window Door Failure	Roof Deck	Missile Impacts on Walls	Roof Structure Failure	Wall Structure Failure			
0	No Damage or Very Minor Damage: Little or no visible damage from the outside. No broken windows or failed roof deck. Minimal loss of roof cover with no or very limited water penetration.	< 2%	No	No	No	No	No			
1	Minor Damage: Maximum of one broken window, door, or garage door. Moderate roof cover loss that can be covered to prevent additional water entering the building. Marks or dents on walls requiring painting or patching for repair.	>2% and <15%	One window, door, or garage door failure	No	<5 Impacts	No	No			
2	Moderate Damage: Major roof cover damage, moderate windown breakage. Minor roof sheathing failure. Some resulting damage to the interior of the building from water.	>15% and <50%	> One and < the larger of 20% & 3	1 to 3 panels	Typically 5 to 10 impacts	No	No			
3	Severe Damage: Major window damage or roof sheathing loss. Major roof cover loss. Extensive damage to the interior from water.	> 50%	> the larger of 20% & 3 and <50%	> 3 and <25%	Typically 10 to 20 impacts	No	No			
4	<b>Destruction:</b> Complete roof failure and/or failure of wall framing. Loss of more than 50% of roof sheathing.	Typically > 50%	> 50%	> 25%	Typically >20 impacts	Yes	Yes			

Table III.3.7 aggregates the data for a regional projection. Town specific projections can be

137 HURRICANE NUMBER OF BUILDINGS DAMAGED

111.5./	Пυ	RRIC	ANE,	NUM	IBER C	)F	DUI	LDING	5 L	JAMA	AGED	
Return Period	Mir	nor	Mode	erate	Seve	re	De	struct	on		otal maged	
HAZUS MH 4.2 Hurricane Model (2019 Plan)												
10-yr	0	)	0		0			Ο			0	
20-yr	76	6	3		0			О		79		
50-yr	36	0	23	3	2			Ο		385		
100-yr	2,1	19	19	2	9			О		2	2,320	
200-yr	6,5	17	79	5	37			6		-	7,355	
500-yr	16,4	180	3,3	33	243			92		2	0,148	
1,000-yr	23,4	158	6,4	29	702			286		3	0,875	
HAZUS	MH 6	5.0 F	Hurrica	ane M	Iodel (d	cur	rent	versi	on)			
10-yr	15	5	0		0			0		15		
20-yr	16	4	8		1			О			173	
50-yr	2,5	10	23	9	13			О		2,762		
100-yr	8,6	70	1,2	43	84			14		10,011		
200-yr	16,6	669	3,5	54	335			94	94		20,652	
500-yr	26,1	105	8,4	65	1,314	1		448		36,332		
1,000-yr	30,6	598	12,7	42	2,745	5		1,014		47,199		
111.3.8	III.3.8 Hurricane, Count of Moderately Damaged											
ESSENT	ial F	AC	ILITIES	5								
		10-	20-	50-	100-	20	00-	500-	1,0	000-	Total	
Туре		yr	yr	yr	yr		yr	yr	,	yr	Stock	
HAZUS	MH 4	.2 F	Iurrica	ne M	lodel (2	201	9 Pl	an)				
EOC		0	0	0	0		0	0		0	2	
Fire		0	0	0	0		0	0	0		16	
Hospital		0	0	0	0		0	0	0		3	
Police		0	0	0	0		0	0	0		16	
School		0	0	0	0		0	72		06	130	
HAZUS MH 6.0 Hurricane Model (current version)												
EOC		0	0	0	0		0	0		0	6	
Fire		0	0	0	0		0	0		0	33	
Hospital		0	0	0	0		0	0		2	2	
Police		0	0	0	0		0	0		0	12	
School		Ο	0	0	0		2	12	:	35	122	

found in Appendix H. The numbers of buildings damaged by wind in the region is greater in the

current version of HAZUS-MH than was estimated under the previous version in 2019. Based on the current HAZUS estimate, 239 buildings are at least moderately damaged in a 50-year event but that number increases to over 12,742 buildings at least moderately damaged in a 1000-year event with 1,014 buildings being completely destroyed.

Essential Facilities Damage: The essential facilities in the region were provided in the HAZUS- MH default dataset. Loss of use refers to the inability of the essential facility to provide its normal function to the community. After hurricanes this is normally due to loss of electricity. Town-specific results can be found in Appendix H. Results showed that schools were the only facilities that experienced loss of use, with 2 schools being closed for more than one day for a 200-year event, 12 for a 500-year event and 35 for a 1000-year event. Table III.3.8 summarizes the number of essential facilities moderately damaged for each wind event.

Debris Generated: HAZUS-MH generated estimates for the amount of debris generated from wind damage. Table III.3.9 provides the total debris generated for the various probabilistic events. The current HAZUS-MH model estimates more debris will be generated than the previous model. Bridgeport had the most debris generated in each hurricane scenario. The Region was projected to have 74,916 tons of debris in a 100-year event and 384,120 tons in a 1000-year event.

III.3.9 Hurricane, Debris Generated in Tons									
Return Period	Bridgeport	Easton	Fairfield	Monroe	Stratford	Trumbull	Total		
HAZUS MH 4.2 Hurricane Model (2019 Plan)									
10-yr	0	0	0	0	О	0	0		
20-yr	16	7	71	3	172	10	279		
50-yr	2,931	287	1,481	462	1,777	304	7,242		
100-yr	12,391	1,186	6,053	1,488	6,876	3,169	31,163		
200-yr	28,497	10,210	16,284	9,752	13,917	9,297	87,957		
500-yr	62,556	14,646	34,440	15,111	30,347	17,157	174,257		
1,000-yr	94,461	24,295	50,772	23,555	43,347	28,511	264,941		
HAZUS MH 6.0 H	Hurricane Mod	del (current v	ersion)						
10-yr	0	0	0	0	0	0	0		
20-yr	966	18	364	38	297	72	1,755		
50-yr	12,594	1,011	6,853	1,762	5,197	3,261	30,678		
100-yr	32,606	2,248	16,039	4,333	12,666	7,024	74,916		
200-yr	59,558	3,405	29,855	6,764	24,169	11,585	135,336		
500-yr	104,708	7,150	61,461	14,049	47,868	24,442	259,678		
1,000-yr	150,026	11,228	91,683	21,309	72,222	37,652	384,120		

III.3.10 Hurricane, Persons Seeking Short-Term Shelter									
Return Period	Bridgeport	Easton	Fairfield	Monroe	Stratford	Trumbull	Total		
HAZUS MH 4.2 Hurricane Model (2019 Plan)									
10-yr	0	0	0	0	0	0	0		
20-yr	0	0	0	0	0	0	О		
50-yr	0	0	0	0	0	0	О		
100-yr	1	0	0	0	0	0	1		
200-yr	47	0	0	0	1	1	49		
500-yr	381	0	2	0	15	6	404		
1,000-yr	953	0	16	0	66	9	1,044		
HAZUS MH 6.0 H	Iurricane Mo	del (current v	ersion)						
10-yr	0	0	0	0	0	0	О		
20-yr	0	0	0	0	0	0	О		
50-yr	0	0	0	0	0	0	О		
100-yr	27	0	0	0	5	1	33		
200-yr	158	0	10	0	19	2	189		
500-yr	825	0	77	2	144	10	1,058		
1,000-yr	2,113	2	252	10	351	33	2,761		

Shelter Needs: HAZUS-MH generated the number of households displaced due to damage and loss off electricity and water. Table III.3.10 provides the total number of individuals seeking temporary shelter. The number of people requiring shelter was typically less than displaced households. The current HAZUS-MH model estimates that more people will need shelter than the previous HAZUS-MH model. Bridgeport, expectably due to its high population, has the highest shelter needs. Overall, only 33 people in the region could require shelter in a 100-year event. However, 2,761 people could require shelter in a 1000-year event.

**Economic Loss:** Table III.3.11 summarizes the combined economic loss for each town. Again, these estimates are from wind damage only. The current HAZUS-MH model estimates greater damages overall for the region than the previous model. The combined economic loss for

the region from the 100-year wind event was estimated at \$609.5 million, while the combined economic loss from the 1000-year wind event was estimated at \$5.09 billion. The breakdown of economic loss in these categories can be found in Appendix H.

## **NOAA Damage Estimates**

For Fairfield County between 2018 and 2023, NOAA's National Centers for Environmental Information (NCEI) Storm Events Database identified one tropical storm, Hurricane Isaias in 2020, as causing direct property damages of \$9 million. This estimate is limited to the direct impacts of a tropical storm event and did not include indirect damages of a tropical storm, such as the damage from high winds and coastal flooding caused by Superstorm Sandy in October 2012 or the flash flooding that occurred in September 2021 due to the heavy rains brought by the remnants of Hurricane Ida.

III.3.11 Hurricane, Building-Related Economic Loss, in Thousands								
Return Period	Bridgeport	Easton	Fairfield	Monroe	Stratford	Trumbull	Total	
HAZUS MH 4.2 Hurricane Model (2019 Plan)								
10-yr	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
20-yr	\$82	\$23	\$386	\$101	\$208	\$95	\$894	
50-yr	\$16,122	\$613	\$13,294	\$1,789	\$9,689	\$3,924	\$45,432	
100-yr	\$69,590	\$2,661	\$42,148	\$6,855	\$33,266	\$15,061	\$169,581	
200-yr	\$172,900	\$6,061	\$89,460	\$15,759	\$72,827	\$33,328	\$390,334	
500-yr	\$454,157	\$14,852	\$234,741	\$36,201	\$210,106	\$82,588	\$1,032,645	
1,000-yr	\$802,611	\$26,858	\$410,133	\$63,784	\$400,688	\$157,021	\$1,861,095	
HAZUS MH 6.0 H	Hurricane Mod	del (current v	ersion)					
10-yr	\$0	\$0	\$79	\$0	\$35	\$0	\$114	
20-yr	\$7,540	\$625	\$7,051	\$1,193	\$3,829	\$2,310	\$22,547	
50-yr	\$84,481	\$6,256	\$59,929	\$11,514	\$36,040	\$22,742	\$220,961	
100-yr	\$256,742	\$14,583	\$152,312	\$27,530	\$105,280	\$53,050	\$609,497	
200-yr	\$567,840	\$27,311	\$334,423	\$53,443	\$252,039	\$105,362	\$1,340,417	
500-yr	\$1,239,703	\$58,984	\$792,915	\$116,061	\$629,162	\$237,723	\$3,074,548	
1,000-yr	\$2,047,268	\$97,364	\$1,317,266	\$190,599	\$1,044,320	\$397,762	\$5,094,580	

More recent tropical storm events as documented in the NCEI storms database include:

August 4, 2020, Tropical Storm Isaias resulted in an estimated \$9 million in damages across Fairfield County. Trees and power lines were down across the state and MetroCOG region, gusts were reported upwards of 50 miles per hour, and the event resulted in one death in New Haven county.

July 9, 2021, Tropical Storm Elsa caused flooding and closures at multiple locations and intersections in Bridgeport including Chambers Street, Bishop and Connecticut Avenue, Lincoln Avenue and Arlington Street, Gregory and Columbia Street, East Washington and East Main Street, and Seaview Avenue at the Interstate-95 exit ramp. Johnson Drive in Fairfield was also reportedly closed due to flooding.

**September 1, 2021**, the remnants of Hurricane Ida resulted in approximately \$2,000 in damages when a large tree snapped in half in Monroe, and over \$5 million in heavy rain and flash flooding damages across Fairfield County.

### **FEMA** Assistance

For all events categorized as tropical storms between 2018 and 2023, FEMA provided

\$3.81 million in Public Assistance funds to the region's 6 municipalities: a total of \$3.25 million for Isaias and \$564k for Hurricane Ida. Since 2011 (there were no events in years 2003-2010) with Hurricane Irene, the region's municipalities, as well as fire districts,

housing authorities, other agencies, and nonprofits, received a total of \$18.7 million in PA funds. All municipalities received funds with Bridgeport, Fairfield and Stratford having received the largest amounts, between \$4.8 million and \$6.2 million. A municipal breakdown is provided in Table III.3.12.

Beginning with Hurricane Irene in 2011, \$6.4 million in FEMA Individual Assistance to homeowners was approved, which was based on a total of \$13 million in damages found during damage inspections. Most of this funding was for Irene and Sandy - \$5.4 million, versus \$943, 160 for the remnants of Hurricane Ida. Bridgeport and Fairfield received the highest amounts, between \$2.2 million and \$3.4 million (Table III.3.13). Individual Assistance to renters followed

III.3.13 FEMA, Approved Individual Assistance to Homeowners for Hurricanes, 2011-Present

	Sandy & Irene	Ida	Total	
Bridgeport	\$1,770,295	70,295 \$523,129		
Easton	\$33,734	\$6,561	\$40,294	
Fairfield	\$3,233,237	\$209,025	\$3,442,262	
Monroe	\$57,081	\$33,587	\$90,668	
Stratford	\$336,314	\$145,301	\$481,615	
Trumbull	\$34,556	\$25,558	\$60,114	
Total	\$5,465,217	\$943,160	\$6,408,377	

III.3.12 FEMA, Public Assistance for Hurricanes, 2011-Present

	Irene (2	2011) & Sandy	Isais & Ida		
Municipality	Municipal	Community	Total	(Municipal)	Total
Bridgeport	\$3,529,916	\$426,078	\$3,955,995	\$882,241	\$4,838,235
Easton	\$179,468	\$18,835	\$198,303	\$191,713	\$390,016
Fairfield	\$4,974,740	\$21,479	\$4,996,219	\$1,211,130	\$6,207,349
Monroe	\$285,190	\$43,392	\$328,582	\$210,110	\$538,692
Stratford	\$4,171,772	\$69,076	\$4,240,849	\$646,692	\$4,887,541
Trumbull	\$1,119,835	\$64,094	\$1,183,929	\$674,145	\$1,858,075
Total	\$14,260,922	\$642,955	\$14,903,876	\$3,816,031	\$18,719,908

Soutce: FEMA, Disaster Declarations

III.3.14 FEMA, Approved Individual Assistance to Renters for Hurricanes, 2011-Present

	Sandy & Irene	Ida	Total	
Bridgeport	\$412,807	\$121,692	\$534,499	
Easton	\$0	\$0	\$0	
Fairfield	\$573,480	\$5,829	\$579,309	
Monroe	\$9,748	\$0	\$9,748	
Stratford	\$40,493	\$9,761	\$50,254	
Trumbull \$14,625		\$0	\$14,625	
Total	\$1,051,153	\$137,282	\$1,188,435	

Soutce: FEMA, Disaster Declarations

a similar pattern, \$1.05 million approved for Sandy and Irene and \$137,282 for the remnants of Hurricane Ida. With the exception of Easton, all municipalities received IA funds for renters, with the most funds provided to Bridgeport and Fairfield (Table III.3.14). FEMA's National Risk Index for Expected Annual Losses due to Hurricanes, reinforces this pattern (Table 3.3.15).

### **CLIMATE CHANGE ASSESSMENT**

The State NHMP anticipates that the intensity of tropical storms and hurricanes is likely to increase due to climate change. Due to the overall unpredictability of hurricanes, the plan did not project a change in the location, frequency and duration of these events.

Given the emphasis on redevelopment and TOD in Bridgeport, Fairfield, and Stratford, it is likely new development will be exposed to a greater number of intense hurricanes. However, adherence to the State Building Code (continuously updated for wind speeds) will help reduce future losses. Additionally, temperature changes associated with climate change are likely to impact more rural communities, such as Monroe and Easton; which have longstanding agricultural ties and will need to plan for harsher growing conditions and potential impacts to crops.

## III.3.15 HURRICANES: ESTIMATED ANNUAL LOSS

Municipality	Annual Loss
Bridgeport	\$8,416,745
Easton	\$909,783
Fairfield	\$6,417,812
Monroe	\$1,636,594
Stratford	\$4,146,879
Trumbull	\$3,016,028

Soutce: FEMA, National Risk Index



# III.4 Hazard Profile: Flooding

## ASSESSMENT & GENERAL LOCATION

Periodic flooding of lands adjacent to rivers, streams and shorelines is a natural occurrence, but has significant potential to endanger life safety, damage property and disrupt the quality of life for many of the region's residents. There are several types of flooding, such as coastal, riverine, pluvial, and flash flooding, all which can be caused by several types of natural hazard events. The following provides a general overview of flooding and assesses the risks associated with coastal and inland (riverine/pluvial) flooding separately.

#### **EXTENT**

FEMA has adopted the 1% annual chance flood hazard as the base flood for flood plain management purposes. During any given year there is a 1% or .2% chance that a storm of sufficient precipitation will occur that will cause flooding that reaches or exceeds FEMA's base flood levels. The previous 100-year and 500-year flood

standards respectively align with the 1% and .2% chance percentages. Although still commonly in use, FEMA adopted the percentage standards to eliminate the idea that a 100-year flood will only occur once every hundred years, or a 500-year flood every 500-years. This plan primarily references the percentages, rather than the 100- and 500-year terms. In addition, the terms used by FEMA and related analytical tools such as HAZUS do not use the 1% and .02% chance flood hazards. This document defers to the terms used by the specific analytical tool.

Regulatory floodways regulate development to ensure that there are no increases in upstream flood elevations. For streams and other watercourses where FEMA has provided Base Flood Elevations, however the community is required to review floodplain development to ensure that increases in water surface elevations do not occur, or identify the need to adopt a floodway.

FEMA's Flood Insurance Rate Maps (FIRM) identify the areas with a 1% annual chance of flooding as Special Flood Hazard Areas (SFHA, various A or V Zones). The National Flood Insurance Program's (NFIP's) floodplain management

regulations must be enforced in the SFHA in participating NFIP communities, and the purchase of flood insurance is mandatory for a property with a federally backed mortgage. Moderate flood hazard areas are also shown on the FIRM; these are the areas between the limits of the base flood and the 0.2-percent-annual-chance flood (B or shaded X Zones). The areas of minimal flood hazard are the areas outside the SFHA and higher than the elevation of the 0.2-percent-annual-chance flood (C or unshaded X Zones). Coastal High Hazard Areas are further discussed in the Coastal Flooding Section.

Flooding can and has occurred outside of a delineated FEMA floodplain. Pluvial flooding can occur independent of an existing waterbody, and is typically a result of a short duration, heavy precipitation event. Urban areas are more at risk given the higher density of impervious surface coverage, however areas with poor or undersized drainage infrastructure can also be impacted.

#### INTENSITY

The intensity and severity of a flood is influenced by a variety of factors, including human factors such as population and level of development, and natural characteristics such as topography. Specific factors include:

**Flood depth:** The greater the depth of flooding, the higher the potential for significant damage.

Flood duration: The longer duration of time that floodwaters are in contact with building components (structural members, interior finishes, and mechanical equipment) the greater the potential for damage. Seawater can be especially harmful due to the corrosive nature of high salinity levels.

**Velocity:** Flowing water exerts force on the structural members of a building, increasing the

likelihood of significant damage.

**Elevation:** The lowest possible point where floodwaters may enter a structure is the most significant factor contributing to its vulnerability to damage due to flooding.

## **Impacts**

Flooding can directly impact human safety and health including the potential loss of life, injury, and health impacts. Socially vulnerable populations, such as persons with mobility impairments or those without access to personal vehicles may have limited resources to respond to an imminent threat (i.e., flash flooding) or adapt to gradual changes, such as sea level rise.

Flooding impacts critical facilities, infrastructure, natural resources, and public health. Critical facilities such as hospitals may lose power and operate on backup generators during and after a flooding event. Bridges and roadways could become compromised and result in the temporary closure of transportation routes. Water damage, debris blockage and an overwhelmed stormwater system are also potential consequences of flooding. Certain types of construction are more resistant to the effects of floodwater than others. Masonry buildings are typically the most resistant to flood damage because they can be in contact with limited depths of water without sustaining significant damage. Wood frame structures are more susceptible and may develop mold or wood rot which could impact structural stability. Compromised drinking water (and infrastructure), threatened wastewater treatment and sewage systems, and reduced hydraulic capacities could impact public health. Exposure to toxins and disease can occur due to mold growth in damp areas, failing septic/sewer systems, and mosquito population growth in the ideal breeding ground that flooded areas provide. Erosion could cause further impacts to structures and natural resources.

The habitats of both salt and freshwater resources can also be impacted by flooding, including rare habitat types, critical species dependent on select habitats, and the increased susceptibility of habitats to other on-going threats. Increased inundation of tidal marshes could expand coastal marshes into freshwater systems. Inundated agricultural fields can cause damage or the destruction of crops. Shellfish beds and shellfish production could also be impacted. Standing floodwater is often contaminated and could cause infection, disease, and injury, to people, wildlife, and natural resources.

### **FUTURE PROBABILITY**

The Connecticut 2023 Natural Hazard Mitigation Plan (draft) anticipates that multiple flood events can be expected to occur throughout the state annually – and that Fairfield and New Haven counties have the highest number of annualized flood events. NOAA's NCEI data on past flood events suggests that approximately 6.5 flood events could occur annually in Fairfield County (all floods). FEMA's National Risk Index data for riverine and coastal flooding is discussed in their relevant sections.

As discussed in the beginning of this chapter, the Connecticut Governor's Council of Climate Change projects that sea level rise and extreme precipitation events will increase due to climate change, which will cause greater impacts due to inland and coastal flooding.

#### LOSS ESTIMATES

## National Flood Insurance Program (NFIP)

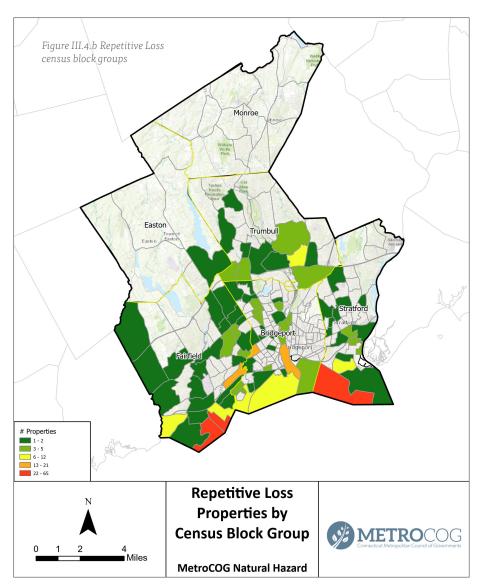
All communities in the MetroCOG Region participate in the NFIP. Flooding annualized loss estimates were developed based on NFIP damage data from 1978 to 2023, a 45-year period. Fairfield has had the most closed paid losses, a total of \$56.5 million, or \$1.25 million yearly on average (Table III.4.1).

## **Repetitive Loss Properties**

Properties that experience damage from recurring flooding (both coastal and inland) and have made multiple claims under the NFIP are referred to as "repetitive loss" properties. Due to the multiple claims under the NFIP, these properties are considered costly to insure and a strain on FEMA resources. FEMA offers grant programs to assist communities and states in implementing actions that reduce or eliminate the long-term risk of flood damage to focus on repetitive loss proper-

III.4.1 National Flood Insurance Program (NFIP), Local Participation*								
	Bridgeport	Easton	Fairfield	Monroe	Stratford	Trumbull		
NFIP Entry Date	10/15/1980	9/30/1983	8/15/1978	4/17/1985	6/1/1978	12/4/1979		
Effective FIRM	7/8/2013	6/18/2010	7/8/2013	6/18/2010	7/8/2013	6/18/2010		
Policies in Force	1,134	19	1,676	23	1,148	109		
Total Premiums Paid	\$952,426	\$14,439	\$2,042,192	\$17,330	\$1,119,268	\$101,138		
Insurance in Force	\$245,232,000	\$5,652,000	\$474,384,000	\$7,352,000	\$295,632,000	\$30,325,000		
Closed Paid Losses	925	18	2,480	9	813	186		
Amount of Closed Paid Losses	\$15,134,919	\$190,176	\$56,568,672	\$41,251	\$11,793,565	\$1,100,475		
Annual Loss Estimate	\$336,332	\$4,226	\$1,257,082	\$917	\$262,079	\$24,455		

Source: CTDEEP; \* as of December 2, 2023.



ties. The primary objective of these programs is to eliminate or reduce the damage to residential property caused by repeated flooding. Funds are provided to implement various mitigation measures that will reduce future flooding losses.

A Repetitive Loss (RL) property is defined as a residential property that is covered under an NFIP flood insurance policy and meets one of the following criteria:

 Has incurred flood-related damage on two occasions, in which the cost of the repair, on average, equaled or exceeded 25% of the market value of the structure at the time of each such flood event; 2. At the time of the second incidence of flood-related damage, the contract for flood insurance contained increased cost of compliance coverage.

A Severe Repetitive Loss (RL) property is defined as any NFIP-insured single-family or multi-family residential building:

- 1. That has incurred flood-related damage for which four or more separate claims payments have been made, with the amount of each claim (including building and contents payments) exceeding \$5,000, and with the cumulative amount of such claims payments exceeding \$20,000; or
- 2. For which at least two separate claims payments (building payments only) have been made under such coverage, with the cumulative amount of such claims exceeding the market value of the building.

The term "SRL property" refers to an SRL building, the contents within an SRL building, or both. In both instances, at least two of the claims must be within 10 years of each other. In determining SRL status, FEMA considers the loss history since 1978, or from the building's construction if it was built after 1978, regardless of changes in ownership.

If a property is not insured against flood losses or is insured but the owner does not submit a claim, then the property cannot appear on the RL list. Therefore, the RL list is not an absolute reflection of flood risk in a community. Nevertheless, the list can provide a starting point for evaluating flood risk, and it could indicate flooding may

Figure III.4.c Vulnerability Index

Source: Resilient CT

## Vulnerability



#### **Exposure**

The degree of the stress that a certain asset is going through with climate vulnerability. This includes changes such as the magnitude and frequency of extreme events.



#### Sensitivity

The degree to which a built, natural, or human system will be impacted by changes in climate conditions.



## **Adaptive Capacity**

The ability of a system to adjust to changes, manage damages, take advantage of opportunities, or cope with consequences.

## III.4.2 REPETITIVE LOSS (RL) & SEVERE REPETITIVE LOSS (SRL) PROPERTIES

		(SILE) TROTE		
	Total RL	Residential	Non- Residential	SRL
2019				
Bridgeport	95	84	11	О
Easton	1	1	0	0
Fairfield	209	201	8	9
Monroe	0	0	0	0
Stratford	76	66	10	4
Trumbull	26	25	1	1
Total	407	377	30	14
2024				
Bridgeport	108	91	17	9
Easton	1	1	0	0
Fairfield	172	162	10	19
Monroe	0	0	0	0
Stratford	74	63	11	9
Trumbull	27	26	1	4
Total	382	343	39	41

Soutce: FEMA

be a problem in a specific area even when not obvious upon a cursory review. See Table III.4.2 for a regional summary and Figure III.4.b for a census block group map.

#### CLIMATE CHANGE ASSESSMENT

## Resilient CT, Climate Change Vulnerability Index (CCVI)

Through CIRCA's Resilient CT Program, a vulnerability assessment was conducted to understand regional climate change vulnerabilities.

The Climate Change Vulnerability Index (CCVI) combines social, ecological, and built sensitivities with climate and physical exposures while adjusting for adaptive capacities to characterize vulnerabilities on local and regional scales. Vulnerability was determined through the process indicated in Figure III.4.c.

The highest flood vulnerabilities are found along the region's shoreline and major rivers, as well as urbanized areas of the three coastal municipalities (due to stormwater drainage issues that cause pooling and ponding). Higher social vulnerability factors in Bridgeport and Strat-

ford increase overall vulnerability to flooding. Flood vulnerabilities in the three northern communities of Easton, Trumbull, and Monroe are primarily aligned with watercourses. See Table III 4 3

## III.4.3 CLIMATE CHANGE VULNERABILITY INDEX

	Adaptive Capacity (1-4.8)	Exposure (1-4.5)	Sensitivity (1-3.7)	Flood Vulnerability (0-1)
Bridgeport	2.378	2.197	2.463	0.308
Easton	3.406	1.368	1.752	0.055
Fairfield	3.565	1.720	1.693	0.077
Monroe	3.181	1.437	1.696	0.065
Stratford	2.972	2.161	1.993	0.174
Trumbull	3.464	1.466	1.814	0.066

Soutce: CIRCA, Resilient CT

## III.4.i COASTAL FLOODING

## Assessment & General Location

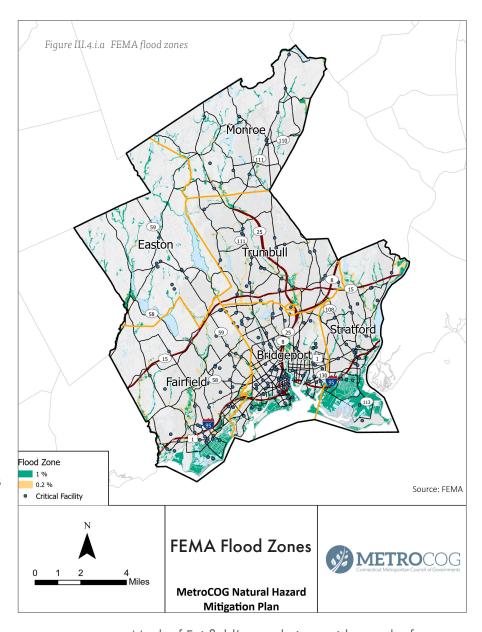
Coastal flooding is a natural hazard that threatens the coastlines of Bridgeport, Fairfield, and Stratford. Much like inland flooding, coastal flooding represents a common naturally occurring event that threatens safety, causes damage to property, and reduces residents' quality of life.

### **Locations**

The three MetroCOG coastal communities, Bridgeport, Fairfield, and Stratford, are most at risk of coastal flooding, with the three inland communities lacking tidally influenced waterways. The shorelines of each community vary in land use, development density, and natural resources.

Bridgeport Harbor is one of three deep water harbors in Connecticut. The harbor is fed by three main tributaries, the largest being the

Pequonnock River, followed by the Yellow Mill Channel, and Johnson's Creek/Lewis Gut. The Harbor area includes the United Illuminating plant and a City-owned marina. Many residential neighborhoods lay near the harbor's edge as well as two marinas along the banks of Johnson's Creek. The Steele Point redevelopment is protected by bulkheads, but the current base flood can exceed the elevation of the tops of the bulkheads. The Steele Point redevelopment effort is continuing and is expected to extend into the 2030s.



Much of Fairfield's population resides south of the Interstate 95 corridor. The neighborhoods in the vicinity of Fairfield Beach and Pine Creek are largely residential and there are concerns for public safety and possible damage due to coastal flooding.

A significant portion of the population of Stratford lives along the shoreline. In addition to the immediate shoreline along Long Island Sound, the threat of coastal flooding exists for residents that reside throughout the South End and along the lower reaches of the Housatonic River. In 2010, cottages located on Long Beach, a barrier beach connecting Stratford with Pleasure Beach in Bridgeport, were removed and the area converted to permanent open space.

## Intensity

The draft State Natural Hazard Mitigation Plan (NHMP, 2023) identified three types of coastal flooding causes: storm surge, nuisance flooding, and sea level rise. The source of the flood may impact its intensity.

**Storm surge:** Abnormal rise of seawater that is above the predicted astronomical tides and is generated by a storm's winds pushing water toward land. Storm surge can cause minor to major impacts to coastal infrastructure and buildings, including complete destruction. Storm surge is discussed in detail in Section III.3, Hurricanes and Tropical Storms.

Nuisance flooding: Temporary minor inundation of low-lying coastal areas that happens during exceptionally high tides. Nuisance flooding (also referred to as sunny day or tidal flooding) can cause minor impacts to infrastructure and buildings. Once nuisance flooding reaches a level of moderate to major damage, it becomes classified as flooding from sea level rise.

**Sea level rise:** The permanent inundation of low-lying coastal areas as the increasing elevation of the oceans exceeds the land's elevation. Sea level rise can cause complete destruction of coastal communities over time as land is lost. It also worsens storm surge and nuisance flooding severity over time. SLR is discussed in greater detail in Section III.3.14.

#### Extent

Coastal flooding extent is measured with tide and or stream gages to determine the water's height above normal water levels. Topographical features (particularly elevation), ocean levels, astro-

nomical tide levels, and the storm surge height determine how far inland coastal flooding extends. The direct coastal flooding associated with tropical storms, hurricanes, and nor'easters can also migrate into tidal and estuarine stream systems.

The extent of coastal flooding depicted in III.3.7 is based on the FEMA flood zones relating to a 1% and a 0.2% storm event (see Section III.4). Areas designated as Coastal High Hazard Area (SFHA Zones V, V1-V30 and VE) are subject to stricter building requirements because of the higher risk of damage from strong waves. Wave heights are typically larger than 3 feet during the 1% annual chance flood in these zones. In comparison, coastal Zone A areas have wave heights of between 1.5 and 3 feet during the 1% annual chance flood. Municipal maps for coastal flooding with enhanced critical facilities can be found in Appendix A.

#### Historic Record

The FEMA Flood Insurance Study (FIS) identifies the coastal storm events that had the most effect on Fairfield, Stratford and Bridgeport as occurring in 1815, 1938, 1944, 1954, 1955, 1960, 2011 (Tropical Storm Irene), and 2012 (Superstorm Sandy). The major unnamed hurricane of September 21, 1938, was estimated to cause over 500 deaths across Long Island and Southern New England (NWS). Details of this event and other Hurricanes and Tropical Storms can be found in Section III.3. Coastal flood events from 1996-2023 (with the exception of Irene and Sandy) can be found in Table III.4.i.1.

## **Recent Events & Impacts**

Flooding and winds associated with hurricanes and storm events have caused extensive shoreline erosion and related damage. These events have demonstrated that the extent of coastal flooding has exceeded the limits

indicated on FEMA mapping. Inundation of flood waters from both Tropical Storm Irene and Superstorm Sandy extended farther inland than expected. The following are descriptions and examples of recent major flooding events in the region. These examples are drawn from NOAA's NCEI Storm Events Database, as well as from discussions with municipal stakeholders. Although it has been well over a decade since Tropical Storm Irene and Superstorm Sandy occurred, these two events resulted in the most severe coastal flooding in recent memory and are therefore highlighted in this section.

- Tropical Storm Irene, August 28, 2011:
  The large envelope of winds associated with Tropical Storm Irene pushed a 3- to 5-foot surge of water into Long Island Sound resulting in moderate to major coastal flooding, wave damage, and erosion. The storm surge resulted in damage or destruction of over 100 homes in East Haven, Milford, Westport, Fairfield, and Stratford. Heavy damage to public beaches and other public and private facilities also occurred. The NOS tidal gauge at Bridgeport, CT recorded a maximum water level of 12.07 ft. MLLW, well above the NWS moderate
- coastal flooding benchmark of 10.4 feet. These water levels caused widespread moderate to major inundation along the coast. In Bridgeport, water from Long Island Sound came up through Bridgeport Harbor and flooded the Bridgeport train station tracks. In Fairfield, the combination of fresh water and surge inundated multiple sections of White Street with a few feet of water causing its closure. In addition, water inundation was experienced 1/2 mile inland on Fairfield Beach Rd past 1 Rod Highway.
- Superstorm Sandy, October 29, 2012:
   Superstorm Sandy produced a storm surge of 8-to-9 feet along much of western Long Island Sound, with its effects further exacerbated by its coincidence with the high tide.
   This produced up to two to five feet of inundation that spread several blocks inland in many places. In certain areas the inundation reached north of Interstate 95, including areas along the Pequonnock River in Bridgeport and along Ash Creek and the Mill River in Fairfield.
- April 16, 2018: The entrance ramp to Interstate 95 from Surf Avenue in Stratford was closed due to flooding.

III.4.i.1 Coastal Flooding, Previous Occurences				
Date	Intensity & Impacts			
March 19, 1996	Strong winds of 40 to 50 MPH pushed water inland producing tides two-to-four feet above normal and resulted in moderate flooding along much of western Connecticut's shoreline.			
October 19, 1996	Gale force winds (40 mph) across Long Island caused tides to exceed their astronomical means, and produced tide levels of 3 to 5 feet above normal. Waarying amounts of coastal flooding were reported along with varying degrees of beach erosion. In Stratford, roadways were covered with up to 3 feet of water leaving residents stranded. The Fairfield Beach area also experienced flooding. Sand was pulled from the beaches and deposited yards away in the basements and 1st floors of residential homes.			
March 13, 2010	A prolonged period of strong easterly winds resulted in tidal heights of 3 to five 5 feet above normal, with many locations reporting levels not seen in 20 years. The National Oceanic Service (NOS) tidal gauge in Bridgeport reported a maximum tide level of 10.4 feet, which produced moderate flooding and closed many roads close to the shoreline. Roads crews had to remove sand and debris.			
February 27, 2013	Strong onshore winds produced a 2 to 3 foot storm surge for much of southwest Connecticut, resulting in widespread minor to locally moderate flooding. The Birdseye Marina in Stratford experienced moderate inundation of up to three feet; similar flooding was experienced along the Housatonic River.			

• October and November 2018: Bridge-port, Fairfield, and Stratford were subject to many coastal flood watches and warnings during this period, with flooding reported during storms on October 27 and November 26. In Fairfield, vehicles such as passenger cars and a mail truck were lost to coastal flooding. In Stratford, the flooding associated with the November 26, 2018 storm approached the limits of flooding sustained during Tropical Storm Irene.

## • October 2019:

- October 11 th: Tropical Storm Melissa produced moderate coastal flooding along parts of the coast of Southwestern Connecticut in the morning hours.
- October 17th: Strong southerly winds in advance of an intensifying low pressure system contributed to moderate coastal flooding in Connecticut.
- October 27th and October 29th: An approaching storm initially produced moderate coastal flooding across parts of southwest CT on the 27th. After the storm passed, high pressure easterly winds also produced moderate coastal flooding on the 29th.January 2024: Back-to-back coastal storms on January 10 and January 13, 2024 that were accompanied by sustained onshore winds resulted in high tide elevations that exceeded the normal high tides. Coastal flooding exceeded NWS predictions and caused widespread inundation along the Connecticut shoreline. While the surge was about 3.5 feet (vertical) on January 10, the three-foot surge on January 13 ultimately resulted in higher water levels overall. Flooding occurred in Fairfield,

Bridgeport, and Stratford. According to Bridgeport's Emergency Management Director Scott Appleby, "Bridgeport experienced flooding throughout much of the East End, including along Seaview and Unions avenues, and in parts of Black Rock at Brewster Street, Canfield Avenue and Gilman Street, among other locations"

## **Future Probability**

FEMA's National Risk Index identifies Fairfield County as having a "relatively high" coastal flooding risk index compared with the rest of the United States. As discussed in the Sea Level Rise section, the Connecticut Institute for Resilience and Climate Adaptation (CIRCA) has established a "planning threshold" of a 0.5-meter (1.64 feet) rise in sea level expected by 2050.

## **Vulnerabilities & Risk Assessment**

Coastal flooding may result in direct flooding damage to property and infrastructure as well as result in coastal erosion that can cause additional areas becoming increasingly vulnerable to flooding over time. Based on FEMA's mapping products and other GIS data developed by MetroCOG, the exposure of parcels, buildings, historic resources, and critical facilities have been developed for the FEMA 1% and .02% coastal flood zones and can be found in Section Figure III.11.a. Exposure estimates due to storm surge, sea level rise, and coastal erosion are also provided in this section. Repetitive loss properties are discussed at the beginning of this section.

#### **HAZUS**

All damages were assessed using the same methodology described in Section Figure III.11.a.

**Building Damage:** Town specific damage can be found in Appendix H. Table III.4.i.2 summa-

rizes the damage for the Region. In general, the current HAZUS-MH results predict that significantly more buildings will be damaged by coastal flooding than the previous model. The model estimates that more than 1,200 buildings would be more than 50% damaged from a 1% annual chance coastal flood and over 2,300 buildings in a 0.2% annual chance coastal flood event.

Essential Facilities Damage: Town specific loss of use projections can be found in Appendix H. As apparent in Table III.4.i.3, essential facilities are impacted in every flood scenario. In general, the HAZUS-MH results show that more essential facilities are at risk of coastal flooding than the previous model. Schools were the most impacted by coastal flooding.

III.4.i.2	III.4.i.2 Coastal Flooding, Buildings by Damage Level						
Return Period	1%- 10%	11%- 20%	21%- 30%	31%- 40%	41%- 50%	>50%	Total
HAZUS	MH 4.2 F	lood Mod	el (2019 I	Plan)			
10-yr	91	152	51	2	0	7	303
25-yr	90	154	49	2	0	6	301
50-yr	201	493	197	57	9	42	999
100-yr	253	798	469	101	36	107	1,764
500-yr	132	1,071	979	458	168	291	3,099
HAZUS	MH 6.1 F	lood Mod	lel (curre	nt)			
10-yr	666	3,591	1,847	826	181	386	7,497
25-yr	666	3,591	1,847	826	181	386	7,497
50-yr	492	3,961	2,661	1,238	952	906	10,210
100-yr	435	3,806	3,213	1,377	1,146	1,211	11,188
500-yr	220	3,558	4,122	2,039	1,630	2,372	13,941

generated estimated debris from coastal flooding. The estimate was significantly larger than estimates due to inland flooding and hurricane wind, as well as when compared with the 2019 estimates. Table III.4.i.4 summarizes the debris generated from different flooding scenarios.

**Debris Generated:** HAZUS-MH

Shelter Needs: The number of people requiring shelter was a fraction of displaced households and can be found in Table III.4.i.5. In general, the current HAZUS-MH results predict a much greater sheltering need in the region from coastal flooding than the previous model results.

III.4.i.3 Coastal Flooding, Count of Moderately DAMAGED ESSENTIAL FACILITIES Type 10-yr | 25-yr | 50-yr | 100-yr | 500-yr **Total Stock** HAZUS MH 4.2 Flood Model (2019 Plan) **EOC**  $\cap$ Fire О Hospital Police School HAZUS MH 6.1 Flood Model (current) EOC Fire Hospital О Police School 

Economic Loss: Table III.4.i.6 summarizes the combined economic loss for each town. Overall, the current HAZUS-MH model predicts much greater economic loss due to coastal flooding than the previous model, with the greatest economic loss predicted for Bridgeport. The Region is projected to lose over \$22 billion in a 1% annual chance coastal flood event and over \$27 billion in a 0.2% annual chance coastal flood.

III.4.i.4 Coastal Flooding, Debris Generated, Tons							
Municipality	10-yr	25-yr	50-yr	100-yr	500-yr		
HAZUS MH 4.2 Flood Model (2019 Plan)							
Bridgeport	162	162	1,125	2,755	10,870		
Fairfield	2,848	2,820	16,361	38,033	102,259		
Stratford	976	976	4,729	10,112	33,377		
Total	3,986	3,958	22,215	50,900	146,506		
HAZUS MH 6.	1 Flood N	Model (cu	rrent)				
Bridgeport	53,648	53,648	108,412	156,237	344,232		
Fairfield	154,973	154,973	242,490	294,166	434,024		
Stratford	54,178	54,178	115,066	173,652	377,468		
Total	262,799	262,799	465,968	624,055	1,155,724		

TERM SHELTER						
Municipality	10-yr	25-yr	50-yr	100-yr	500-yr	
HAZUS MH 4.2 Flood Model (2019 Plan)						
Bridgeport	4	4	235	442	1,037	
Fairfield	169	165	347	403	458	
Stratford	60	60	339	493	664	
Total	233	229	921	1,338	2,159	
HAZUS MH 6.1	Flood Mo	del (currer	nt)			
Bridgeport	5,933	5,933	7,790	8,113	8,491	
Fairfield	452	452	502	510	522	
Stratford	583	583	620	638	657	
Total	6,968	6,968	8,912	9,261	9,670	

III.4.i.6 Coastal Flooding, Building-Related Economic Loss, in Thousands							
Municipality	10-yr	25-yr	50-yr	100-yr	500-yr		
HAZUS MH 4.2	2 Flood Mo	del (2019 F	Plan)				
Bridgeport	\$23.0	\$23.0	\$142.0	\$340.7	\$896.4		
Fairfield	\$148.6	\$143.3	\$423.0	\$661.7	\$1,092.6		
Stratford	\$91.7	\$91.7	\$427.0	\$635.1	\$957.6		
Total	\$263.3	\$258.0	\$992.0	\$1,637.5	\$2,946.6		
HAZUS MH 6.1	Flood Mo	del (currer	nt)				
Bridgeport	\$7,569.2	\$7,569.2	\$9,469.5	\$10,405.3	\$13,151.0		
Fairfield	\$3,960.2	\$3,960.2	\$5,053.9	\$5,449.1	\$6,417.5		
Stratford	\$4,578.4	\$4,578.4	\$6,548.1	\$6,304.0	\$7,453.6		
Total	\$16,107.7	\$16,107.7	\$21,071.5	\$22,158.3	\$27,022.1		

III.4.i.7 Coastal Flooding: Estimated Annual Loss						
Municipality	Annual Loss					
Bridgeport	\$536,422					
Fairfield	\$7,171,197					
Stratford	\$1,118,068					

Soutce: FEMA, National Risk Index

## Loss Estimates & FEMA Assistance

FEMA's National Risk Index for Expected Annual Losses due to Coastal Flooding totals to \$8.8 million for the region's coastal municipalities, with a breakdown in Table III.4.i.7. FEMA PA and IA funds for Tropical Storm Irene and Hurricane Sandy are discussed in Section III.3.

## **Climate Change Assessment:**

The draft State NHMP anticipates that the frequency and intensity of flood events will increase due to climate change. As the temperature of ocean waters increases, stronger tropical storms will result in more frequent and severe coastal flooding, as well as more intense storm surge. Sea level rise could cause further increases in frequency, intensity, and duration. NOAA's State Climate Summary (2022) for Connecticut anticipates an increase in both nuisance flood days and tidal flood days (days that exceed nuisance level flooding).

In summary, given the emphasis on specific types of redevelopment in and near coastal flood zones, adherence to the State Building Code and local flood damage prevention regulations will help control risks as properties are redeveloped.

#### III.4.ii INLAND FLOODING

### **Assessment & General Location**

Inland flooding is a well-documented, commonly occurring natural hazard that threatens many areas and neighborhoods throughout the Region. It has significant potential to damage property and disrupt the quality of life for many residents. An in-depth review and analysis of records and feedback from residents indicates that inland flooding affects communities throughout the Region with moderate to frequent regularity and varying degrees of intensity, dependent on the season, setting, and recent weather pattern. Inland flooding commonly results from excessive precipitation within a watershed for an extended period of time that causes rivers to swell or excessive precipitation in short duration that impacts a localized area. Inland flooding can also be caused by dam failure and ice jams, as well as exacerbated by wildfires that prevent soil from absorbing rainfall.

## Intensity

Flash flooding occurs when an extreme rainfall event creates a flood independent of an over-flowing water body. These floods can occur during a rapid rise of water throughout a watershed or in poorly drained urban areas that cannot absorb precipitation. Flash flooding is typically a result of an unusually large amount of rain and/or high velocity of water flow (especially in hilly areas) within a very short period of time. The National Weather Service (NWS) flash flood warnings fall into the following classes:

- Base: Flash flood impact is possible; commonly used.
- Considerable: Indicates imminent or ongoing flash flooding capable of unusual severity or impact; urgent action needed to protect lives and property; rarely used.

 Catastrophic: Imminent or occurring flash flooding that threatens life and catastrophic damage; floodwaters have risen or will rise to levels rarely if ever seen; extremely rare.

Surface water (pluvial) floods typically occur gradually and are due to overwhelmed urban drainage systems causing water to flow into streets and nearby structures. During the initial public engagement in developing this plan, many meeting attendees reported their experiences with pluvial flooding.

Riverine flooding occurs when streams, rivers, channels, and other waterbodies receive more rain or snowmelt from their watershed than their capacity can handle; or when a waterbody becomes blocked by an ice jam or debris. The NWS classifies riverine flooding as Minor, Moderate, or Major based on water height and impacts along the river. Minor river flooding means that low-lying areas adjacent to the stream or river, mainly rural areas, farmland. and secondary roadways near the river flood. Moderate flooding means water levels rise high enough to impact homes and businesses near the river resulting in some evacuations being necessary. Larger roads and highways may also be impacted. Major flooding means that extensive rural and/or urban flooding is expected. Neighborhoods may become isolated and major traffic routes may be flooded. Evacuation of numerous homes and businesses may be required.

#### Extent

As explained in the beginning of this section, FEMA has identified areas where during any given year there is a 1% or .2% chance that a storm of sufficient precipitation will occur that will cause flooding that reaches or exceeds FEMA's base flood levels (the 1% floodplain). The extent of inland flooding is depicted in Figure III.4.i.a and

is based on the flood zones relating to a 1% and a 0.2% storm event, as determined by FEMA.

Flooding, whether riverine, pluvial, or coastal represents the most common and costly natural hazard in Connecticut. The state typically experiences flooding in early spring due to snowmelt and heavy spring rains and then again in late summer to early autumn when tropical storms are most active. This pattern has been evident in the past with Tropical Storm Elsa in July 2021, the remnants of Hurricane Ida in September 2021, Storm Lee in 2023, and the unnamed storms of December 2023 and January 2024. However, severe thunderstorms are possible throughout the summer months and have the potential to produce substantial rainfall totals over short periods of time – such as the torrential rainfall and resulting flash floods that occurred on July 4th, 2023. In the winter, weather patterns can produce nor'easters that result in heavy rain and high winds.

### Locations

Floodways and floodplains are most vulnerable to flooding. Floodplains are lands along watercourses that are subject to periodic flooding; floodways are areas within floodplains that convey flood waters. Floodways are subject to water being carried through them at relatively high velocities and forces. Beyond the floodway lies the floodway fringe, an area that remains in the floodplain yet is out of the floodway. However, flooding can occur outside of those areas documented by FEMA mapping. In these instances, the higher rate of flooding is due to a combination of heavy rainfall with insufficient drainage (pluvial flooding).

**Bridgeport:** Bridgeport is a heavily developed urban environment and the waterways that exist within the city limits pose inland flooding con-

cerns. A large percentage of the city's watercourses have undergone large-scale channel modifications or have been buried, which has resulted in many unintentional constrictions that have the potential to create flooding issues during heavy precipitation events. Of particular concern are the channels of Island Brook and Ox Brook, along with several tributaries of the Yellow Mill River in the northeastern section of the City. Smaller, more localized areas also experience flooding, such as the Rooster River, Ash Creek, and Bruce Brook. Flooding is also typical along the banks of the Pequonnock River downstream of Bunnells Pond. The areas in Bridgeport at risk to inland flooding from 1% and 0.2% probability storms are depicted in FEMA FIRM maps, included in Appendix E.

Easton: Easton has the lowest population density in the region. Large lot zoning regulations and a significant portion of the town being preserved (as water company-owned lands) have reduced property damage from flooding. Although roadway flooding can be handled using barricades and warning signs to prevent loss of life, and alternate routes are available in almost every case, the Town has some problem areas. These include the Aspetuck River at Silver Hill Road and at Wells Hills Road, Morehouse Brook at Morehouse Road, Cricker Brook at Beers Road, and Cricker Brook at Morehouse Road. In addition, flooding occurs at the headwaters of Patterson Brook at Route 136 and Tatetuck Brook at Route 59. Flood risk areas in Easton, based on FEMA Firm data, are depicted on the map located in Appendix E.

**Fairfield:** The Town of Fairfield contains four primary drainage basins that flow primarily north to south. The system most susceptible to inland flooding is along the Mill River, which flows from the Easton Reservoir through the center of town.

Extensive flooding is caused by a 1% storm as well as from a more severe storm. Inland flooding is also a problem along the Rooster River and Ash Creek and their tributaries. To a lesser extent, inland flooding poses a threat during extreme weather events along Great Brook and Saco Brook.

Much of the property directly abutting the Mill River falls within the 1% flood contour, while a smaller portion falls within the 0.2% flood contour. These flooding concerns extend the length of river and remain a very real threat. With regards to the Rooster River and Ash Creek, flooding is more commonly caused by man-made constriction. A specific location is where the river passes under Interstate 95. The flow is controlled by a culvert system. During times of heavy precipitation, the culvert can be overwhelmed and flooding can occur in the neighborhood surrounding Royal Avenue and Camden Street. Homes in this neighborhood are in the floodplain, and a viaduct is the only way in and out. Further specific flooding concerns exist where Metro-North New Haven Line bridges cross the river. The bridges tend to have low vertical clearances and narrow horizontal spans. These features can act as a constriction point and cause flooding of up-river neighborhoods. Low-lying homes adjacent to London's Brook and downstream of the Fairchild Wheeler Golf Course are also prone to flooding. Great Brook can flood in the area of Merwins Lane. Flood risk areas in Fairfield are depicted on the FEMA Flood Zone map attached in Appendix E.

**Monroe:** The areas of Monroe which are most frequently subject to flooding are adjacent to the Pequonnock River, which consistently overflows its banks due to major storm events. Flooding also occurs in areas along the West Branch of the Pequonnock River and along the Farmill River.

Flooding occurs along the West Branch of the Pequonnock River in a variety of locations. The Aquarion Water Company operates several reservoirs throughout Fairfield County and owns extensive tracts of land around these reservoirs. A small impoundment is located along Route 25 about mid-way between Judd Road and Pepper Street. Water is diverted from the impoundment through a pipeline to Easton Reservoir. It lies only a few feet below the roadway elevation and flooding occurs during heavy rain events. Stop logs are in place at the dam that can be removed to allow for greater water flow, either before or during a severe weather event. While this measure is in place to help mitigate flooding, it does not remove the possibility of flood occurrences entirely. The impact felt by flooding in this area is limited to roadway closures, as there are no homes or businesses within the vicinity.

Another critical flooding area is where the West Branch crosses under Old Newtown Road. The river has a tendency to back up at the under sized culvert resulting in repetitive losses for many properties near Chuck's Corner. However, there are secondary roads that could be taken in the event of flooding to circumvent the blocked or impassable roadways.

In addition to the flooding associated with the Pequonnock River and the West Branch, many of its other tributaries experience flooding as well. The neighborhood bounded by Pastor's Walk and Wiltan Drive is subject to backyard flooding and drainage problems. A swale, or intermittent stream, flows parallel to the roads through the backyards. The swale was likely constructed when the neighborhood was developed. Additionally, a low-gradient stream under Bart Road and along Verna Road has virtually no gradient and is only a few feet below backyard elevations. During heavy precipitation events the po-

tential exists for the stream to overflow its banks and inundate the area. A very small diameter culvert at Bart Road may cause upstream flooding during high flows. The culvert under Cottage Street near Brookside Trail, on the Boys Halfway River, may be also under capacity. Flood risk areas in Monroe are depicted on the FEMA Flood Zone map attached in Appendix E.

**Stratford:** Inland flooding in Stratford occurs with moderate to frequent regularity. Areas that are most frequently reported flooded during rain events include Main Street at Stratford Center, Broadbridge Avenue, Terrill Road, Hamilton Avenue, Reed Street, Bunnell Avenue, and Parkwood Road.

Flooding can also occur in localized areas from storm drains backing up. Areas affected by this type of flooding include Albert Avenue and Albright Avenue. Several residents at these locations have reported repeated flooding, and one resident has had to file multiple flood insurance claims. Additional flooding is also experienced in the areas of Reed's Lane, St. Michael's Avenue, Tyrone Place, and West Avenue in the vicinity of Barnum Avenue. However, it appears that the problems in these areas are not widespread.

Properties along the Pumpkin Ground Brook also experience frequent flooding, especially around Cutspring Road and Chapel Street. Flooding impacts the Oronoque Village condominium complex, an over-55 community consisting of 929 homes spread across about 300 acres. The property is crossed by the Freeman Brook and a small unnamed brook, with both brooks having buried sections in the Village. During more severe rain events these streams tend to overflow and cause flooding, primarily in the FEMA designated flood zones. Property damage from these events has exceeded \$300,000 with the loss of

vehicles, furnaces, hot water heaters, and damage to basements/lower levels and garages.

The areas in Stratford where inland flooding typically occurs are depicted in FEMA Flood Zone map included in Appendix E.

Trumbull: Trumbull contains fewer water-courses than the other towns in the Region, but inland flooding remains a concern as the Town is traversed by the Pequonnock River, Horse Tavern Brook, and Island Brook. The most frequent flooding occurs along sections of Horse Tavern Brook, especially where it crosses under Chestnut Hill Road and Blackhouse Road. Severe flooding occurs from major rain events along sections of the Pequonnock River from Daniels Farm Road through the Twin Brooks Park area and the neighborhoods between the river and White Plains Road near the town line with Bridgeport.

Horse Tavern Brook flows through a fairly developed section of Trumbull in its southwestern corner. The brook and its tributaries cause moderate flooding during periods of heavy rain. A comprehensive flood control study has been completed for this area that addresses recurring flooding and recommends mitigation actions.

With regards to the Pequonnock River, the neighborhood along Manor Drive is especially susceptible to flooding. This section of town is in a low-lying flat area directly abutting the river. The houses in the area are very close to the river's elevation, which only increases their flood risk. Furthermore, the gradient of the floodplain along Route 127 causes flooding at the bend in the river. The flood risk areas in Trumbull are depicted in the FEMA Flood Zone map included in Appendix E.

III.4.ii.1 INLAND	Flooding, Previous Occurences
Date	Intensity & Impacts
April, 1980	A spring rainstorm caused severe flooding along all watercourses in Easton. Due to the frozen ground the heavy precipitation could not penetrate the surface and combined with snowmelt to create extensive flooding. Residents reported the Aspetuck River overflowed and flooded CT-136.
September 16, 1999	Torrential and record rainfall brought by Tropical Storm Floyd caused widespread urban, small stream, and river flooding. Serious widespread inland flooding throughout low elevation and poor drainage areas was prevalent, and resulted in the closure of numerous roads and flooded basements. Fairfield County was declared a disaster area.
April 21, 2000	A series of intense thunderstorms were accompanied by torrential rainfall that produced widespread flooding of small streams, brooks, rivers, and low-lying and poorly drained areas. Rainfall amounts ranged from around 2-to-4 inches. Significant and widespread ponding of water caused road flooding in Stratford.
August 11 & 12, 2000	From the east side of Bridgeport and through Stratford, torrential rain caused widespread, extreme flooding in low lying and poor drainage areas along area streams and rivers. The heavy rains were reported to fall in "sheets" at a rate estimated by the NWS of 3.5-to-4 inches per hour. Property damage from the event was extensive; 471 residents experienced flooding, and 24 reported first floor flooding.
August 21, 2004	Severe thunderstorms produced heavy rainfall and caused significant street flooding.
September 18, 2004	Remnants of Hurricane Ivan produced heavy rain, resulting in localized flash flooding of roadways.
June 29, 2005	Slow moving thunderstorms produced significant hourly rainfall rates of greater than two inches.
August 2, 2008	Severe thunderstorms with torrential downpours resulted in flash flooding. Many streets in the East End of Bridgeport were inundated, and properties damaged. Sections of Fairfield and Stratford experienced similar flooding.
August 7, 2008	Strong thunderstorms produced heavy rainfall, causing flash flooding across southwest CT. Stratford was hard hit; some of the worst flooding occurred on sections of Terrill Rd., where water levels were close to 2 feet. In Bridgeport, severe flooding occurred along East Main St. and Crescent Ave.
November 1, 2010	The remnants of Tropical Storm Nicole produced heavy rain and flooding. Sections of CT-25 in Monroe and roads in the vicinity of I-95 at Exit 33 in Stratford were closed due to flooding.
June 23, 2011	Several rounds of thunderstorms resulted in localized flash flooding. The intersection of State St. and Iranistan Ave. in Bridgeport was closed due to 3 feet of standing water.
June 7, 2013	In Bridgeport, the intersections of Iranistan Ave. State St., Fairfield Ave. Railroad Ave., Bishop Ave., River St., Savoy St., and Amsterdam Ave. were closed due to flooding. 4.6 inches of rainfall was reported at Sikorsky Airport.
July 14, 2014	A car was stuck in high water under an overpass at the intersection of Bishop St. and Connecticut Ave. in Bridgeport. In Fairfield, the Rooster River flooded nearby streets.
April 16, 2017	Fire departments responded to a water rescue call at the intersection of Barnum Ave. and Bishop Ave. in the Mill Hill area of Bridgeport.

### Historic Record

Since the early 1900s there have been eleven major flooding events to impact the state and particularly the MetroCOG region. These events occurred in March 1936, September 1938, August 1955, October 1955, June 1982, May and June 1984, October 2005, April 2007, August

2011, and September of 2012 on two separate occasions. The 1955 flood has been estimated to be a 0.2% flood event across Connecticut, with flood frequencies of greater than a one percent storm in southwestern Connecticut. The other storms had variable effects, depending on the location.

In Easton, the flood of October 1955 exceeded any prior recorded flood within the Town. Due to the minimal quantity of developed land along the stream, little is known of the exact severity of the flooding that took place during this storm. However, through resident reports, a general idea of the level of damage can be ascertained. According to Easton citizens, the 1955 flood washed out the bridges on Valley Road and Center Road which crossed the Aspetuck River, upstream of the Aspetuck Reservoir. The Mill River overtopped its banks, destroying public and private property. However, according to the Aquarion Water Company, none of the four water supply reservoirs (Easton, Aspetuck, Hemlock, or Saugatuck) were in danger of overtopping during the flood of October 1955.

Heavy rain events typically cause the Pequonnock River to overflow its banks and subject the Region to occasional flooding, with some being severe. Based on the FEMA Federal Insurance Study (FIS), the largest flood events occurred in July 1897, July 1905, March 1936, September 1938, December 1948, August 1955, October 1955, and April 2007.

In Monroe, the upper reaches of the Pequonnock River are subject to overtopping their banks with every major precipitation event. In March of 1936, two closely occurring storms combined with a considerable amount of snowmelt produced major flooding. The flood of October 1955 far exceeded any prior flood on record in Monroe. Certain low-lying areas directly adjacent to the Pequonnock River and the West Branch of the Pequonnock River experienced high levels of devastation from that event.

Due to Trumbull's generally steep topography, waterways are subject to rapid rates of rise at high velocities. This geographical factor combines with the river system's relatively large drainage area to produce augmented flood levels. Major floods occurred in 1905, 1936, 1938, 1955, and 1972.

## **Recent Events & Impacts**

Major inland flooding events that occurred between 1980 and prior to 2018 can be found in Table III.4.ii.1 and have been compiled from the National Climatic Data Center, Storm Events Database, and from correspondence with municipal officials. Events from 2018 to present include:

**April 16, 2018:** The intersection of Bruce Avenue and Stratford Avenue and the intersection of King Street and Broadbridge Avenue in Stratford were impassable due to flooding.

July 17, 2018: A vehicle was trapped in floodwaters under the railroad overpass on West Broad Street between Knowlton Street and Linden Avenue in Stratford.

**September 25, 2018:** Rain developed ahead of an approaching warm front, resulting in rainfall amounts of four inches or more across southern Connecticut. A total of 7.32 inches of rain was recorded in Trumbull. Widespread flash flooding occurred throughout the region.

- Bridgeport: Flooding occurred along the Rooster River, Island Brook, and the Pequonnock River. A few homes flooded during the storm and foundation damage was reported. A total of 15 water rescues for people trapped in vehicles were performed by local emergency management personnel.
- Easton: Congress Street was flooded by the Mill River. Dogwood Drive was overtopped in two locations by Morehouse Brook and a tributary. Two homes were directly flooded and 50 water rescues were performed by emergency personnel.

- Fairfield: Flooding occurred along the Rooster River, Mill River, and other streams townwide, with bank erosion occurring in many areas. Numerous people were trapped in vehicles on Bennet Street and at the intersection of Brookside Drive and Samp Mortar Drive.
- Monroe: Flooding occurred along Hurds Brook at East Village Road west of Robin Road, on Route 25 in front of the Fire Department, and on Hattertown Road west of Knapp Street along tributaries to the Mill River.
- Stratford: Localized flooding occurred.

July 3rd, 2020: Widespread showers and thunderstorms brought heavy rainfalls, with Sikorsky Airport reporting 3.99 inches of rain. In Bridgeport, the Fire Department made water rescues from vehicles due to flooding on River Street and Central Avenue. Vehicles were stuck in high waters at the Third Street and Connecticut Avenue intersection and Jennings Avenue.

July 9, 2021 (Tropical Storm Elsa): Sikorsky Airport reported 4.09 inches of rain. Multiple roads were closed due to flooding in Bridgeport including the intersections of Bishop Avenue and Connecticut Avenue, Lincoln Avenue and Arlington Street, Gregory Street and Columbia Street, East Washington Street and East Main Street, and Seaview Avenue at the I-95 exit ramp. In Fairfield, Kings Highway East (Route 1) was closed in both directions at Chambers Street and Johnson Drive was closed due to flooding from Black Rock Turnpike to Fiske Street.

July 29, 2021: Scattered showers and thunderstorms resulted in isolated flash flooding, with 1.54 inches of rain reported in Bridgeport. Fern St. in Bridgeport was closed due to flooding.

**September 1, 2021** (Remnants of Hurricane Ida): Extremely heavy rainfall, with much of that

rain falling in just a few hours, resulted in widespread flash flooding and extensive river flooding. Sikorsky Airport recorded 5.59 inches of rain. Fairfield Police reported numerous flooded streets and road closures across town and multiple cars were stranded in flood waters on I-95 near Bridgeport with water above the car doors. NOAA's Storm Events Database estimated over \$5.1 million in damages in Fairfield County due to the heavy rainfall and flash flooding associated with Hurricane Ida's remnants.

**September 23, 2021:** Thunderstorms with heavy rain generally ranged from 1-3 inches with some locally higher amounts; most of the rainfall fell in a 1-to 2-hour period. In Trumbull, Whitney Avenue was reported closed to due flash flooding.

July 4, 2023: Thunderstorms produced torrential rainfall rates of 1-2 inches per hour, with some areas seeing 1-3 of rain over a 1-to 3-hour period and resulted in localized flash flooding. One road was closed due to high water in Trumbull. In Stratford, several Metro North Railroad underpasses were impassible and several roads were closed due to flooding. In Bridgeport, multiple cars stalled on roadways due to flooding including at the I-95 underpass at Fairfield Avenue due to flooding. In Black Rock, one home and one commercial building was flooded, and several roads were closed.

## **Future Probability**

Based on the review of historical records, severe rainstorms that result in moderate-to-severe inland flooding occur at fairly frequent rate.

FEMA's National Risk Index identifies Fairfield County as having a relatively moderate risk of riverine flooding (77.2). According to the discussion in the State Water Plan (2018), the Connecticut Physical Climate Science Assessment

Report (2019), and the Fifth National Climate Assessment, most modeled scenarios project a generally wetter future, with the largest precipitation increases projected for the winter and spring months. Summer and autumn months are projected to remain about the same in terms of both frequency and rainfall level, which is already significant. The models suggest that the region may be at risk of increased late fall, winter, and early spring flooding in the future due to climate change.

Vulnerabi	lities	&	Risk
Assessme	nt		

All types of inland flooding may result in direct flooding damage to properties and infrastructure. Based on FEMA's mapping products and other GIS data developed by MetroCOG, the exposure of parcels, buildings, historic resources, and critical facilities has been developed for the FEMA 1% and .02% flood zones and can be found in Section Figure III.11.a. Repetitive loss properties are discussed at the beginning of this section.

#### **HAZUS**

To quantify potential damages from inland flood events of specific magnitudes, a "Level 1" analysis was modeled using the HAZUS-MH version 6.0 flood model. Estimated damages generated by HAZUS-MH are presented herein in comparison to the results generated by HAZUS-MH (4.2) for the 2019 NHMP. Some of the results differ significantly than those estimated in 2019. It is believed that the differences are due to the updated methodology for estimating flood damages in version 4.2 as well as the updated base data used for the analysis.

III.4.ii.2 Inland Flooding, Buildings by Damage Level							
Return Period	1%- 10%	11%- 20%	21%- 30%	31%- 40%	41%- 50%	>50%	Total
HAZUS	MH 4.2 F	lood Mod	el (2019 I	Plan)			
10-yr	215	142	29	4	2	2	394
25-yr	239	165	36	4	2	2	448
50-yr	270	205	48	6	1	3	533
100-yr	397	280	60	11	4	3	755
500-yr	943	441	65	12	3	7	1,471
HAZUS	MH 6.0 I	lood Mod	del (curre	nt)			
10-yr	788	81	2	0	0	0	871
25-yr	954	139	7	0	0	0	1,100
50-yr	1,053	203	14	1	0	0	1,271
100-yr	1,101	233	18	1	0	0	1,353
500-yr	1,644	376	32	5	4	1	2,062

Building Damage: Building damage was based on a flood depth grid that was created by overlaying the flood depth by the DEM. This flood depth was then used with a depth-damage curve to estimate damage to buildings expressed as a percentage of the building damaged. With the current exception of the 500-year storm, HAZUS-MH results generally show that more buildings in the region are susceptible to damage than the previous model, but that the percentage of damage expected is lower than previously modeled. Table III.4.ii.2 shows the results for the region. Town specific data can be found in Appendix H.

III.4.ii.3 Inland Flooding, Count of Moderately Damaged Essential Facilities							
Туре	10-yr	25-yr	50-yr	100-yr	500-yr	Total Stock	
HAZUS M	IH 4.2 F	lood Mo	del (201	9 Plan)			
EOC	0	0	0	0	О	2	
Fire	0	0	0	О	О	16	
Hospital	0	0	0	0	О	3	
Police	1	1	1	1	1	16	
School	0	2	3	3	4	130	
HAZUS M	IH 6.1 F	lood Mo	del (cur	rent)			
EOC	0	0	0	0	0	6	
Fire	0	0	0	0	0	33	
Hospital	0	0	0	0	0	2	
Police	0	0	0	0	0	12	
School	1	1	2	3	7	120	

III.4.ii.4 Inland Flooding, Debris Generated, Tons								
Municipality	10-yr	25-yr	50-yr	100-yr	500-yr			
HAZUS MH 4.2 Flood Model (2019 Plan)								
Bridgeport	1,090	1,199	1,404	2,510	2,039			
Easton	291	433	549	839	960			
Fairfield	1,058	1,367	1,755	2,116	1,984			
Monroe	180	236	289	379	679			
Stratford	724	821	927	1,029	1,183			
Trumbull	1,244	1,425	1,628	1,769	2,880			
Total	4,587	5,481	6,552	8,642	9,725			
HAZUS MH 6.0	Flood M	odel (cur	rent)					
Bridgeport	319	429	562	636	801			
Easton	61	80	110	151	232			
Fairfield	455	694	937	1,093	1,483			
Monroe	54	83	111	144	262			
Stratford	184	228	311	359	1,105			
Trumbull	157	333	441	520	1,128			
Total	1,230	1,847	2,472	2,903	5,011			

## Essential Facilities Damage: Dam-

age, as well as loss of use estimates, were generated for all essential facilities. Damage was calculated in the same method as building damage. Loss of use estimates were calculated by assuming a default depth of flood to which the facility may close. This depth threshold for functionality is different for each essential facility type. Loss of use projections can be found in Table III.4.ii.3. Town specific results can be found in Appendix H. Very few essential facilities are affected by any inland flooding event. In Bridgeport, 2 schools would be impacted in the 500-year event. In Fairfield, 1 school would be impacted in the 500-year event. In Stratford, 1 school would be impacted during the 10- and 25-year events, 2 in the 50- and 100- year events and 3 in the 500-year event. In Trumbull, 1 school would be impacted in the 100- and 500-year events.

Debris Generated: HAZUS-MH generated estimates for the amount of debris generated from inland flooding. Overall debris estimates are in III.4.ii.4. The current HAZUS-MH results generally show that less debris is generated from inland flooding than the previous model. Fairfield had the most debris generated with 1,093 tons in a 1% event and 1,483 tons in a 0.2% event. Overall, the Region is projected to have 2,903 tons of debris in a 1% flood and 5,011 tons in a 0.2% flood.

Shelter Needs: Shelter needs were generated in HAZUS-MH by the number of households displaced due to the flood and potential evacuation. Displaced houses include not only areas in the

flood but near the flood in potential evacuation zones. The number of people requiring shelter was a fraction of those displaced households and can be found in Table III.4.ii.5. The current HAZUS-MH results generally show that more people will require shelter than the previous model.

Economic Loss: Economic loss was calculated from both direct property damage and business interruption. Table III.4.ii.6 summarizes the combined economic loss for each town. The current HAZUS-MH results predict more economic loss due to flood damage than the previous model. Bridgeport can expect the greatest losses of any MetroCOG municipality. Overall, the Region can expect \$811.4 million in loss from a 1% annual chance event and \$1.24 billion from a 0.2% annual chance event.

III.4.ii.5 Inland Flooding, Persons Seeking Short-								
Term Shelter								
Municipality	10-yr	25-yr	50-yr	100-yr	500-yr			
HAZUS MH 4.	2 Flood N	Iodel (20	19 Plan)					
Bridgeport	65	71	80	146	172			
Easton	О	О	О	О	О			
Fairfield	9	11	14	19	135			
Monroe	1	1	2	2	7			
Stratford	18	22	23	28	43			
Trumbull	6	8	8	12	16			
Total	99	113	127	207	373			
HAZUS MH 6.	o Flood l	Model (cu	rrent)					
Bridgeport	807	851	886	910	1,395			
Easton	4	5	8	9	11			
Fairfield	179	189	195	198	214			
Monroe	70	76	83	84	97			
Stratford	255	258	262	273	369			
Trumbull	64	76	77	78	99			
Total	1,379	1,455	1,511	1,552	2,185			

III.4.ii.6 Inland Flooding, Building-Related Economic Loss, in Thousands								
Municipality	10-yr	25-yr	50-yr	100-yr	500-yr			
HAZUS MH 4.2 Flood Model (2019 Plan)								
Bridgeport	\$96.6	\$106.3	\$118.1	\$171.9	\$173.3			
Easton	\$15.0	\$19.0	\$22.0	\$28.9	\$31.5			
Fairfield	\$67.8	\$77.3	\$99.9	\$125.7	\$269.2			
Monroe	\$25.7	\$31.5	\$39.0	\$50.2	\$61.1			
Stratford	\$67.3	\$81.2	\$92.3	\$106.2	\$129.9			
Trumbull	\$60.2	\$71.9	\$82.6	\$110.7	\$147.4			
Total	\$332.6	\$387.2	\$453.9	\$593.6	\$812.4			
HAZUS MH 6.	o Flood I	Model (cu	rrent)					
Bridgeport	\$193.1	\$224.7	\$286.8	\$302.3	\$375.3			
Easton	\$8.2	\$10.7	\$12.7	\$14.3	\$18.6			
Fairfield	\$102.7	\$129.8	\$153.8	\$167.3	\$203.9			
Monroe	\$50.2	\$65.8	\$76.9	\$87.7	\$128.9			
Stratford	\$82.6	\$91.8	\$107.6	\$117.4	\$327.2			
Trumbull	\$62.9	\$87.4	\$104.3	\$122.4	\$187.9			
Total	\$499.6	\$610.1	\$742.1	\$811.4	\$1,241.8			

III 4 ii 7 FFMA	PUBLIC	A SSISTANCE FOR	INLAND FLOODING	2007-PRESENT
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	Municipal				Total		
Municipality	1700*	1904**	Total	1700*	1904**	Total	(all)
Bridgeport	\$183,268	\$230,849	\$414,117	0	\$114,926	\$114,926	\$529,042
Easton	\$28,133	\$8,693	\$36,826	0	0	0	\$36,826
Fairfield	0	\$426,492	\$426,492	\$69,334	0	\$69,334	\$495,827
Monroe	\$40,816	0	\$40,816	0	0	0	\$40,816
Stratford	\$34,658	\$163,854	\$198,512	0	0	0	\$198,512
Trumbull	\$52,284	0	\$52,284	0	0	0	\$52,284
Total	\$339,158	\$829,889	\$1,169,047	\$69,334	\$114,926	\$184,260	\$1,353,307

<sup>\* 1700:</sup> 4/15/2007 to 4/27/2007, severe storms and flooding. \*\* 1904: 3/12/2010 to 5/17/2010, severe storms and flooding. Soutce: FEMA, Disaster Declarations, OpenFEMA, <a href="https://www.fema.gov/about/openfema/data-sets">https://www.fema.gov/about/openfema/data-sets</a>

III.4.ii.8 Individual Owner Assistance							
1700* 1904** Total							
Bridgeport	\$100,572	\$83,520	\$184,092				
Easton	\$22,145	\$5,254	\$27,399				
Fairfield	\$83,358 \$52,242		\$135,600				
Monroe	\$12,039	\$22,080	\$34,119				
Stratford	\$45,900	\$24,134	\$70,034				
Trumbull	\$62,492	\$38,839	\$101,330				
Total \$326,505 \$226,070 \$55:							

III.4.ii.9 Individual Renter Assistance						
	1700*	1904**	Total			
Bridgeport	\$3,922	\$56,423	\$60,345			
Stratford	\$1,274	0	\$1,274			
Trumbull	0	\$565	\$565			
Total	\$5,196	\$56,988	\$62,184			

III 4 ii 10 RIVERINE FLOODING: ESTIMATED

Annual Loss				
Municipality	Annual Loss			
Bridgeport	\$228,895			
Easton	\$3,669			
Fairfield	\$208,789			
Monroe	\$7,637			
Stratford	\$246,244			
Trumbull	\$20,092			

Soutce: FEMA, National Risk Index

## NOAA Damage Estimates, FEMA Assistance, & Loss Estimates

For Fairfield County between 2018 and 2023, NOAA's Storm Events Database identified one flash flood event as causing direct property damage. \$5.1 million in damages were estimated due to the remnants of Hurricane Ida in 2021 (countywide). Although FEMA's disaster assistance database classified this event as a tropical storm, flash floods were the main impact – as detailed in Section III.3 (hurricanes/tropical storms): \$564k was provided to the region's municipalities in Public Assistance funding, \$943,160 in Individual Assistance to owners and \$137,282 in IA to renters.

Prior to 2018, Public Assistance and Individual Assistance funds were provided for two severe storm events in which flooding (both coastal and inland) were the primary impacts in the region. As non-coastal municipalities also received funding in both events, the 2007 and 2010 events have been included in this section as Tables III.4.ii.7 to III.4.ii.9.

FEMA's National Risk Index for Expected Annual Losses due to Riverine Flooding totals to \$715,327 for the region's municipalities, with a breakdown in Table III.4.ii.10.

## **Climate Change Assessment**

The draft State NHMP anticipates that the frequency and intensity of flood events will increase due to climate change, an assumption that NOAA's State Climate Summary for Connecticut (2022) supports. This report projects an increase in annual average precipitation, with increases most likely occurring in spring and winter. These more intense rainfall events are likely to increase the likelihood of flooding, with urban areas being particularly vulnerable. Further, the draft State Plan notes that as winters become warmer, increased precipitation will likely take the form of rain or freezing rain (rather than snow), which could further exacerbate inland flooding. NOAA's Climate Mapping for Resilience and Adaptation projects an increase in average annual precipitation under both the lower emissions and higher emissions scenarios.

In summary, adherence to the State Building Code and local flood damage prevention regulations will help control risks as properties are redeveloped associated with increased flooding events.

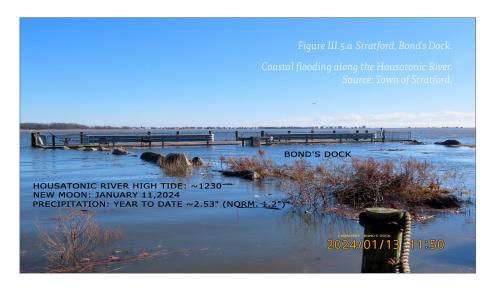
## III.5 Hazard Profile: Sea Level Rise

## ASSESSMENT & GENERAL LOCATION

Sea level rise is a constant and ongoing occurrence that has the potential to impact all low-lying shoreline areas.

Global sea level rise is the result of thermal expansion of seawater and the melting of land-based ice sheets and glaciers. The Intergovernmental Panel on Climate Change's (IPCC) AR6 Synthesis Report: Climate Change 2023 estimated that the global mean sea level rose by 17 centimeters (~6.7 inches) in the 20th Century. The IPCC reported an observed rate increase of 1.9 millimeters/year (~0.074 inches) between 1971 and 2006, while the rate almost doubled from 2006 to 2018 to an average yearly rise of 3.7 millimeters (~0.14 inches).

Local sea level changes, which is of more direct concern to coastal communities, is caused by a combination of global sea level rise, changes in local and global ocean currents, and changes in land elevation. Weakening Atlantic currents and local land subsidence accelerate the rate of sea level rise occurring in Long Island Sound. Coastal communities experiencing increases in mean sea level are at greater risk to the effects of coastal flood hazards as natural, protective buffers such as coastal wetlands and dunes are lost. The loss of these protective barriers means that coastal properties and infrastructure alike become more frequently and severely exposed to coastal flooding and storm surge inundation.

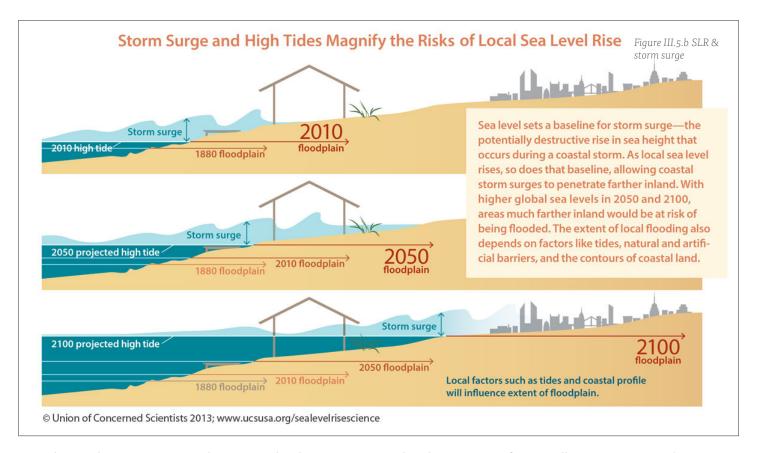


As sea level rises, tidal marshes and barrier islands will be the first areas to experience dam age. Within the MetroCOG Region, the three coastal communities of Bridgeport, Fairfield and Stratford, will be highly susceptible to damage from sea level rise. These municipalities have a coastline that extends about 15.5 miles and contain many tidal marshes, inlets, embayments, rivers, and creeks, all of which will be affected by sea level rise. Rising sea level can increase shoreline, beach, and dune erosion and consequently increase damage from coastal storms.

### HISTORICAL RECORD

Sea levels have been constantly rising since the end of the last ice age. However, it is only in the last 20 years that this change has begun to increase at a more rapid rate, and its threat to human coastal communities realized. Along the Atlantic Coast, it is estimated that by the end of the century sea levels could rise anywhere from 20-to-40 inches, with higher amounts possible depending on the impact of melting polar ice (2022 Sea Level Rise Technical Report, NOAA).

Connecticut is experiencing a relative sea level rise greater than that of the rest of the globe. For the duration of the past ice age, much of the northern hemisphere was covered in up to a mile of ice. The immense size of these glaciers warped



the Earth's crust, causing the area today known as the northeast United States to be slightly uplifted. Since the ice has melted and the glaciers have retreated, the crust is slowly evening out, leading to Connecticut sinking at approximately 0.76-to-0.89 millimeters per year (≈0.03- to-0.035 inches). This only further complicates assessing and predicting the long term effects of continued sea level rise.

The IPCC concluded that there has been a global mean rise in sea level between 15 and 25 centimeters (~4-to-10 inches) between 1901 and 2018. Relative sea level rise in Connecticut in the same time period is estimated between 15 and 30 centimeters (~6-to-12 inches). The IPCC further estimates that global sea level will rise 15 to 101 centimeters (~5.9 to 39.7 inches) during the 21 st century.

A long-term tide gauge has been operated by NOAA at Steele Point in Bridgeport since 1964. The historical mean sea level trend at that gauge

has been a rise of 3.16 millimeters per year (1.04 feet in 100 years) with a 95% confidence interval of plus-or-minus 0.37 millimeters per year, based on monthly mean sea level data from 1964 to 2022.

## VULNERABILITIES & RISK ASSESSMENT

Global sea level rise (SLR) is occurring at an increasing rate due to the melting of land ice and the expansion of ocean water due to heat absorption associated with climate change. Global sea level represents a global mean; regional variations need to be considered for local planning. Observations and extrapolations show that the sea level in Long Island Sound is rising at a more rapid rate than the global SLR projections.

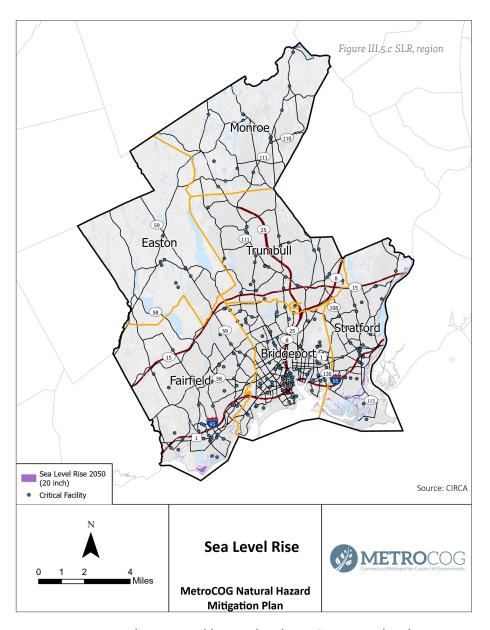
It has long been expected that the rate of sea level rise in Connecticut will be slightly higher than the global projections because of regional subsidence. However, more recent studies have asserted that changes in ocean circulation will increase the relative sea level rise along the Atlantic coast even more than previously thought.

The Connecticut Institute for Resilience and Climate Adaptation (CIRCA) has developed sea level rise projections for use in Connecticut. CIRCA has established a "planning threshold" of a 0.5-meter (1.64 feet) rise in sea level expected by 2050 and has defined a "caution threshold" of 1.0 meters (3.28 feet) in sea level rise expected in the period 2060-2090.

Sea level rise is a slow onset hazard, and its severity or magnitude is measurable only over long periods of time. As discussed in III.4, "Nuisance flooding" refers to the inundation of low-lying areas under "blue sky," non-storm conditions; this phenomenon has already been noted in Fairfield and will continue to become a problem with regards to access

and asset-degradation as water more regularly renders roads impassable and affects structures and infrastructure systems. Coastal storms, which often result in coastal flooding, may do so more frequently and severely. Further, flooding as a result of hurricane "storm surges," may be exacerbated and cause greater property and infrastructure damage due to higher average sea levels.

Bridgeport, Fairfield, and Stratford, the three coastal communities in the MetroCOG region, already experience nuisance flooding as high tide levels rise, and will likely become increasing-



ly impacted by sea level rise. Rising sea levels will impact both the natural and man-made coastal environments. It could result in the disappearance of a large portion of Connecticut's tidal wetlands, and the conversion of upstream wetlands to saltwater marshland. Beachfront communities will see increased erosion of sand and dune structures, which will potentially lead to more extreme and frequent flooding. Dikes and sea walls that are in place now could see a rapid decline in their effectiveness, potentially increasing the frequency and extent of flooding of coastal areas.

As sea levels rise, drainage systems will become less effective, leading to the potential for greater flooding from even moderate rain events. Bridge-port already experiences problems with inadequate storm drainage in coastal neighborhoods; a higher water table will only exacerbate this problem.

Future storm events, especially those with an accompanying strong storm surge, will pose an even greater threat to coastal and low-lying communities. Storm surges from hurricanes and nor'easters will reach further inland, impacting a greater portion of the region. The flooding and inundation that typically occurs from a Category 3 hurricane could, by the end of this century, result from a Category 1 storm. This phenomenon is portrayed in III.4. Sea level rise for the Region is shown in Figure III.5.c. Town specific sea level rise maps can be found in Appendix E.

Of great concern is the influence sea level rise will have on the severity of episodic hazard events such as storm surge and coastal flooding, as well as long term coastal erosion. It can be expected that sea level rise will be an amplifier of the magnitude for these other coastal hazards.

Annualized loss estimates were prepared for sea level rise for each coastal community as presented in Section III.2.iiand Figure III.11.a.

### **CLIMATE CHANGE ASSESSMENT**

As climate changes, and the sea level rises, migration away from the coastline is likely to occur in some communities, while others may try to mitigate the impending coastline changes. Economic status and resources will likely play a contributing role in decision making and mitigation actions.

# III.6 Summer Storms & Tornadoes

## ASSESSMENT & GENERAL LOCATION

Unlike other natural hazards that are likely to affect discrete areas of the Region, summer storms and tornadoes have the potential for indiscriminate impacts. These systems can bring torrential rains, damaging winds, dangerous lightning, and large hail. Due to the complex nature of these storms, the affected area from an event could range from very small to a system with regional, county and/or statewide impacts.

## **INTENSITY & EXTENT**

Severe summer storms can include tornadoes, downbursts, lightning, high winds, heavy rain, and hail. These weather systems can cause flash floods, as well as downed trees and power lines. The possible weather events that can impact the region are described further below:

### **Summer Storms**

The development of a thunderstorm occurs in several stages. These stages include:

- 1. Growth
- 2. Development
- 3. Electrification
- 4. Dissipation

A precise combination of atmospheric conditions must be present for thunderstorm creation. The formation of storm cells often starts early in the morning when the sun begins to heat the lower levels of the atmosphere causing, warm air to rise, and creating cumulus clouds. As the atmosphere warms further throughout the day, the clouds grow vertically. Rapid vertical growth is the first sign that a potentially severe thunder-

storm is developing. The final maturation of the cloud structure occurs when the very top of the cloud expands outward, resembling a mushroom.

To help warn residents of the arrival of potentially severe and destructive storms systems, the National Weather Service utilizes a system of watches and warnings to designate the potential for damaging weather:

- Severe Thunderstorm Watch: Outlines
   an area where episodes of hail one inch in
   diameter or larger, and/or damaging winds
   are expected during a three-to-eight-hour
   period. Wind speeds for a severe thunder storm must be in excess of 58 miles per hour,
   or 50 knots. Typical watches cover about
   25,000 square miles.
- Severe Thunderstorm Warning: Outlines an area where episodes of hail one inch in diameter or larger, and/or damaging thunderstorm winds have developed and are occurring. Winds for a severe thunderstorm must be in excess of 58 miles per hour or in excess of 50 knots. A Severe Thunderstorm Warning is generally only issued for small areas where severe weather is likely to impact the region in the very near future.
- Hail: A severe weather phenomenon that can occur within strong thunderstorms where large updrafts are present. Water droplets at the base of the cloud structure are carried upwards by strong updrafts where much colder temperatures at the top of the cloud freeze the droplets. As they fall back down towards earth the droplets are caught again by an updraft and carried to the upper level of the cloud structure. With each trip from the bottom to the top of the cloud the frozen droplets become larger, forming hailstones.

This process repeats itself until the mass of the hailstones exceeds the capacity of the updraft to carry it aloft once more. Hail has the potential to be extremely devastating, capable of causing significant damage to crops, people, and property.

## Lightning

Lightning is an exceptionally dangerous hazard that is most associated with thunderstorms. A lightning strike is the product of a completed circuit between positive and negative charges within the thunderstorm cloud or between the thunderstorm cloud and the ground. Initially the atmosphere acts as an insulator between the positive and negative charges. When the potential between the two becomes too great, a rapid discharge of electricity occurs, producing a lightning strike.

Lightning can occur primarily in two different forms:

- Intracloud lightning occurs between oppositely charged particles within the thunderstorm cloud structure.
  - The discharge occurs within the cloud structure; thus, it poses little threat to human life or property.
- Cloud-to-ground lightning occurs either between negatively charged particles at the base of the cloud and positively charged particles on the ground; or positively charged particles at the top of the thunderstorm structure and negatively charged particles on the ground.
  - This type of lightning can pose a great threat to both human life and property.

## **Downbursts**

Downbursts are a severe weather occurrence that can occasionally accompany a severe

thunderstorm. While much of a thunderstorm's life cycle is dominated by strong updrafts that carry warm, moist, and unstable air aloft, a downburst develops when large portions of unstable air mass begin to fall, creating a downdraft. As the air mass falls it begins to gain immense speed. When the air mass contacts the ground it expands outwards rapidly. If the affected area is less than 2.5 miles in diameter the occurrence is categorized as a microburst, if the area is greater than 2.5 miles in diameter, it is categorized as a macroburst. Downbursts are capable of producing damaging high velocity winds, though they usually only last for several minutes.

### **Tornadoes**

Tornados are violently rotating columns of air caused by the convergence of an updraft and downdraft which descends to the ground. Tornadoes are the product of a severe thunderstorm that has progressed in such a way to produce the rotation needed for tornado development. The severity of a tornado is measured using the Enhanced Fujita scale which ranks tornados based on their estimated wind speeds and the reported damage from the event. Tornadoes have the potential to be devastating to human life and property, causing significant damage across several miles. Most tornadoes have wind speeds less than 110 miles per hour, and only occur across a few miles, but more extreme tornadoes possess the capacity for wind speeds of over 300 miles per hour sustained over more than 50 miles.

### HISTORICAL RECORD

## Severe Thunderstorms

Records of severe thunderstorm events within the Region were gathered from NOAA's National Climatic Data Center, Storm Events Database are indicated in Table III.6.1. Notable events since the last update (August 2018 to August 2023)

include 70 events with Thunderstorms and High Winds, with 3 causing death or injury, as indicated by the NOAA Storm Event Database.

## **Lightning & Hail**

Severe thunderstorms that produced cloud-toground lightning strikes are listed below. Hail producing storms occur infrequently in the Region and NOAA records are limited. However, the potential exists for severe thunderstorms to produce hail and cause widespread damage. Instances of hail are included in the lightning records.

### **Tornadoes**

The state and region are not highly susceptible to tornadoes. When they occur the severity tends to be low. Since 1950, 14 tornadoes have occurred in Fairfield County, with the most severe storm, rated an F-2, occurring in 1950. Four tornadoes struck somewhere in the Region, hitting Fairfield in 1958, Trumbull in 1992, Monroe in 1996 and Bridgeport in 2010. Table III.6.2 shows confirmed tornadoes impacting Fairfield County. The most recent tornado occurred in Fairfield County on August 4th, 2020.

## III.6.1 Summer Storms: Previous Occurences

#### June 24, 2010: Severe Thunderstorm

A cold front and strong upper level trough moved across New England, and this unstable air mass spawned lines of severe thunderstorms across southwestern CT during the afternoon hours. The accompanying super-cells and squall lines produced an **EF-1 tornado in Bridgeport** and severe winds and hail across the remainder of the region.

In Easton, significant tree damage resulted from straight line winds believed to be in excess of 80 mph. Some of the toppled trees damaged residents' homes, causing over \$30,000 in damages.

In Monroe, winds believed to be around 60 mph sporadically toppled trees and downed power lines.

Hundreds of trees were lost in Stratford, with the Lordship and Paradise Green sections being hardest hit. Fallen trees were reported to have damaged a number of homes and several cars. One resident was injured while in their car when it was stuck by a fallen limb. Winds were believed to be close to 90 mph. The cost of the damage totaled \$100,000.

In Trumbull, sporadic damage from winds believed to be around 70 mph was reported, mainly from downed trees and power lines. A falling tree struck a car on Daniels Farm Road, injuring the vehicle's occupant. Two homes were damaged when trees fell on them. The damages from the event totaled \$40,000.

### June 6, 2011: Severe Thunderstorm

Atmospheric instability spawned wide spread clusters of severe thunderstorms across the majority of southern Connecticut. Many trees were brought down by strong winds in Stratford, along with sporadic tree loss in Monroe.

#### July 26, 2012: Severe Thunderstorm

An approaching mass of warm air produced a cluster of severe thunderstorms and led to **downed tree limbs in Bridgeport** and reports of a downed tree in Monroe.

#### September 6, 2014: Severe Thunderstorm

High winds downed trees and wires that closed multiple roads throughout the town of Fairfield.

#### June 23, 2015: Summer Storm

Widespread trees were reported down across the northern portion of Monroe. Several roads were closed.

#### July 25, 2016: Summer Storm

Multiple trees and wires were reported down throughout Bridgeport and on Barnum Avenue in Stratford.

#### July 22, 2018: Severe Thunderstorm

Trees and powerlines were downed on Barnum Avenue in Stratford.

### **FUTURE PROBABILITY**

The likelihood of a severe summer storm occurring in the Region is fairly high. Weather systems that spawn severe thunderstorms are prevalent in the area and the conditions needed for severe weather are fairly common during the summer months. However, these weather patterns generally tend not to result in extreme conditions that produce tornadoes or hail.

The risks from severe summer storms are related to thunderstorms that produce torrential rain that causes inland flooding or high winds that can cause downed trees and power lines.

Based on the observed trends and projections of the Connecticut Physical Climate Science Assessment Report (2019), temperature and precipitation summer temperatures are projected to increase. Combined with the projection that precipitation levels will increase, it is likely that there will be higher-intensity summer storms and thunderstorms that contribute to flash flooding interspersed with longer dry periods during the summer. The higher intensity storms are expected to contribute to an increased frequency of tornadoes over time.

## VULNERABILITIES & RISK ASSESSMENT

Summer storms pose a great threat to the Region, most notably from the torrential rains, damaging winds, dangerous lighting, and large hail that can be associated with a system of this type.

High winds can lead trees and power lines being toppled, causing structure damage and the loss of power. Larger hail can crack windshields and dent the roofs of cars, along with causing damage to homes and other structures. The torrential rains can produce flash flooding that has the potential to damage homes and temporarily block road access, stranding motorists. Along

with the physical impacts of summer storms, these systems arrive with incredible speed and ferocity. Residents can be unprepared and stranded in locations without adequate shelter.

Annualized loss estimates for thunderstorms and tornadoes were prepared for each community as presented in Table III.6.3, equating to \$3,213453 per year for the region. Based upon NRI risk assessment, the region is at a very high risk for wind events, especially when considering past historical evidence.

III.6.2 Previous Occurences, Tornadoes							
Location	Date	Magnitude	Injuries*				
Fairfield County	July 14, 1950	F2	3				
Fairfield County	August 15, 1958	F1	0				
Fairfield County	August 9, 1968	F1	0				
Fairfield County	July 19, 1971	F2	0				
Fairfield County	September 18, 1973	F1	0				
Fairfield County	June 29, 1990	Fo	7				
Fairfield County	July 5, 1992	Fo	0				
Trumbull	August 4, 1992	F1	0				
Monroe	July 9, 1996	F1	0				
Fairfield County	May 31, 2002	F1	0				
Fairfield County	July 12, 2006	F1	0				
Fairfield County	May 16, 2007	EF1	0				
Bridgeport	June 24, 2010	EF1	3				
Fairfield County	August 4, 2020	EFo	0				

<sup>\*</sup> No deaths were reported as a result of these events. Soutce: NOAA's National Climatic Data Center Storm Events Database

III.6.3 SUMMER STORMS, ESTIMATED ANNUAL LOSS						
	Hail	Lightning	Strong Wind	Tornado		
Bridgeport	\$2,341	\$165,754	\$921,794	\$264,562		
Easton	\$138	\$8,412	\$50,261	\$28,569		
Fairfield	\$991	\$69,088	\$409,455	\$169,926		
Monroe	\$411	\$21,115	\$111,050	\$85,745		
Stratford	\$860	\$54,592	\$333,359	\$127,133		
Trumbull	\$687	\$40,702	\$227,211	\$119,299		
Total	\$5,427	\$359,663	\$2,053,129	\$795,233		

## **CLIMATE CHANGE ASSESSMENT**

The State NHMP anticipates that the intensity of tornadoes likely to increase due to climate change. Due to the overall unpredictability of tornadoes, the plan did not project a change in the location, frequency and duration of these events. Future development will follow the State Budling Code to mitigate future impacts. on property, and considerations of high winds and the ability to uproot trees will impact management of forested areas thorough the region.

# III.7 Hazard Profile: Winter Storms

## ASSESSMENT & GENERAL LOCATION

Winter weather affects the Region to varying degrees each year, bringing not only the typical threats of snow, wind, and ice, but concerns of extreme cold and flooding. These events can create tertiary hazards as well, including loss of power and heat. While severe winter weather is commonly associated with the months of December, January, and February, the potential exists for occurrences from late September through mid-May.

Although the entire Region is susceptible to winter storms, the geography, topography, and its location along Long Island Sound influence the severity of different events and result in disparate impacts across the region. Due to their proximity to Long Island Sound, coastal and low-lying areas receive less snowfall than the northern portions. Along the coast, it is not uncommon for a mixture of snow, sleet, and freezing rain to occur, while inland towns, such as Easton, Monroe and Trumbull may receive only snow. Inclement winter weather may affect driving conditions, cause damage to trees, and interrupt power distribution.

### INTENSITY

Winter storms and weather range from blizzards, ice storms, heavy snow, sleet, freezing rain, and extreme cold. Most deaths from winter storms result from traffic accidents on icy roads and hypothermia from prolonged exposure to cold. Damage to trees and tree limbs and the resultant downing of utility cables are a common consequence of these types of events. Secondary effects include loss of power and heat.

The possible weather events that can impact the region are described below:

- Blizzard: Sustained winds or frequent gusts of 35 mph or more are the defining characteristic of a blizzard. The high winds result in snowdrift and reduced visibility of less than one-quarter mile for three or more hours. Extremely cold temperatures are often associated with blizzard conditions.
- Winter Storm: A heavy snow event resulting in a snow accumulation of more than six inches in twelve hours.
- Freezing Rain: Temperatures at higher atmospheric elevations are warm enough for rain to form but surface temperatures are below 32 degrees. The rain freezes on contact and coats objects such as trees, cars, powerlines, or roads, forming a glaze of ice. Freezing rain is generally associated with an approaching warm front as cold air is trapped at lower levels in the atmosphere. When a substantial amount of freezing rain occurs and at least one-quarter inch of ice accumulates, it is referred to as an "Ice Storm."
- Nor'easter: Nor'easters form as low-pressure disturbances along the south Atlantic coast, move northeast along the Middle Atlantic and the New England coasts, and collide with a cold, dry high-pressure system moving down from the north. Strong northeast winds are created, and wind driven waves can batter the coastline, causing flooding and severe beach erosion. Coupled with a high tide, the low pressure of a nor'easter can have an effect similar to a storm surge from a hurricane.
- **Sleet:** Water droplets freeze into ice pellets before reaching the ground and bounce

upon hitting a surface. Sleet can accumulate like snow and create hazardous road conditions for motorists. It typically falls as a mix of snow and freezing rain.

#### HISTORICAL RECORD

NOAA has developed a Regional Snowfall Index (RSI) for the northeast that rates winter storms into five descriptive categories by score: Extreme, Crippling, Major, Significant, and Notable. The index is based on snowfall amounts, size of the area impacted, and the population within the path of the storm. Winter storms from 1956 to 2023 were reviewed. During that time period, 73 high impact snowstorms that affected the northeast were identified and rated, with 9 storms (inducated in blue) from the previous plan being incorporated (Table III.7.1).

In general, there has been an increased frequency of notable or stronger winter storms over the last 15 years as compared to the earlier parts of the RSI record. Based on the RSI, nearly one-quarter were considered either extreme or crippling to the Northeast, while the majority were categorized as major. The remainder of the snowstorms were listed as significant

#### **Recent Events**

In late October 2011, a historic and unpreceded early-season winter storm impacted the area with up to 18 inches in some parts of Connecticut. This was the first time a winter storm of this magnitude occurred in October. The storm is often referred to as the 2011 Halloween nor'easter or Storm Alfred. The combination of high winds and wet, heavy snow caused trees to fall and power lines to snap. About 830,000 customers lost power throughout the state, and many remained without electricity for over a week. Almost the entire state was declared a federal disaster area; New London County was the

### III.7.1 WINTER STORMS PREVIOUS OCCURENCES

#### Extreme

March 12, 1993 January 6, 1996

#### Crippling

February 14, 1958
March 2, 1960
February 2, 1961
January 11, 1964
December 25, 1969
January 19, 1978
February 10, 1983
February 15, 2003
January 21, 2005
January 22, 2016

#### December 13, 2023

#### Major

December 11, 1960 January 18, 1961 January 29, 1966 February 22, 1969 February 18, 1972 February 5, 1978 February 17, 1979 January 21, 1987 February 8, 1994 February 12, 2006 February 12, 2007 February 4, 2010 February 9, 2010 February 23, 2010 December 24, 2010 January 9, 2011 February 1, 2011 February 7, 2013 January 29, 2014 February 11, 2014 January 29, 2015 March 12, 2017 January 30, 2021

### Significant

March 18, 1958
December 23, 1966
February 5, 1967
February 8, 1969
April 6, 1982
January 24, 2000
December 18, 2009
March 15, 2007
March 4, 2013
December 13, 2013
December 30, 2013
January 25, 2015

March 5, 2018 March 11, 2018 December 14, 2020 December 21, 2022

#### Notable

March 18, 1956 January 25, 1987 February 22, 1987 February 2, 1995 March 31, 1997 December 30, 2000 March 1, 2009 January 26, 2011 October 29, 2011 January 20, 2014 November 26, 2014 December 9, 2014 February 8, 2015 January 3, 2018 March 1, 2018 March 20, 2018 January 11, 2019 March 3, 2019 January 1, 2022 January 4, 2022

January 22, 2022

only exception. Federal Obligated funds that the region was provided totaled \$593,517 in both municipal and community dollars (Table III.3.3).

The February 2013 nor'easter, commonly referred to as Winter Storm Nemo, developed from the combination of two areas of low pressure, one originating in the northern plains and the other forming over Texas. The NWS issued blizzard warnings for all of Connecticut on February 7th and the Governor declared a state of emergency on February 8th and ordered the closure of all limited access highways. The snowstorm resulted in heavy snowfall and blizzard force winds. The highest snowfall amounts were recorded in Hamden at 40 inches, while 30-to-36 inches blanketed the Region. During the evening and overnight, snow fell at an extreme rate of six inches per hour. The event triggered federal assistance totaling \$1,611,715 (Table III.3.3).

Winter storms over the last five years have produced up to 16 inches of snow and occasionally freezing rain or ice throughout the region. However, such storms have generally been more manageable than the more severe storms described earlier in the historic record.

According to the climate change models performed for the State Water Plan (2018), Connecticut is expected to experience higher temperatures during the winter months in the future as well as increased rainfall during the winter. This may result in fewer snow events overall and more wintry-mix storms consisting of snow, sleet, freezing rain, and potentially ice. However, given the increased overall precipitation, there may be a potential for higher snowfall amounts during the snowstorms that do occur.

### III.7.2 FEMA Assistance for Winter Storms

	Municipal	Community	Grand Total
Bridgeport	\$722,160	\$51,367	\$773,527
Easton	\$169,679	\$33,625	\$203,304
Fairfield	\$576,124	\$143,853	\$719,977
Monroe	\$240,216		\$240,216
Stratford	\$543,478	\$86,813	\$630,291
Trumbull	\$466,375	\$5,836	\$472,211
Total	\$2,718,032	\$321,493	\$3,039,525

Soutce: FEMA, Disaster Declarations

### **FUTURE PROBABILITY**

Connecticut experiences at least one severe winter storm every five years. However, a variety of small and medium snow and ice storms occur nearly every winter. The probability of a nor'easter or any other winter storm occurring in any given winter is likely. The data from the NCDC suggests that the Northeast experiences a severe snowstorm every 1.2 years or, effectively, the area can expect at least one sizable snow event every year.

### VULNERABILITIES & RISK ASSESSMENT

The entire Region is vulnerable to the impacts of winter storms. FEMA's NRI indicates that Fairfield County has a relatively high risk of winter weather and a very high risk of an ice storm. While there may be damage to structures directly from the winter weather, the tertiary effects are what impact the Region the most.

Transportation is severely impacted by winter storms as heavy snowfall and icy conditions can make roadways dangerous and sometimes impassable. This greatly restricts access to hospitals and other medical care facilities, which puts everyone at risk during an event. People in more rural areas of the Region are also more impacted as travel is mostly limited to personal vehicles

and rural areas often take longer to clear the roads. Even when roads are cleared, vulnerable populations may be unable to clear their own walks and driveways, leaving them trapped or stranded. In addition to impeding travel, winter storms also have the potential to knock out power in the Region. Without power many households lose the ability to heat their homes, putting them at risk for hypothermia, frostbite, and other effects of extreme cold exposure.

Annualized loss estimates were prepared for winter storms for each community as presented in Table III.7.3.

### NOAA Damage Estimates, FEMA Assistance, & Loss Estimates

On March 21, 2013 the damage in the State of Connecticut, resulting from a severe winter storm and snowstorm during the period of February 8-11, 2013, was of sufficient severity and magnitude to warrant a major Presidential disaster declaration under the Robert T. Stafford Disaster Relief and Emergency Assistance Act. An additional previous winter storm garnered another Presidential declaration on November 17, 2011, under the authority of the Robert T. Stafford Disaster Relief and Emergency Assistance Act from a storm that occurred during the period of October 29-30, 2011. Since 2006, there have been 5 additional winter storm presidential declarations, all due to snowstorms.

For all events categorized as winter storms between 2003 and 2023, FEMA provided \$23,862,516 in Public Assistance funds to the region's 6 municipalities. \$1,455,455 additional dollars were provided to the communities. (Table III.3.3)

### III.7.3 WINTER STORMS\*, ESTIMATED ANNUAL LOSS

Municipality	Annual Loss
Bridgeport	\$200,600
Easton	\$26,247
Fairfield	\$130,395
Monroe	\$87,274
Stratford	\$99,682
Trumbull	\$112,346

<sup>\*</sup>Includes cold wave, ice, & winter weather. Soutce: FEMA, National Risk Index

#### **CLIMATE CHANGE ASSESSMENT**

The annual mean temperature in Connecticut has increased by about 3°F (1.7°C) since 1895, faster than rising global mean temperatures. Due to rising temperatures, increased rain could create more ice storms. The intensity of winter storms is likely to increase due to climate change, according to the 2023 State NHMP. Due to the overall unpredictability of these storms, the plan did not project a change in the location, frequency and duration of these events.

## III.8 Hazard Profile: Dam Failure

### ASSESSMENT & GENERAL LOCATION

Dams are man-made or artificial barriers usually constructed across a stream channel to impound water. Various materials are used for dam construction such as timber, rock, concrete, earth, steel or a combination of these materials. In Connecticut, most dams are constructed of earth or combinations of earth and other materials. Spillways are commonly constructed of non-erosive materials such as concrete or rock. Spillway systems are typically provided along the dam to allow water to flow from the impounded area, and mechanisms are typically installed to control water levels of the impoundment.

Dams have been essential for economic development and for manufacturing, water supply, mechanical power, and fire protection. In addition to the historic economic benefits, Connecticut's dams are also used for flood control, water supply, recreation and for mitigating the impact of increased runoff typically caused by land use changes associated with property development.

CTDEEP is responsible for regulatory oversight of dams and reservoirs and regularly inspects dams. High hazard potential dams are inspected at a more frequent interval. Dam safety and inspection regulations are codified in state statutes, which are discussed in more detail in Chapter IV, Community Capabilities.

#### INTENSITY

The state classifies dams based on their hazard potential, that is, the damage that would likely occur if the structure failed. Two groups of factors influence the potential severity of a full or partial



III.8.1	III.8.1 Dam Classifications						
Class	Description						
AA	Negligible hazard potential; no measurable damage to roadways, land and structures. Economic loss would be negligible.						
A	Low hazard potential; damage to agricultural land and unimproved roadways. Economic loss would be minimal.						
BB	Moderate hazard potential; damage to normally unoccupied structures and low volume (less than 500 vehicles per day). Economic loss would be moderate.						
В	Significant hazard potential; possible loss of life, minor damage to habitable structures, residences, and other critical infrastructure, damage to roadways that carry less than 1,500 vehicles per day, and impact on railroads. Economic loss would be significant.						
С	High hazard potential; probable loss of life, major damage to habitable structures, residences, and other critical infrastructure, damage to main roadways that carry greater than 1,500 vehicles per day, and impact on railroads. Economic loss would be great.						

failure: (1) the amount of water impounded, and (2) the density, type, and value of development and infrastructure located downstream. CTDEEP has developed five classes, which are defined in Table III.8.1. The highest potential impact from a dam failure would result from Class B or Class C dams (such as the Stevenson Dam in III.4.1).

III.8.2 COUNT OF DAMS						
Municipality	Total	A/AA	BB	В	С	
Bridgeport	11	6	2	0	3	
Easton	20	14	3	1	2	
Fairfield	31	20	9	0	2	
Monroe	16	14	1	0	1	
Stratford	10	7	1	1	1	
Trumbull	29	16	9	0	4	
Region	117	77	25	2	13	

Soutce: CTDEEP, Office of Dam Safety

III.8.3 CLASS B & C DAMES					
Dam Name	Downstream Watercourse	Municipality	Class		
Lake Forest Dam	Island Brook	Bridgeport	С		
Bunnells Pond Dam	Pequonnock River	Bridgeport	С		
Island Brook Lagoon Dam	Island Brook	Bridgeport	С		
Popps Mountain Dike	Saugatuck River	Easton	С		
Easton Reservoir Dam	Mill Brook	Easton	С		
Hemlock Reservoir Dam	Cricker Brook	Fairfield	С		
Samp Mortar Reservoir Dam	Mill River	Fairfield	С		
Stevenson Dam	Housatonic River	Monroe	С		
Beaver Dam Lake Dam	Pumpkin Ground Brook	Stratford	С		
Canoe Brook Lake Dike	Horse Tavern Brook	Trumbull	С		
Canoe Brook Lake Dam	Canoe Brook	Trumbull	С		
Canoe Brook Lake East Dike		Trumbull	С		
Pinewood Lake Dam	Booth Hill Brook	Trumbull	С		
Aspetuck Reservoir Dam	Aspetuck River	Easton	В		
Brewster Pond	Long Brook	Stratford	В		

The potential inundation of water released would result in loss of life and major damage to main roads and habitable structures. Thus, the extent of a dam failure event can be measured by its classification. As classification levels increase, effects increase and cause more damage.

There are 117 dams of varying size in the Metro-COG Region which are quantified in Table III.8.2. The majority of the dams are classified as having a negligible to low hazard potential – Class AA, A, BB, or unclassified. 13 dams have been classified as Class C dams and two are Class B dams. The area of the impoundment ranges from small detention ponds to large public water supply reservoirs.

Fairfield is the home of the most dams, including those impounding the Hemlock Reservoir and the Samp Mortar Reservoir. Both are classified as Class C dams. The second highest number of dams is found in the Town of Trumbull, with 29 dams. While most have low hazard potential, there are four Class C dams in the town. The Class C dams are located at and impound Canoe Brook Lake and Pinewood Lake, both private lakes.

Twenty dams are located in Easton, including those impounding the Easton Lake Reservoir and Saugatuck Reservoir, and 16 dams are in Monroe. The most critical dam in Monroe is the Stevenson Dam that impounds the Housatonic River to create Lake Zoar and is used to generate electricity. The fewest number of dams are located in Bridgeport, with 11 dams, and Stratford with 10 dams. Three of the dams in Bridgeport have high hazard potential, while one of the dams in Stratford poses a high risk. The Class C and Class B dams are listed in Table III.8.3. Figure III.8.b shows the location of these dams.

Soutce: CTDEEP, Office of Dam Safety

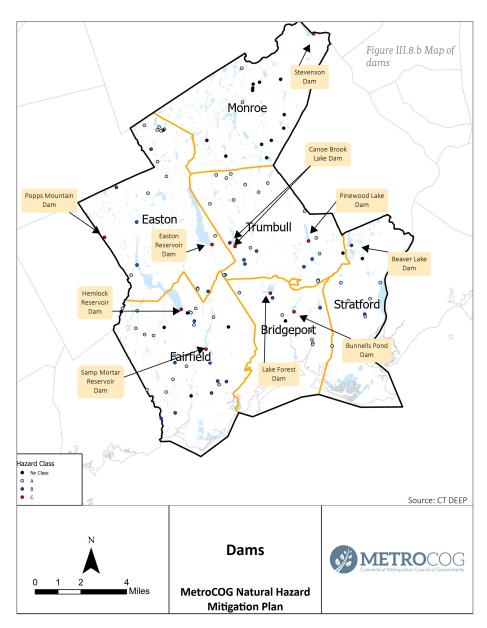
### **Impacts**

Dam failures can be triggered suddenly, with little or no warning due to heavy rains, floods, and earthquakes. Excessive floodwaters cause pressure and build additional force to behind dams, and, depending on its condition, a failure can occur. In addition, a chain reaction from the sudden release of waters can cause the next dam downstream to fail. Earthquakes can also severely damage a dam and cause it to fail.

Like coastal and inland flooding, dam failures pose a significant risk to human life. The magnitude of inundation flooding can cause infection, injuries and fatalities, especially among vulnerable populations who may not have time to evacuate. Dam failures can cause direct damage to buildings and critical infrastructure by inundation leading to water damage, erosion, and potential collapse. Roads and bridges may need to be closed, and rail and airline operations

could be disrupted. Floodwaters can damage utility infrastructure including power lines, substations, and water treatments plants, which would impact utility services.

The debris, sediment, chemicals, and other contaminants carried by floodwaters can damage both buildings and the natural environment, as well as creating a public health concern. The sudden release of large volumes of water can cause habitat destruction, loss of wildlife, and contamination of surrounding waterbodies. The destruction of buildings and infrastructure would



also impact the local economy, and rebuilding would likely require a significant investment in time and funds.

#### HISTORICAL RECORD

Fortunately, there have been few dam failures in the State. The most recent severe dam failure incident in southern Connecticut occurred in 1982. During a period of heavy rain over the weekend of June 5th and 6th, 1982, flooding throughout the state resulted in 17 dam failures and severe damage to another 31 dams. The total cost from this event was approximately \$70 million.

Only one significant dam failure event has occurred in the Region. According to the National Performance of Dams Program (NPDP), on July 29, 1905 a cloudburst produced 11.32 inches of rain in 17 hours. Four dams in the Pequonnock River watershed (Berkshire Mill Dam, Toucey Dam, Ward's Mill Dam, and Bunnell's Lower Reservoir Dam) were affected. The Berkshire Mill Dam was undermined. The Toucey Dam in the Long Hill section of Trumbull breached and contributed to the failure of the Ward's Mill Dam downstream. Reports to the NPDP suggest that the Ward's Mill Dam probably failed by sliding on ledge. The combined damage contributed to the collapse of the Bunnell's Lower Reservoir Dam (used for public water supply) downstream. The collapse at Bunnell's Dam was due in part from overflow caused by debris blockage of the spillway. The resulting floodwaters damaged several bridges, impeded traffic, and damaged ships at the mouth of the river. According to contemporary reports, the tide was at ebb stage when the floodwave reached the mouth of the river which minimized damage to shipping. Total damages were estimated at \$250,000, or \$8.7 million in 2023 dollars.

Flooding from the September 25, 2018 storm washed out a small dam along Sasco Brook in Fairfield. In early 2024, flooding from heavy rains and melting snow caused a partial dam break in eastern Connecticut (Norwich) along the Yantic River, prompting the evacuation of roughly 500 people, and the closure of numerous roads throughout the state (Hartford Courant).

#### FUTURE PROBABILITY

Since the failure of a dam can occur without warning, there is no season where a dam failure is more likely. However, dams are at a greater risk during heavy rain events as overtopping is a major cause of failure. To mitigate the potential hazards, the CTDEEP requires dams to be routinely inspected and those that have a higher hazard potential are inspected more frequently. Therefore, the likelihood of a dam failure impacting the Region is low.

As listed above, there are 13 Class C dams in the Region. These dams are considered to cause the greatest risk to life and property upon failure. Fortunately, the majority of dams in the region are well-maintained and the risk of failure is low. The overall risk of failure is likely to increase in the future due to the expected increased incidence of flooding due to the effects of climate change.

### VULNERABILITIES & RISK ASSESSMENT

### Bridgeport - Three Class C Dams

Bunnells Pond Dam: Impounds the Pequonnock River and creates an approximate 47-acre pond, located in Beardsley Park. The dam was built in 1906 and is an earthen structure with a concrete spillway. The lake and dam are owned by CT DEEP. In proximity to the dam is Glenwood Park, an active recreation area that includes outdoor tennis courts and an indoor ice-skating facility. Farther downstream is the commercial area along US Route 1, as well as densely populated residential neighborhoods.

Lake Forest Dam: Impounds Island Brook and creates a privately owned lake with a surface area of about 66 acres. The lake is surrounded by single family residential neighborhoods on relatively small lot sizes. Downstream is the Island Brook Lagoon, another impoundment of Island Brook that would be impacted by a failure of the Lake Forest Dam.

**Island Brook Lagoon Dam:** Impounds Island Brook and creates a small, privately owned



lake, with a surface area of about five acres. It is surrounded by single family residential neighborhoods on relatively small lot sizes.

#### Easton – Two Class C Dams

Easton Lake Reservoir Dam: Impounds the Mill River to create the Easton Lake Reservoir, a public water supply reservoir. It is owned and maintained by the Aquarion Water Company. The dam is constructed of concrete and the reservoir has a surface area of about 488 acres. The area directly downstream of the reservoir is made up of sparsely developed residential land uses, consisting of single family homes on at least one-acre lots. Farther downstream, the residential patterns become denser but remain single family residential.

Popps Mountain Dam (Dike): Owned by the Aquarion Water Company, the dam is located on the Saugatuck Reservoir about 2,000 feet northeast of the main dam (Samuel P. Senior Reservoir Dam) that impounds the Saugatuck River to create the reservoir. The outflow from the dam drains primarily into the Town of Weston and undeveloped portions of Easton. The surface

area of the Saugatuck Reservoir is about 827 acres. The dike is a concrete structure.

#### Fairfield - Two Class C Dams

Hemlock Reservoir Dam: Impounds Cricker Brook to create the Hemlock Reservoir, a public water supply reservoir. It is owned and maintained by the Aquarion Water Company. The dam is constructed of concrete and the reservoir has a surface area of about 437 acres. The area directly downstream of the reservoir is low-to-medium dense residential development, consisting of single family homes on at least one-acre lots. Cricker Brook flows from the dam into Samp Mortar Reservoir. Farther downstream, the residential patterns become denser but remain single family residential.

Samp Mortar Reservoir Dam: Impounds Cricker Brook, entering on the west side, and the Mill River, entering from the north. The lake formed by the dam is owned and maintained by a private association. Residences line the banks of the Samp Mortar Reservoir, and land use downstream of the dam is moderately dense residential. The total surface area is about 35 acres.

#### Monroe - One Class C Dam

Stevenson Dam: Impounds the Housatonic River to create Lake Zoar. The concrete dam is owned and maintained by First Light Power Resources, and used for hydroelectric power generation. The area immediately downstream is largely undeveloped; although the Housatonic River is a significant recreational resource, and numerous riverfront structures are located a short distance downstream in Derby and Shelton. Route 34, a heavily travelled main artery between New Haven and Newtown, is located on top of the dam.

### Stratford - One Class C Dam

Beaver Dam Lake Dam: Impounds the Pumpkin Ground Brook and creates Beaver Dam Lake, a private lake in the northwest corner of Stratford. It has a surface area of about 58 acres. The shoreline is sparsely developed and the large Roosevelt Forest is to the east of the lake. Downstream, land use patterns become medium density, single-family residential. The Trumbull Corporate Park lies downstream and just east of the dam.

#### Trumbull - Four Class C Dams

Canoe Brook Lake Dike: Impounds the Horse Tavern Brook and creates Canoe Brook Lake, a private lake in the northwest part of Trumbull. It has a surface area of about 64 acres. The lake and dike are owned and maintained by an association of property owners living on and near the lake. The shoreline is lined with homes on large lots and houses are setback from the edge of the water. The dike is located on the south edge of the lake and Canoe Brook Road is on top of the dike. Downstream, land use patterns are primarily medium density, single-family residential. Horse Tavern Brook flows into the land now occupied by the Westfield/Trumbull Shopping Park, about 1.2 miles downstream of the dike.

Canoe Brook Lake Dam: Impounds Canoe Brook and enters Canoe Brook Lake (described above) on the west side. Land use on this side of the lake is residential but more sparsely developed than downstream of the Canoe Brook Lake Dike along Horse Tayern Brook.

Canoe Brook Lake Dike, East Dike: This dike is located along the east side of Canoe Brook Lake (described above). Land use on this side of the lake consists of single-family residential homes on lots of one-half to one acre.

Pinewood Lake Dam: Impounds the Booth Hill Brook and creates Pinewood Lake, a private lake in the southeast part of Trumbull. It has a surface area of about 60 acres. The lake and dike are owned and maintained by an association of property owners living on and near the lake. The shoreline is lined with homes on large lots and houses are setback from the edge of the water. The dam is located on the south edge of the lake and West Lake Road runs along the top of the dam. The dike and spillway are located off Old Dike Road. Downstream, land use patterns are primarily medium density, single-family residential. Booth Hill Brook flows into Twin Brooks Park and joins the Pequonnock River.

#### **CLIMATE CHANGE ASSESSMENT**

Due to the overall unpredictability of dam failure, the plan does not project a change in the location, frequency and duration. However, proper management and regular maintenance may help protect again the impacts of climate change on local dams.

### III.9 Hazard Profile: Extreme Heat

# ASSESSMENT & GENERAL LOCATION

Extreme heat conditions are defined by long periods of unusually high temperatures and are associated with high levels of humidity lasting for more than two

days. Heatwaves can have lasting impacts that can potentially lead to heat related illness among vulnerable populations across the region.

Due to the changing climate, extreme heat events are occurring more frequently throughout the region, state, and country. The likelihood of heat related illness drastically increases with the uptick in abnormally hot days.

Across Fairfield County, there have been 13 days with a maximum temperature of over 90 degrees since 2018. Dark colored impervious surfaces such as buildings, roads, and pavement as well as reduced green space and tree canopy cover cause urban areas to experience higher temperatures and greater negative impacts of extreme heat than surrounding rural areas - the urban heat island effect. This is of concern due to the FEMA-NRI identified socially vulnerable populations who live in the region, especially in Bridgeport and Stratford, which is detailed in the beginning of this chapter. The lack of air conditioning in older buildings and schools is also of great concern – over the last five years, many schools in the region and surrounding areas have canceled multiple school days due to extreme heat concerns.

	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	11
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	13
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135							4	William .
90	86	91	98	105	113	122	131								no	IAA
95	86	93	100	108	117	127										1
100	87	95	103	112	121	132									-	and the
		Like	lihood	d of He	at Dis	orders	s with	Prolo	nged E	xposi	ure or	Strent	ious A	ctivity	,	
		autio	on		Ex	treme	Cautio	on			Danger	. 31	E E	ktreme	Dange	er

#### INTENSITY

The National Weather Service 'heat index chart' (Figure III.9.a) indicates heat related issues under extended exposure related to physical activity. As humidity increases are coupled with an increase in temperature, the likelihood of heat related disorders drastically increases. The chart is broken down into 4 categories from 'caution' to 'extreme danger', at which point the heat index is over 125, meaning heat stroke is highly likely. The thresholds used by the National Weather Service issue related warnings:

- Excessive Heat Outlooks: Issued when conditions are favorable for excessive heat within 3-7 days
- Excessive Heat Watch: Issued when excessive heat may occur within 24 to 72 hours
- Heat Advisory: Issued when extremely warm conditions are within 12 hours of onset

Excessively extreme heat has the potential to become devastating to public health, infrastructure, the environment, and the local economy. High temperatures can dramatically impact water demands, power requirements, and put a strain on the electrical grid. Crops may be damaged and livestock deaths occur. Human health can

be negatively impacted due to heat exhaustion and heat stroke.

#### HISTORICAL RECORD

The highest local temperature on record was 106 degrees on July 15th, 1995, in Danbury CT, in the northwestern tip of Fairfield County (Table III.9.1). The State of Connecticut Hazard Mitigation Plan indicates that 7 extreme heat events occurred between 1996 and 2022. As of December 2023, there have been no FEMA Disaster Declarations associated with excessive heat in the region, or Connecticut as a whole. Neither deaths nor property related losses were reported in association with extreme heat in the region in 2023.

### VULNERABILITIES & RISK ASSESSMENT

The MetroCOG region faces a Relatively Moderate risk assessment rating, based upon NHI data with a Relatively Moderate annual loss rating of \$226,172. Bridgeport accounts for \$101,115 of the annual loss. (Table III.9.2). With continued development and a growing population, the MetroCOG region is likely to face an increase in extreme heat hazards. According to the Connecticut State Hazard Mitigation Plan, CTDEEP estimates that 19.4% of the surface coverage in the MetroCOG region is impervious- the highest percentage of impervious coverage among the state's COG regions.

## III.9.2 HEAT WAVE, ESTIMATED ANNUAL LOSS

Municipality	Annual Loss
Bridgeport	\$101,115
Easton	\$5,813
Fairfield	\$41,849
Monroe	\$14,151
Stratford	\$35,659
Trumbull	\$27,585

Soutce: FEMA, National Risk Index

### III.9.1 ALL-TIME MAXIMUM TEMPERATURES, CONNECTICUT

Date	Temperature (F)	Location	
July 15, 1995	106 F	Danbury	
August 23, 1916	106 F	Torrington	

Source, NOAA see https://www.ncei.noaa.gov/access/monitoring/scec/records/ct/tmin

### FUTURE ANTICIPATED LOSSES & CLIMATE CHANGE ASSESSMENT

The Connecticut Hazard Mitigation plan indicates the state will experience 1-2 extreme heat events per year, a number indicative of a 52% Risk Factor for Heatwave Likelihood. Based upon climate change projections, by 2050 the Risk Factor for Fairfield County climbs to 83%. Since 1900 the annual temperature in the region has increased by 3.5 degrees. FEMA's Climate Mapping for Resilience Adaptation Tool anticipates that the length of excessive heat days is likely to increase by 6.8 dways under a low emission scenario and 7.6 days under a high emission scenario.

## III.10 Hazard Profile: Extreme Cold

### ASSESSMENT & GENERAL LOCATION

Extreme cold is defined by extended lengths of low temperatures, generally with high winds. The definition of low temperatures varies based on the general climatic conditions of each region. In the Northeast United States, and Connecticut specifically, low temperatures are widely considered to be below freezing, or 32 degrees. Temperatures in the state fluctuate throughout the year and colder temperatures can typically occur from September to May. The entire state is exposed to the impacts of extreme cold, with a disproportionate impact on aging populations, young populations, populations with disabilities, and those experiencing homelessness. The effects of extreme cold are linked to negative impacts on public health and wellness, pose a risk to transportation infrastructure such as freezing roads, disrupt agriculture by damaging or killing plants and crops, and disrupt human critical infrastructure- such as through bursting pipes.

#### INTENSITY

The intensity of extreme cold is described through 'wind chill', which is labeled by the National Weather Service. as what the air temperature feels like to the human skin due to the combination of cold temperatures and winds blowing on exposed skin. Extreme cold and windchill can lead to frost bite and hypothermia concerns though a combination of high winds and low temperatures. The NWS issues the following notifications related to windchill events:

 Wind Chill Advisory: When cold wind chill values, but not extremely cold values, are expected or occurring

- Wind Chill Watch: When dangerously low temperatures are possible and there is a chance of cold air and strong winds.
- Wind Chill Warning: When cold wind chill temperatures are occurring presently and there is an associated risk of frostbit from extended exposure
- Frost Advisory: When frosts are expected or occurring, and threats may be posed to sensitive vegetation
- Freeze Watch: When there is a potential for freezing temperatures within the next 36 hours
- Freeze Warning: When the temperatures are expected to dip below 32 degrees. Temperatures below this threshold can kill some types of commercial crops
- Hard Freeze Warning: When temperatures are anticipated to drop below 28 degrees for an extended period of time, killing most commercial crops or plants

### HISTORICAL RECORD

Connecticut's record lowest temperature was measured on two separate occasions as -32 degrees in February of 1943 and January 1961, both outside of the MetroCOG region. Historically, the region has three recorded cold and extreme cold events, supported by the NCEI NOAA Storm Event Database; from January 1950 to October 2023 (Table III.10.1). There have been zero recorded deaths associated with the events, as per the NOAA Storm Event Database, although the Connecticut Hazard Mitigation State Plan indicates there have been 73 cold related deaths in Connecticut from 2014 to 2018.

### VULNERABILITIES & RISK ASSESSMENT

The NRI vulnerability assessment indicates that the regional threat of extreme cold is "Relatively

III.10.1	III.10.1 Extreme Cold, Previous Occurences							
Dates	Event	Overall Desciption						
January 15-16, 2004	Cold/ Wind Chill	An arctic cold front swept SE across the region during the afternoon of the 13th. The extremely cold air that followed resulted in a new record low temperature of 1 degree at Sikorsky Airport in Bridgeport on the 14th. A record low temperature of 0 degrees was tied at the airport on the 16th. Low temperatures ranged from 0 in Bridgeport to 5 degrees below 0 in Meriden. The lowest Wind Chill Index temperature values ranged from 19 degrees below 0 at Groton with a sustained wind speed of 23 mph to 25 degrees below 0 at Meriden with a sustained wind speed of 14 mph. Peak gusts were between 25 and 35 mph.						
January 17-18, 2000	Extreme Cold/ Extreme Wind Chill	An arctic cold front swept across the region during the afternoon of the 16th. Strong and gusty northwest winds combined with below normal temperatures and produced extremely low wind chill values mainly from 2 am to 10 am on the 17th and from 1 am to 1 pm on the 18th. On the 17th, wind speeds from 15 to 20 mph combined with temperatures from 5 to 10 degrees above 0, produced wind chill values from 15 to around 20 degrees below 0 in urban areas along the coast such as Bridgeport and from 20 to 30 degrees below 0 across suburban and rural areas.						
January 21, 2000	Extreme Cold/ Extreme Wind Chill	The combination of a quickly intensifying low pressure system off the New England Coast and a strong high pressure system west of the Great Lakes caused strong and gusty northwest winds. Northwest winds averaged 25 to 35 mph with gusts from 40 mph at Danbury to 46 mph at Meriden from around 2 pm to 8 pm. As temperatures fell to around 10 degrees, wind chill values plummeted from 20 to 30 degrees below zero along the coast and to 25 to 35 degrees below zero inland.						

Low," based on the Cold Wave - Hazard Type Risk Index Rating. However, the threat of cold is still particularly of peril to vulnerable populations. Populations experiencing homelessness, as well as those unable to afford heat for their homes are at the highest risk for the associated impacts of extreme cold. The elderly and very young are often unable to withstand the associated temperatures of extreme cold. The MetroCOG region has an estimated 13.7% percent of the population living below the poverty line, and 14.9% of the population over the age of 65 (2017-2021 ACS). It is critical to provide warming shelters in the most vulnerable neighborhoods, access to affordable housing, and financial assistance for heating to ensure that all residents can afford to heat their homes and, in an emergency, seek out shelter in extreme cold conditions.

#### Loss Estimate

Extreme cold events occur annually across the state and often in the region. Based upon the National Risk Index, it is estimated that the annual loss to the region is about \$30,919. Bridgeport has a higher total compared to the

other municipalities in the region, as seen in Table III.10.2. While attributed to population, the higher numbers in Bridgeport may directly be linked to a higher population exposed to extreme cold through populations experiencing homelessness and other housing crisis. The State Hazard Mitigation Plan indicates that the Expected Annual Loss for Fairfield County is equal to \$98,280.09, meaning that the MetroCOG region accounts for 31.5 percent of the total county loss.

#### **CLIMATE CHANGE ASSESSMENT**

Due to the associated impacts of climate change, it is anticipated that extreme cold weather events

are likely to become less common and less severe in the region.

### III.10.2 Cold Wave, Estimated Annual Loss

Municipality	Annual Loss
Bridgeport	\$12,709
Easton	\$1,105
Fairfield	\$5,330
Monroe	\$2,503
Stratford	\$4,509
Trumbull	\$4,763

Soutce: FEMA, National Risk Index

### III.11 Hazard Profile: Drought

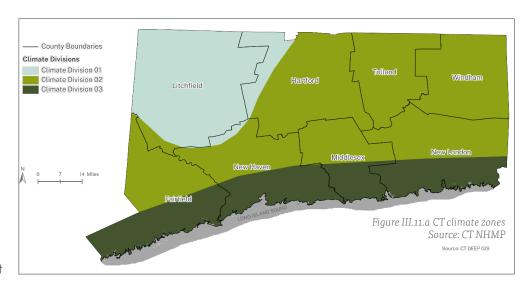
## ASSESSMENT & GENERAL LOCATION

Drought in the United States is currently monitored by the National Integrated Drought Information System. The

U.S. Drought Monitor is managed in partnership between the National Drought Mitigation Center, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration and shows areas across the country that are in a drought using a classification system ranging the extent of from 'going into a drought' to 'major drought'.

Droughts can often occur slowly over several years and are often complex to quantify. Droughts are often defined as a deficiency of precipitation over an extended period of time (usually longer than one season) that results in a shortage of available water. Due to climatic differences, what might be considered a drought in one area of the United States may not qualify as a drought elsewhere. There are several types of droughts; typically categorized by their impacts:

- Meteorological Drought: Dry weather patterns govern an area and are divergent from the usual precipitation levels.
- Hydrological Drought: Low water supply becomes evident in water systems, such as groundwater and stream flow.
- Agricultural Drought: Crops become impacted by lack of rain or water resulting in a lack of moisture in the soil.



- Socioeconomic Drought: Supply chain commodities are impacted by drought and begin to affect humans.
- Ecological Drought: Natural ecosystems become affected by drought conditions.

Monitoring for drought includes measuring changes in precipitation, surface/groundwater levels, streamflow, and temperature. Drought is characterized by severity, area affected, duration, and time of year. Anthropogenic actions can drastically increase the risk of drought without changes in weather. Land development and increased impervious surface levels ultimately reduce the recharge of groundwater.

#### **EXTENT & INTENSITY**

The extent of drought can depend on the duration, intensity, regional extent, and water supply demands, as well as vegetation. The intensity of a drought could range from small scale to total damage in a localized area or regional damage, ultimately impacting ecological and human health, as well as the economy.

### Climate Divisions & Impacts on Drought Potential

The Connecticut State Hazard Mitigation Plan addresses drought regionally by dividing the state into three climate zones (Figure III.11.a). This

approach provides a better understanding of drought severity compared with a COG or county level analysis. The MetroCOG region is in Climate Division 03; the Coastal Division. Division 03 has historically been less prone to drought conditions compared to Divisions 01 (mostly Litchfield County) and 02 (the rest of the state). This is driven by the greater amount of agricultural land in Divisions 01 and 02. The extent of a drought depends heavily on the length, intensity, geographic area, and water demands made by human activities and vegetation, such as farming. The scale of the impact could range from minor effects to catastrophic damage in a localized area, to widespread damage impacting human health, the environment, and the economy.

#### HISTORICAL RECORD

Six drought events were reported between January 1950 and October 2023. According to the State Hazard Mitigation plan, a severe drought warning was issued in Connecticut in the summer of 2022, with 87% of the state having experienced severe drought conditions. A widespread loss of crops and shortages in water recharge were sustained, creating water emergencies. Despite this, the USDA estimates that Fairfield County experienced no agricultural losses per the Insurance Crop Losses report.

### VULNERABILITIES & RISK ASSESSMENT

Despite having a 'Relatively Low' Hazard Type Risk Index Rating based on NRI data, the risk for drought in the region dictates a \$1,222.45 (Table III.11.1) annual loss with Easton and Monroe being the only two towns impacted. This is most likely due to the agricultural uses in these two towns, but the overall low level of agricultural land uses in the region when compared with other parts of the state. While agriculture may

not be a top use of land in the region, there are many watercourses, businesses, and residents served by wells, and a strong reliance on water. Statewide drought conditions could directly impact the region through increased food prices due to drought impacting local crops, as well as exacerbated wildfire concerns because of higher temperatures and dry conditions.

### FUTURE IMPACTS OF CLIMATE CHANGE

An increase of dry days and extreme heat is anticipated through climate projections, which may indicate an increase in the length and severity of drought conditions in regions across the northeast. Demand for water could be impacted, as could the timing of water availability. Due to higher temperatures, water quality and associated impacts may also be heightened.

Future development will continue to utilize water-saving fixtures and use drought tolerant landscaping when applicable. Aquarion has permanently instituted restrictions on outdoor water use in its service area, encompassing the MetroCOG region.

III.11.1 Drougнт,
ESTIMATED ANNUAL LOSS

Municipality	Annual Loss
Bridgeport	\$0.00
Easton	\$767.69
Fairfield	\$0.00
Monroe	\$454.76
Stratford	\$0.00
Trumbull	\$0.00

Soutce: FEMA, National Risk Index

## III.12 Hazard Profile: Wildfires

### ASSESSMENT & GENERAL LOCATION

Wildfires are a relatively common occurrence in Connecticut, though they are generally small and cause little to no damage to populated areas.

Wildfires often occur in undeveloped rural or forested areas although smaller fires may occur along highway medians. Wildfire damage is typically greatest at the wildland-urban intersection where low-density suburban/rural developed areas border undeveloped forest and shrubland areas. Wildfires are of particular concern for areas with limited firefighting access such as outlying areas without public water service and large contiguous forest parcels. Structural fires in higher-density areas of the region are not considered in this plan.

Wildfires, also known as "wildland fires," are any nonstructural fire, other than a prescribed burn, that occurs in undeveloped areas. Wildfires can occur as brush and shrub fires, especially under dry conditions, with the potential to grow uncontrollable and become highly destructive.

There are three main types of non-structural fires associated with wildland fires. 'Wildland fires' consist of predominantly natural vegetation, 'intermix fires' are composed of vegetation and human made fuel, and 'prescribed fires' are ignited for forest management purposes.

#### INTENSITY

According to the National Fire Protection Agency, fuel, heat, oxygen, and an uninhibited chain reaction must be present for any type of fire to occur. The CTDEEP Forestry Division issues forest fire danger ratings based on an index of how

quickly a fire is likely to spread and measures of drought. The ratings are low, moderate, high, very high, and extreme. In addition, the National Weather Service issues "Red Flag Warnings," which communicates to firefighters that if a fire occurs, it can be expected to behave erratically due to the weather conditions.

#### HISTORICAL RECORD

According to the CTDEEP Forestry Division, much of Connecticut was deforested by European settlers and turned into farmland during the colonial period. A variety of factors in the 19th century caused the decline of farming in the state, and forests reclaimed abandoned farm fields. During the early 20th century, wildfires regularly burned throughout the state. Many of these fires began accidentally by sparks from railroads and industry while others were deliberately set to clear underbrush in the forest and provide pasture for livestock. A total of 15,000 to 100,000 acres of land were burned annually during this period. This destruction led to the creation of the position of the State Forest Fire Warden which prompted improved forest management measures.

The worst year for wildland fires in the recent past was 2012 when 577 separate fire events occurred throughout the state. Droughts in 1999 and 2016 also exacerbated wildland fires, with over 900 acres burned in the state throughout 2016. Less developed communities such as Easton have a greater risk of wildfires than heavily developed communities such as Bridgeport due to greater forest cover.

#### FUTURE PROBABILITY

The causes of wildfires can be natural or anthropogenic. When not quickly addressed they have the potential to destroy property, endanger human life, and damage ecosystems.

Nationwide, humans have caused approximately 90% of all wildfires in the last decade. Accidental and negligent acts include unattended campfires, sparks, burning debris, children playing with matches, and irresponsibly discarded cigarettes. The remaining 10% of fires are caused primarily by lightning.

There are three fire seasons in Connecticut. The spring season runs from mid-March to mid-May. Prior to leaf-out, grasses, dead leaves, branches, and twigs on the forest floor are dried out by the sun. These 'ground fuels' cause spring fires that tend to spread quickly, although they tend to result in little long-term damage to the forest. The summer fire season lasts from mid-May through September and is largely dependent on precipitation, or lack thereof. Summer fires tend to spread less quickly than spring fires because they burn deeper into the ground. Summer fires are the most destructive to vegetation. Consequently, erosion usually follows summer forest fires. The fall fire season runs from October through to the first snowfall. Fall fires can spread rapidly because of the mass amounts of drying leaves that have fallen.

#### **FUTURE PROBABILITY**

The State Water Plan (2018) climate models project increased temperatures and longer dry periods in the summer months. This suggests that climate change will contribute to lower summer groundwater levels and drier soil conditions, making the region more susceptible to wildfires in the future.

### VULNERABILITIES & RISK ASSESSMENT

The overall risk in the MetroCOG Region from wildfires is relatively low. CTDEEP states that the primary cause of wildland fires in seven of the

eight counties is undetermined, with the
secondary cause being arson or debris
burning. Forest fires
can cause not only
long-term damage
to vegetation and
ecosystems, but also
damage to developments, especially as
residential develop-

III.12.1 WILDFIRE, ESTIMATED ANNUAL LOSS				
Municipality Annual Loss				
Bridgeport	\$352.10			
Easton	\$102.29			
Fairfield	\$2,138.20			
Monroe	\$1,044.54			
Stratford	\$462.74			
Trumbull	\$629.10			

Soutce: FEMA, National Risk Index

ment has increasingly encroached on woodland areas.

FEMA's NRI wildfire risk rating for Fairfield County is "very low". According to the 2010 USDA report Wildland-Urban Interface of the Conterminous United States, 65.6% of Connecticut lies in areas of wildland-urban interface. This area includes 53.8% of all housing structures and 53.9% of the state's population. According to the mapping in this report, the coastal area of the MetroCOG region is generally considered outside of the wildland-urban interface and is not prone to wildfires. The towns of Easton and Monroe, northern Fairfield and Stratford, and portions of Trumbull are located in the wildland-urban interface. These general risk areas were used to estimate vulnerable assets as presented in Tables III.2.iii.1 to III.2.iii.6.

Estimates of annualized loss have been determined based on NRI data in Table III.12.1, indicating \$4,728.97 as the expected annual loss due to wildfires for the region. This method generally allows for larger annualized wildfire losses to be estimated for communities with lower population densities as they are known to be more prone to wildfires in Connecticut. Overall, the annualized losses for the MetroCOG Region due to wildfires are relatively modest.

The NOAA Center for Environmental Information, Storm Event Database does not recognize any wildfire events in the region from 1950 to 2023.

According to the State Natural Hazard Mitigation Plan, wildfires can have widespread impacts within, and outside, of a region and cause dangerous air quality, decrease tourism, and result in loss of structures. Connecticut is one of the most heavily forested states in the United States, thus wildland fires will likely be a highly probable occurrence, despite rapid detection and suppression efforts mitigating the risk of widespread damage.

#### CLIMATE CHANGE ASSESSMENT

Connecticut is one of the most heavily forested states in the nation, ranks among the most densely populated, thus has high potential for deviating impacts associated with wildfires. Climate change has the potential to bring high winds, which would make containment of fires more difficult, specifically in residential areas. With warmer temperatures, the US Forest Service indicates the extent of forests will shift upwards, brining species of trees, shubs, and insects northward, which may contribute to altering the fuel sources of wild fires areas. With increasing temperatures, Connecticut will likely be host to invasive plant species and insects that may alter the current pattern of wildfires in the MetroCOG region. Finally, as the existing Connecticut forests continue to age, change in structure, and species composition, fire danger will continue to be an issue.

It is estimated that Connecticut will have a 1.7% change in population between 2020 and 2040, according to the State NHMP. The increases in population will expand the population's vulnerability to fire as populations, especially in areas such as the MetroCOG region. Currently, it is

anticipated that moderate residential development is anticipated in wildland interface zones to prevent future losses.

## III.13 Hazard Profile: Earthquakes

### ASSESSMENT & GENERAL LOCATION

An earthquake is a sudden rapid shaking of the earth caused by the breaking and shifting of rock within the Earth's crust and upper mantle. While often less severe compared to many other parts of the United States, the entire Region is susceptible to earthquakes. Potential effects may be felt differently in some areas based on the type of geology present. The US Geological Survey (USGS) monitors and reports on earthquake activity. Their records indicate a lack of historical and instrumental reports of strong earthquakes in Connecticut. The region has historically been impacted by minor local earthquakes and the diffuse effects of significant earthquake events originating beyond the state of Connecticut.

#### Hazard Assessment

Earthquakes can occur at any time without warning. Damage to buildings can range from minor cracking of walls and foundations to complete collapse. Earthquakes can cause the disruption of utility services such as power, gas, and phone lines, bridge and dam failure, landslides, flash floods, fires, avalanches, and tsunamis.

#### INTENSITY

The magnitude and intensity of an earthquake is determined using the Richter Scale and the Mercalli scale, respectively. The Richter Scale sets the magnitude of an earthquake based on the amplitude of recorded waves. Earthquakes with a magnitude of about 2.0 or less are typically designated as "microearthquakes" and are generally only recorded locally. Earthquakes with magnitudes of 4.5 or greater are strong

enough to be recorded by seismographs all over the world. According to the USGS, several methods may be used to estimate the magnitude of an earthquake because no single method is capable of accurately estimating the size of all earthquakes. The effect an earthquake has on the surface is referred to as its intensity. The intensity of an earthquake is influenced by factors such as the distance from the epicenter, the depth of the epicenter, the duration of ground movement, the geologic setting, and the composition of the built environment being affected. The current scale used in the US is the Modified Mercalli Intensity Scale. It consists of a series of key responses to an earthquake, ranging from how it was felt by people (at the low end of the scale) to observed structural damage. The scale is composed of 12 increasing levels of intensity that range from imperceptible shaking felt by very few people to catastrophic destruction.

Earthquakes in Connecticut are not associated with specific known faults and are referred to as 'intraplate activity.' Bedrock in Connecticut and New England in general, is highly capable of transmitting seismic energy; thus, the area impacted by an earthquake in Connecticut can be widespread. In addition, the population density of Connecticut can potentially put a great number of people at risk. The built environment in Connecticut includes old, unreinforced buildings that are not seismically designed or engineered. People who live or work in unreinforced older masonry buildings, especially those built on filled land or unstable soils, are at the highest risk for injury from an earthquake.

Despite many older homes and a densely settled population, the Fairfield County Region is unlikely to experience an earthquake in any given year and is not susceptible to an earthquake with a high magnitude or intensity. Table III.13.2, from

the FEMA National Risk Index indicates that the Region has a 'Relatively Low' Expected Annual Loss and Hazard Type Risk Index Rating.

#### HISTORIC RECORD

According to the USGS Earthquake Hazards
Program, Connecticut is a region of very minor
seismic activity. However, the New England
states regularly register seismic events and earthquakes have occurred in the Region. Only two
earthquakes in recorded history are considered
notable- both in the East Haddam area, one in
1568 and the other in 1791

As seen in Table III.13.1, 49 earthquakes have been recorded in Connecticut between 1976 and 2023, ranging in magnitude from 1.1 to 3.8 on the Richter Scale, with only two having a magnitude greater than 3.0. These are relatively minor earthquakes. Generally, the earthquakes that have occurred in Connecticut produce very little noticeable shaking and are not felt by very many people. However, it is notable that 32 earthquakes occurred in Connecticut between 2012 and 2016, with the majority occurring in Plainfield. Within the 2012 to 2016 time frame, the nearest earthquake event happened on September 8, 2012, a 2.1 magnitude, 4 km deep earthquake near Stamford. Dozens of residents reported feeling the ground move, but no injuries were reported. More recently, since 2016, there have been 10 additional earthquakes, with little consistency in location; with the largest centering in Kensington, classified as a 2 magnitude.

USGS confirms that seismic waves can travel much further without weakening along the Eastern United States due to the geological rock structure and properties of the region. Significant earthquakes beyond the borders of Connecticut have had a minor, yet notable impact on the MetroCOG region. A magnitude 3.9 earthquake

occurred 117 miles southeast of Bridgeport,
Connecticut in 2010 which did not cause damage locally but was felt by residents along Long
Island Sound. A magnitude 5.8 earthquake
occurred 38 miles from Richmond, Virginia on
August 23, 2011. Many residents of Connecticut
experienced the swaying and shaking of buildings and furniture during the earthquake, although widespread damage was limited to parts
of Virginia and Maryland, numerous structures in
Connecticut underwent safety checks in the aftermath. According to Cornell University, the August
23 quake was the largest event to occur in the
eastern United States since instrumental recordings have been available to seismologists.

Date	Mag*	Location
July 19, 1975	2.3	7 km NW of Mahopac, NY
April 24, 1976	2.2	2 km WNW of East Haddam, CT
December 30, 1979	2.5	o km W of North Castle, NY
October 24, 1980	3.1	3 km N of East Haven, CT
October 25, 1980	3	4 km ENE of New Haven, CT
October 21, 1981	3.8	14 km S of Madison Center, CT
June 17, 1982	2.2	2 km NNE of Moodus, CT
June 17, 1982	2.2	1 km NNE of Moodus, CT
June 17, 1982	3	6 km E of Moodus, CT
June 17, 1982	2.4	1 km ENE of Moodus, CT
September 11, 1987	2.4	3 km WNW of East Haddam, CT
April 12, 1991	2.7	2 km ENE of North Castle, NY
October 28, 1991	3	3 km WNW of Stamford, CT
March 10, 1992	2.8	2 km SW of Napeague, NY
June 16, 2000	3.3	5 km NE of Granville, MA
August 22, 2000	2.6	2 km WSW of Brewster Hill, NY
February 3, 2001	1.8	8 km S of Durham, CT
April 4, 2013	1.8	2 km W of Hope Valley, RI
January 15, 2015	1	1 km E of Wauregan, CT

<sup>\*</sup>Magnitude; Source: https://earthquake.usgs.gov/data/comcat/

III.13.1 EARTH	IQUAKE	s, Previous Occurences
Date	Mag*	Location
February 24, 2015	1.4	1 km ENE of Wauregan, CT
November 4, 2012	1.44	6 km E of Cannondale, CT
February 1, 2014	1.38	1 km SW of Rye Brook, NY
August 14, 2014	1.66	5 km SW of Deep River Center, CT
August 18, 2014	1.57	1 km WSW of East Haddam, CT
October 13, 2014	1.29	4 km E of Moosup, CT
October 14, 2014	1.54	1 km ENE of Wauregan, CT
November 9, 2014	1.5	o km NE of Wauregan, CT
November 20, 2014	1.52	o km SE of Byram, CT
January 12, 2015	1.6	1 km E of Wauregan, CT
January 12, 2015	1.5	1 km ENE of Wauregan, CT
January 12, 2015	2.1	2 km E of Wauregan, CT
January 12, 2015	1.03	1 km ESE of Wauregan, CT
January 12, 2015	1.7	2 km E of Wauregan, CT
January 12, 2015	1.6	1 km ENE of Wauregan, CT
January 13, 2015	2.6	2 km E of Wauregan, CT
January 14, 2015	1.8	o km ENE of Wauregan, CT
February 24, 2015	1.8	o km ENE of Wauregan, CT
May 17, 2015	1.4	6 km N of Bristol, CT
November 9, 2014	0.76	1 km ENE of Wauregan, CT
January 12, 2015	0.72	1 km ESE of Wauregan, CT
January 12, 2015	0.64	1 km ESE of Wauregan, CT
January 12, 2015	0.75	1 km ESE of Wauregan, CT
January 12, 2016	0.81	o km S of Byram, CT
June 13, 2016	1.4	4 km WNW of North Stamford, CT
February 2, 2017	1.6	1 km NNW of Hebron, CT
July 5, 2017	0.9	NY
December 17, 2017	2	4 km E of Kensington, CT
February 27, 2018	1.5	2 km S of Woodbridge, CT
May 31, 2018	0.82	2 km WNW of Mamaroneck, NY
February 26, 1983	3	4 km W of Pawling, NY
July 11, 2018	1.3	o km WNW of Greene, RI
July 14, 2018	1.1	2 km ESE of Durham, CT
	//	

### $*Magnitude; \ Source: https://earthquake.usgs.gov/data/comcat/$

III. 13.1 EARTHQUAKES, PREVIOUS OCCURENCES				
Mag*	Location			
1.4	3 km N of Cos Cob, CT			
1.9	3 km ENE of Durham, CT			
1.6	3 km NE of Newington, CT			
2.2	9 km SE of Merritt Park, NY			
1.9	8 km SE of Stafford Springs, CT			
1.23	3 km SE of North Castle, NY			
2.25	4 km E of Montville Center, CT			
2.42	4 km WSW of Chester Center, CT			
1.54	2 km S of Stamford, CT			
1.97	1 km SE of Stonington, CT			
1.99	1 km ENE of Old Mystic, CT			
1.48	2 km ESE of Lincolndale, NY			
2.66	6 km SW of Deep River Center, CT			
1.31	4 km WSW of Pawling, NY			
1.27	1 km W of Mamaroneck, NY			
2.3	o km WNW of Wauregan, CT			
2	1 km NE of Wauregan, CT			
1.5	o km E of Wauregan, CT			
	Mag*  1.4  1.9  1.6  2.2  1.9  1.23  2.25  2.42  1.54  1.97  1.99  1.48  2.66  1.31  1.27  2.3  2			

3.3

1.2

1.9

4.8

o km NE of Wauregan, CT

1 km SW of Stamford, CT

Whitehouse Station, NJ

3 km SW of West Hartford, CT

At the time of updating this NHMP, the Northeast experienced a magnitude 4.8 earthquake based in New Jersey, with impacts felt from Baltimore to Boston. No damages were reported in the Bridgeport Region.

### **FUTURE PROBABILITY**

January 12, 2015

October 15, 2022

March 5, 2021

April 5, 2024

The conclusion by the USGS is that Connecticut is a region of minor seismic activity. The earthquakes that have occurred have been of low magnitude and intensity. Most people would not

<sup>\*</sup>Magnitude; Source: https://earthquake.usgs.gov/data/comcat/

feel the shaking generated by an earthquake in Connecticut. While earthquakes have occurred outside the state, the impacts felt in Connecticut from these events have also been minor. Based on this review of recent events and the greater historical record, the likelihood of an earthquake of sufficient magnitude and intensity impacting the Region is low. Connecticut may be categorized as having a low or moderate risk for an earthquake > 3.5 occurring in the future and a moderate risk of an earthquake < 3.0 occurring in the future.

### VULNERABILITIES & RISK ASSESSMENT

Based on the historical record and NRI, the MetroCOG Region has a low risk for earthquake activity. However, it is not impossible that a significant event could occur and cause tremendous damage. While no earthquakes have been centered in Bridgeport, there have been historic

earthquakes of estimated magnitude 5.0 and above in other parts of the state.

Based upon the National Risk Index, the Expected Annual Loss associated with an earthquake event would equal \$562,376 with the majority of funds associated with Bridge-

III.13.2 EARTHQUAKE
ESTIMATED ANNUAL LOSS

Municipality	Annual Loss
Bridgeport	\$196,763
Easton	\$12,119
Fairfield	\$158,421
Monroe	\$44,165
Stratford	\$108,714
Trumbull	\$42,185

Soutce: FEMA, National Risk Index

port (\$196,763), Fairfield (\$158,421), and Stratford (\$108,714) (Table III.13.2).

The State NHMP presents four "worst-case" scenarios for major earthquakes occurring in the state. These include a 6.4 magnitude earthquake in East Haddam, a 5.7 magnitude earthquake in Haddam, a 5.7 magnitude earthquake in Portland, and a 5.7 magnitude earthquake in Stamford. Each of these scenarios was modeled for each town in the Region using HAZUS-MH.

#### **HAZUS**

Using the East Haddam 1791 Earthquake Scenario generated in HAZUS-MH, many essential facilities would lose functionality during the first day as shown in Table III.13.3. It is estimated that in the MetroCOG region, 12,022 buildings would be damaged: with 26.8% being either 'moderate', 'extensive' or 'complete' damages. The building related economic loss for the Metro-COG region indicates that the largest amount of

III. 13.3 EARTHQUAKES, ESSENTIAL FACILITIES					
Туре	Faciltiies with Moderate Damage	Complete Damage	Functionality > 50% on day 1	Total Stock	
EOC	0	0	6	6	
Fire	0	0	33	33	
Hospital	0	0	2	2	
Police	0	0	12	12	

0

122

122

III.13.4 Earthquakes, Buildings Damaged								
Municipality	Municipality Slight Moderate Extensive Complete Total							
Bridgeport	2,981	1,111	185	20	4,297			
Easton	229	61	8	1	299			
Fairfield	1,973	568	81	8	2,630			
Monroe	688	206	30	3	927			
Stratford	1,785	527	78	8	2,398			
Trumbull	1,140	289	38	4	1,471			
Total	8,796	2,762	420	44	12,022			

Source: HAZUS-MH

School

0

III.13.5 EARTHQUAKES, BUILDINGS-RELATED ECONOMIC LOSS*						
Municipality	Residential	Commercial	Industrial	Others	Total	
Bridgeport	\$99.8	\$102.5	\$30.5	\$57.1	\$289.9	
Easton	\$11.7	\$4.4	\$0.7	\$2.3	\$19.1	
Fairfield	\$72.2	\$60.7	\$6.6	\$46.3	\$185.8	
Monroe	\$25.9	\$17.9	\$3.2	\$7.7	\$54.7	
Stratford	\$52.0	\$66.0	\$13.8	\$21.9	\$153.7	
Trumbull	\$43.3	\$30.7	\$2.8	\$9.8	\$86.6	
Total	\$304.9	\$282.2	\$57.6	\$145.1	\$789.7	

<sup>\*</sup>In millions

Municipality	Debris Generated (tons)	Households Displaced	Individuals Seeking Temporary Shelter
Bridgeport	72,000	299	207
Easton	3,000	0	0
Fairfield	35,000	48	20
Monroe	10,000	15	7
Stratford	31,000	79	36
Trumbull	14,000	17	8
Total	165,000	458	278

HAZUS-MH

damage would be residential; with a total loss of \$304,870,000; 38% of the total building economic loss for the region.

It is estimated that 458 households would be displaced in the MetroCOG region. Associated impacts with an earthquake scenario indicate that over 165,000 tons of debris would be generated, with the largest amount present in Bridgeport; with the largest number of debris representing the 'Brick/Wood' category (57%), which would require 2,880 truckloads to remove the debris generated.

While a significant earthquake has never been centered in the MetroCOG region, the modeling suggests that a significant event in our developed and densely populated Region would have a serious impact.

### CLIMATE CHANGE ASSESSMENT

Current evidence that climate change has an impact on the prevalence or magnitude of earthquakes is inconclusive, however according to the U.S. Geological Survey, a correlation has been noted between earthquakes and weather from large changes in atmospheric pressure caused by major storms like hurricanes. These events have shown energy releases over long periods of time. Earthquakes can also cause changes in the flow of groundwater, landslides, and soil strength, which can damage fragile ecological systems and have related deleterious impacts to the environment.

In the MetroCOG region, future development will meet all State Building Codes required for Earthquakes, as they may damage structural foundations and integrity of buildings and roadway.

### III.14 Risk Assessment Summary

III.14.1 Summary Table					
Hazard Type	Historical Extent	Probability of Future Occurence	Impacts	Vulnerable Areas	
Hurricanes	Cat. 3 hurricane was strongest storm to strike CT.	<ul> <li>Tropical cyclone every 3.6 yrs</li> <li>Cat 1 every 10-15 yrs</li> <li>Cat 2 every 23-30 yrs</li> <li>Cat 3 every 46-74 yrs</li> </ul>	Loss of life, building damage, essential facility damage, debris, shelter needs, transportation disruption, loss of power, economic loss	Low-lying areas in or near flood zones vulnerable to inland flooding from rain; coastal low-lying areas vulnerable to coastal flooding and storm surge.	
Coastal Flooding	Cat 3 hurricane was strongest storm to strike CT.	Based on historical record moderate to severe coastal flooding occurs once every 3-4 yrs.	Loss of life, building damage, essential facility damage, debris, shelter needs, transportation disruption, economic loss	Low lying coastal areas especially those in FEMA 1% and 0.2% flood zones	
Inland Flooding	The 1955 flood was esti- mated to be a 2% -0.2% event for the region	Moderate to extreme flooding occurs at a fairly frequent rate. Based on patterns from 2018-2023, suggests 1-2 events annually.	Loss of life, building damage, essential facility damage, debris, shelter needs, transportation disruption, economic loss, breach of dams	Low lying areas nears streams; especially those in the 1% and 0.2% flood zones. Certain areas are more susceptible due to local conditions such as poor drainage.	
Sea Level Rise	Relative sea level rise between 15-30 cm (~6- 12 in) over last 100 yrs.	IPCC reports 15-101cm (~5.9 to ~39.7 in) by 2100; CIRCA planning number of 0.5 m by 2050	More damage from coastal and inland flooding events	Low lying coastal areas especially those in FEMA 1% and 0.2% flood zones	
Summer Storms and Tornadoes	Most severe tornado in history was EF-2	Based on historic record tornadoes hit Region once every 15 years	Building damage, vehicular damage, debris, shelter needs, power loss, downed trees, loss of life from lightning strikes and tornadoes	Entire region	
Winter Storms	Since 2018, storms have dropped up to 16 in. of snow; a 2013 storm brought 3 ft of snow to some areas.	Based on historical record severe winter storms occur once every 1.2 years in the Region	Transportation disruption, loss of power, moderate building damage, loss of life especially to at risk populations such (elderly/disabled)	Entire region. More rural areas where road clearing is more difficult and loss of power leads to loss of water	
Dam Failure	Failure of a class C dam	Low probability but could occur during large rain events	Loss of life, building damage, essential facility damage, debris, people requiring shelter, transportation disruption, economic loss	Low lying areas downstream of dams.	

III.14.1 Summary Table				
Hazard Type	Historical Extent	Probability of Future Occurence	Impacts	Vulnerable Areas
Extreme Heat	Since 2018, Fairfield County has experi- enced 13 days with a maximum temperature of over 90 degrees.	The CT NHMP indicates the sate will experience 1-2 extreme heat events per year.	Infrastructure impacts due to water demand and power needs; strain on electrical grid. Damage to crops and livestock. Human health impacts due to heat exhaustion and heat stroke.	Entire region. Urban areas may experience higher temperatures and greater negative impacts due to urban heat island effect.
Extreme Cold	Since 2000, the region has experienced 3 days of extreme cold	Cold is an annual occurrence. Based on historical patterns, NRI climate projections, periods of extreme cold are relatively low.	Negative impacts on public health, risks to transportation/human critical infrastructure, and disruptions to agriculture.	Entire region. Disproportionate impacts on elderly, youth populations, persons with a disabiliy, and the unhoused.
Drought	Since 1950, there have been 6 drought events reported in the state. The last occurrence was 2023.	The NRI indicates a relatively low risk. Climate projections indicate an increase of dry days and extreme heat which may indicate an increase in the length and severity of drought.	Ranges from minor effects to catastrophic damage in a localized area, to widespread damage impacting human health, the environment, and the economy.	Entire region. Agrictultural land uses may be more impacted.
Wildfire	Undeveloped areas	Low probability for damaging fires	Building damage, debris, smoke, loss of life, people requiring shelter, economic loss	Structures near the urban- wildland interface
Earthquakes	Magnitude 5 earth- quakes have occurred historically in the State	Low probability of significant event	Loss of life, building damage, essential facility damage, debris, people requiring shelter, transportation disruption, economic loss, fires	Entire region

## IV COMMUNITY CAPABILITIES

Numerous capabilities at the federal, state and local scales reduce risk and vulnerability to hazards and increase resilience in the MetroCOG Region. This section describes and evaluates the existing capabilities available to mitigate hazards. The most relevant federal and state resources to hazard mitigation are summarized in the beginning of this chapter, with further explanations in Appendix F. The focus of this chapter is on the local and regional capabilities that municipalities have direct access to in mitigating hazards. This plan has demonstrated the utility of many of these capabilities in evaluating risk and developing mitigation strategies.

The hazard(s) that each capability mitigates are identified. Capabilities typically fall into several of the following categories:

- Planning and Regulatory
- Administrative and Technical
- Financial
- Education and Outreach

Chapter 6 of this plan provides an overview of federal and state funding opportunities and technical resources that can implement the plan. Further, Chapter 5 of the draft State NHMP provides an in-depth review of federal and state capabilities.

### IV.1 Federal

### FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) REGION 1

FEMA sponsors the major flood related programs through the Federal Insurance Administration, the National Preparedness Programs Directorate, and the State and Local Programs Directorate. FEMA provides disaster assistance under Section 404 of the Robert T. Stafford Disaster Assistance and Recovery Act and the Flood Mitigation Assistance Act, Part 78. The FEMA website provides numerous educational resources. FEMA's National Risk Index (NRI) continues to inform the vulnerability of communities to natural hazards, including climate change.

### National Flood Insurance Program (NFIP)

All MetroCOG municipalities participate in the National Flood Insurance Program (NFIP), which provides insurance to help reduce the socio-economic impact of floods. Participation in the NFIP is based on an agreement between local communities and the Federal government that states if a community adopts and enforces a floodplain management ordinance to reduce future flood risks to new construction in Special Flood Hazard Areas (SFHAs), the federal government will make flood insurance available as a financial protection against flood losses. FEMA's Risk Insurance Division oversees the program in partnership with the states. Connecticut's NFIP coordinator is located within CTDEEP's Land and Water Resources Division.

The NFIP touches on all four community capabilities:

 Planning and regulatory. Adopting floodplain management regulations and managing development in the floodplain is required. The municipality's local flood damage prevention ordinance must include established minimum building standards for the floodplain. All new buildings and substantial improvements to existing buildings are required to be protected from damage by floods with a 1% annual chance of occurring. New floodplain development may not aggravate existing flood problems or increase damage to other properties.

- Administrative and technical. Each
  community must designate a floodplain
  administrator. Other administrative and technical capabilities that support compliance
  may relate to permitting, zoning or site plan
  review.
- Financial. Having NFIP policies speeds recovery and allows post-disaster funds to be used elsewhere. Joining the NFIP gives communities access to other kinds of pre- and post-disaster funding for mitigation.
- Education and outreach. Education and outreach programs and tools through the NFIP support flood risk communication and mitigation.

### Flood Insurance Rate Maps

FEMA's Risk Analysis Branch is responsible for developing, maintaining, and updating Flood Insurance Rate Maps (FIRMs) which identify the community's SFHAs - any land that would be inundated by a flood having a 1% chance of occurring in any given year. These maps are developed through partnerships between FEMA, the state, and local communities to identify flood hazards, assess flood risks, and provide accurate data to guide stakeholders. FIRMs provide the basis for community floodplain management regulations and flood insurance requirements.

As flood hazards are dynamic and can change frequently, FEMA works with communities to collect new or updated flood hazard data and periodically updates flood maps to reflect these changes. Preliminary FIRMs were released for Fairfield County in June of 2023.

### Community Rating System (CRS)

Administered by FEMA's Risk Reduction Branch, CRS is a voluntary program that offers discounts on flood insurance premiums to communities that undertake activities beyond minimum flood insurance standards. As of late 2023, the Towns of Fairfield, Stratford and Trumbull continue to maintain their Class 8 rating, which provides a 10% discount to policy holders. Like the NFIP, the CRS touches on all four community capabilities. The CRS program groups activities into six categories:

- Preventive activities keep flood problems from getting worse, such as limiting use and development in flood-prone areas.
- Property protection activities are typically undertaken by property owners on a building-by building or parcel basis.
- Natural resource protection activities preserve or restore natural areas or the natural functions of floodplain and watershed areas.
- Emergency services measures are taken during an emergency to minimize its impact.
- Structural projects keep flood waters away from an area with a levee, reservoir, or other flood control measure.
- Public information activities advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.

The CRS program requires that communities with ten or more repetitive loss properties (Category C) prepare a floodplain management plan that covers the repetitive loss areas. All coastal communities in the MetroCOG Region are Category C Repetitive Loss Communities. Multi-jurisdictional NHMPs that are prepared in accordance with the CRS Floodplain Management Planning process qualify for floodplain management planning credit. Due to the rigorous requirements of the program, the NHMP will be monitored, evaluated and updated as a CRS activity and meet the following post-adoption requirements:

- An annual evaluation report on progress towards plan implementation must be prepared at least once each year and submitted with the community's annual CRS recertification. The report must be submitted to the governing body, released to the media, and made available to the public.
- If a community receives credit due to participation in a multi-jurisdictional plan that includes action items for each community, the annual evaluation report must cover those action items. This can be done either by a multi-jurisdictional planning committee or through separate submittals by each community MetroCOG's CRS communities submit their annual reports separately.
- The community must update the plan at least every five years. As public information activities are an important and required component of CRS, NHMP public participation requirements and recommendations of the NHMP regarding public education and awareness are being implemented through the CRS Program.

### Risk Analysis Branch

FEMA's Risk Analysis Branch is responsible for the National Hurricane Program, which conducts and supports projects and activities that help protect communities from hurricane hazards. The program is a partnership between FEMA, the U.S. Army Corps of Engineers and the NOAA National Hurricane Center.

The Risk Analysis Branch also manages FEMA's Multi-Hazard Mitigation Planning (HMGP) program, a process for states and communities to identify policies, activities, and tools that can reduce or eliminate long-term risk to life and property from a hazard event.

#### **Risk Reduction Branch**

FEMA's Risk Reduction Branch administers the National Earthquake Hazards Reduction Program (NEHRP) a multi-agency partnership that works in conjunction with state and regional organizations to support state and local programs designed to protect citizens from earthquake hazards.

### Office of Response & Recovery

In addition to administering federal disaster funds, the office maintains information on dollar amounts of past disaster assistance including Public Assistance, Individual Assistance, and Temporary Housing. Information on retrofitting and acquisition/relocation initiatives is also maintained by the division.

FEMA can provide information on past and current acquisition, relocation, and retrofitting programs, and has expertise in many natural and technological hazards. FEMA funds training for state and local officials at the Emergency Management Institute in Emmitsburg, Maryland.

### **Mitigation Directorate**

FEMA's Mitigation Directorate has several Technical Assistance Contracts (TAC) that support FEMA, states, territories, and local governments with activities to enhance the effectiveness of natural hazard reduction program efforts. The TACs support FEMA's responsibilities and legislative authorities for implementing the earthquake, hurricane, dam safety, and floodplain management programs. The range of technical assistance services provided through the TACs varies based on the needs of the eligible contract users and the natural hazard programs. Contracts and services include:

- The Hazard Mitigation Technical Assistance Program (HMTAP) Contract:
   supports post-disaster program needs for large, unusual, or complex projects; situations where resources are not available; or where outside technical assistance is needed. Services include environmental and biological assessments, benefit/cost analyses, historic preservation assessments, hazard identification, community planning, training, and more.
- The Wind and Water Technical Assistance (WAWTA) Contract: supports wind and flood hazards reduction program needs. Projects include recommending mitigation measures to reduce potential losses to post-FIRM structures, providing mitigation policy and practices expertise to states, incorporating mitigation into local hurricane program outreach materials, developing a Hurricane Mitigation and Recovery exercise, and assessing the hazard vulnerability of a hospital.
- The National Earthquake Technical Assistance (NETA) Contract: Supports earthquake program needs. Projects include economic impact analyses of various earthquakes, vulnerability analyses of hospitals

and schools, identification of and training on nonstructural mitigation measures, and evaluating the performance of seismically rehabilitated structures, post-earthquake.

# NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION (NOAA)

NOAA's mission is to understand and predict changes in climate, weather, ocean, and coasts, to share that knowledge and information with others, and to conserve and manage coastal and marine ecosystems and resources. NOAA's State Climate Summary for Connecticut (2022) was a helpful resource in updating the plan's risk assessment. Capabilities through NOAA relevant to hazard mitigation include:

- National Weather Service (NWS): The NWS issues advisories, watches, and warnings for natural hazards that include flooding, winter weather, severe storms and tornadoes, and wildfires. These warnings enable communities and residents to prepare for impending events, but due to the unpredictable nature of some events (such as tornadoes), some communities may have a very limited time to respond to the warning.
- National Integrated Drought Information System (NIDIS): is a multi-agency partnership that coordinates drought monitoring, forecasting, planning, and information at the national, state, and local levels. The NIDIS provides numerous resources, including historic drought conditions, outlooks, and information on how droughts are related to public health, agriculture and wildfire management. See <a href="https://www.drought.gov">www.drought.gov</a>.

### US ARMY CORP OF ENGINEERS (US ACE)

The USACE provides technical and financial assistance for floodplain management planning, and has undertaken several flood and erosion control projects, including the design, construction, and operation of flood protection projects in communities across the state. In 2020, the Coastal Storm Risk Management Feasibility Study for New Haven and Fairfield Counties was completed. The feasibility study analyzed coastal storm damage-prone communities to identify economically-justified problem areas for USACE construction eligibility. Although a flood control project in Fairfield was under consideration, the study ultimately selected Long Wharf in New Haven. The USACE continues to evaluate flood protection in Fairfield.

US ACE also provides emergency flood assistance after local and state funding has been used. Assistance can be used for both flood response and post-flood response, but it is limited to the preservation of life and improved property. Direct assistance to individual homeowners or businesses is not permitted. The Corps may loan or issue supplies and equipment once local sources are exhausted during emergencies.

### US DEPARTMENT OF AGRICULTURE

### Natural Resources Conservation Service

The NRCS works cooperatively with landowners, conservation districts, federal, state, and local governments, and citizens from urban and rural communities to restore and enhance the land-scape. NRCS soil conservationists, soil scientists, agronomists, ecologists, engineers, planners, and other specialists promote land stewardship by providing technical assistance through teams to

address surface and groundwater quality; wetlands, riparian areas, and biodiversity; aquatic and terrestrial habitat; the impacts of land use changes; and for erosion control.

## US DEPARTMENT OF THE INTERIOR, NATIONAL PARK SERVICE

### Rivers, Trails, & Conservation Assistance

The National Park Service provides communities with technical assistance to conserve rivers, preserve open space, and develop trails and greenways and assists with the identification of nonstructural options for floodplain development.

### IV.2 State

# DEPARTMENT OF EMERGENCY SERVICES & PUBLIC PROTECTION (DESPP)

The Department of Emergency Services and Public Protection (DESPP) houses the Division of Emergency Management and Homeland Security (DEMHS). DEMHS includes emergency preparedness, response and recovery, mitigation and an extensive training program. DESPP/DEMHS is the state point of contact for most FEMA grant and assistance programs.

### **Hazard Mitigation Planning**

As required by FEMA, DEMHS, through the State Hazard Mitigation Officer (SHMO), is responsible for updating the State Hazard Mitigation Plan (HMP) every five years. The document examines statewide impacts of natural hazards, compares impacts between counties, examines state capabilities, and outlines new initiatives for hazard mitigation planning at the state level to be enacted at the local level over the next five years. The 2023 update to the 2019 is currently in draft and was a helpful resource as this plan was updated.

DEMHS Region 1 includes all the municipalities in the MetroCOG region, as well as eight municipalities in lower Fairfield County. The Regional Emergency Planning Team (REPT) for DEMHS Region 1 operates under bylaws which established their mission, membership and procedures. The REPTs are supported by Regional Emergency Support Functions (RESFs), which are discipline-oriented workgroups that provide collaborative planning and resource support.

DESPP maintains the statewide "CT Alert" Emergency Notification System, which uses the State's Enhanced 9-1-1 database for location-based

notifications to the public for life-threatening emergencies. The database includes traditional wire-line telephone numbers in the state, but residents may register on-line for other means of communication, such as a mobile phone, e-mail, text messages, or certain hearing-impaired receiving devices. Further, each MetroCOG municipality receives regular weather updates through DEMHS Region 1 email alerts as well as NWS-issued watches and warnings.

### DEPARTMENT OF ADMINISTRATIVE SERVICES

### State Building Code

The <u>Connecticut Department of Administrative</u>
<u>Services</u>, Division of Construction Services includes the Office of the State Building Inspector, which is responsible for maintaining the current (2022) state building code. Each MetroCOG municipality has adopted the Connecticut Building Code as its building code. The code includes design standards for wind, snow load, earthquakes, and other hazards.

- Wind: Standards for constructing buildings to withstand wind pressures and wind forces on roofs. The ultimate design wind speed for all MetroCOG municipalities is 120 mph. The Building Code classifies some areas south of Interstate 95 as a Wind-Borne Debris Region which includes areas of Bridgeport, Fairfield, and Stratford.
- Lightning: Guidelines for the proper grounding of buildings and electrical boxes to protect against lightning damage.
- Snow: 30 pounds per square foot be used as the base "ground snow load" for computing snow loading for roofs.
- Earthquakes: Seismic design criteria for buildings.

• Flooding: The 2022 code is significant relative to flood mitigation. Adherence to the State Building Code requires that the foundation of structures withstand flood forces and that all portions of the building subject to damage are above or otherwise protected from flooding. It requires 1 foot of freeboard in all A, AE, and VE zones (VE zones have a risk of significant wave action and tend to be found along coastlines). Coastal A zones (A or AE zones occurring waterward of the limit of moderate wave action) are regulated like VE zones in certain cases. Flood openings are required in breakaway walls. Essential facilities must be elevated 2 feet above the BFE or to the 0.2% annual chance flood elevation.

The Office is also responsible for the municipal Building Inspector Training Program.

# DEPARTMENT OF ECONOMIC & COMMUNITY DEVELOPMENT (DECD)

### State Historic Preservation Office (SHPO)

Responsible for overseeing the governmental program of historic preservation for Connecticut's citizens, SHPO administers a range of federal and state programs that identify, register and protect the buildings, sites, structures, districts and objects that represent Connecticut's cultural heritage. SHPO recently released the Connecticut Cultural Resources Information System (Conn-CRIS), an online viewer of Connecticut's cultural resources. Building on the resiliency concepts integrated in the 2017-2018 State Historic Preservation Plan update, the viewer can be used to identify cultural resource vulnerable to flooding. A best practice guide for planning techniques to make historic resources more resilient was distributed to municipalities in 2018.

### DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION

### Bureau of Water Protection & Land Reuse, Inland Water Resources Division

This division is generally responsible for flood hazard mitigation in Connecticut. Key capabilities include:

- NFIP State Coordinator: Provides flood insurance and floodplain management technical assistance, floodplain management ordinance review, substantial damage/ improvement requirements, community assistance visit, and other general flood hazard mitigation planning including the delineation of floodways.
- Inland Wetlands and Watercourses
   Management Program: Provides training,
   technical, and planning assistance to local
   Inland Wetlands Commissions and reviews
   and approves municipal regulations. Controls flood management and natural disaster
   mitigation.
- Stormwater: the Connecticut Stormwater

  Quality Manual provides guidance on site
  planning, source control, and stormwater
  practices, including the design, construction,
  and maintenance of stormwater systems. The
  practices detailed in the manual aim to reduce the volume of urban runoff and pollutant discharges, recharge groundwater, and
  control peak flows. These types of stormwater
  best practices protect water quality and
  minimize flooding risks. A revised manual
  became effective in March of 2024.
- Former Office of Long Island Sound Programs (OLISP): Administers the Coastal Area Management (CAM) Act program and Long Island Sound License Plate Program.

#### Soil Erosion & Sediment Control

Per CGS 22a-325 - 22a329, all municipalities in Connecticut are required to adopt regulations pertaining to soil erosion and sediment control. All applications for proposed development that will disturb more than a half-acre must include a soil erosion and sediment control plan. DEEP's guidelines serve as the technical standard for compliance with the statute and detail specific measures to reduce damages and pollution associated with erosion and sedimentation while simultaneously reducing flooding risks. The manual was updated in 2012 to incorporate appendices on Low Impact Development (LID); a revised version became effective in March of 2024. LID manages stormwater by designing with nature in mind; techniques seek to retain stormwater close to where it falls thus keeping runoff out of pipes that drain to waterways.

### Chemical Management & Climate Resilience

resources for businesses to assess the vulnerability of their location to climate-related natural hazards and to prevent damage/contamination from toxic on-site materials. Resources are targeted to all businesses, but especially those in flood prone areas that use chemicals in their process, sell chemicals and/or store hazardous waste onsite, including retailers and service providers. The CT Toxic Users & Climate Risk Viewer layers include the national flood hazard zones, hurricane evacuation areas, EPCRA Tier 2 filers, RCRA hazardous waste generators, storage/disposal facilities, and Toxic Release Inventory reporters.

### Office of Climate Planning

The Office of Climate Planning works in partnership with all branches of DEEP to plan for,

report progress on, and meet the state's emissions reduction goals of 45% by 2030 and 80% by 2050.

The Office is responsible for administering the Governor's Council on Climate Change and works to implement the Council's recommendations included in "Taking Action on Climate Change and Building a More Resilient Connecticut for All". The office conducts these activities with a focus on equity and environmental justice to ensure costs and benefits of climate mitigation are shared and that vulnerable communities are prioritized in adaptation and resilience strategies.

### Office of Dam Safety

CTDEEP and state regulations requires repaired or reconstructed dams are designed to handle at least a 100-year rainfall event with at least one foot of freeboard. All dams must be registered by the owner with CT DEEP, which requires dams to be routinely inspected - those with a higher hazard potential are inspected more frequently. Dams found to be unsafe under the inspection program must be repaired by the owner. Depending on the severity of the identified deficiency, an owner is allowed time to make the required repairs or remove the dam. If a dam owner fails to make necessary repairs to the subject structure, CT DEEP may issue an administrative order requiring the owner to restore the structure to a safe condition and may refer noncompliance with such an order to the Attorney General's Office for enforcement. As a means of last resort, the CT DEEP Commissioner is empowered to remove or correct, at the expense of the owner, any unsafe structures which present a clear and present danger to public safety.

Public Act No. 13-197, An Act Concerning the Dam Safety Program and Mosquito Control, was passed in June 2013 and shifted regularly

scheduled inspection and reporting requirements from the CTDEEP to the owners of dams. Owners of certain unregistered dams or similar structures were required to register them by October 1, 2015. The act also made owners responsible for supervising and inspecting construction work and established new reporting requirements for owners when the work is completed.

The owner of any high or significant hazard dam (Classes B and C) is also required to develop and implement an emergency action plan (EAP), which must be updated regularly and filed with CTDEEP and the chief executive officer of any municipality that could potentially be affected in the event of an emergency. Requirements for EAPs include (1) criteria and standards for inundation studies and inundation zone mapping; (2) procedures for monitoring the dam or structure during periods of heavy rainfall and runoff, including personnel assignments and features of the dam to be inspected at given intervals during such periods; and (3) a formal notification system to alert appropriate local officials who are responsible for the warning and evacuation of residents in the inundation zone in the event of an emergency.

### Open Space & Watershed Land Acquisition Grant Program

Financial aid is available to municipalities, non-profit land conservation organizations, and water companies to acquire land for the protection of local outdoor recreation, unique natural features, fish and wildlife habitat, and land which can be classified as Class I or Class II water supply property.

### **Division of Forestry**

Connecticut DEEP's Division of Forestry maintains an active forest fire prevention program and a specially trained force of firefighting personnel to combat fires. During the spring fire season and at other times of high or above fire danger, the division broadcasts daily predictions and issues advisories to state park staff, municipalities, fire departments, and the media. The division monitors areas with below normal precipitation and utilizes precipitation and soil moisture data to compile and broadcast daily probability forecasts. Danger levels are classified as low, moderate, high, very high, or extreme. The division may also assist local fire departments with specific requests, as well as the U.S. Forest Service in controlling large fires across the nation.

### DEPARTMENT OF TRANSPORTATION (CTDOT)

### Statewide Roadway Weather Information System (RWIS)

CTDOT has implemented the Statewide Roadway Weather Information System (RWIS). Each of the 13 RWIS sites communicate real-time and historical weather information to CTDOT staff and weather services. This information is used to monitor the impacts of heavy rainfall and to inform a variety of winter maintenance activities. An additional 25 priority sites have also been identified. CTDOT is responsible for maintenance and plowing along state roadways, and local communities coordinate with CTDOT when problems need to be addressed.

### Sustainability & Resiliency Unit

Housed under the Office of Policy & Intergovernmental Affairs, Bureau of Policy and Planning, the Sustainability and Resiliency Unit develops plans to increase the sustainability of the state's multimodal transportation system. The unit works with offices across CTDOT to increase energy efficiency, reduce the carbon footprint of transportation, reduce waste and reduce the cost of government operations. The Unit is also respon-

sible for the development and implementation of adaptation strategies to ensure CTDOT is prepared for the impacts of climate change on the State's transportation infrastructure.

### **Design Standards**

CTDOT uses the NOAA published Volume 10, Version 3.0 of the "NOAA Atlas 14, Precipitation-Frequency Atlas of the United States" for the northeastern states for its runoff calculations. CT-DOT's design standards for culverts and bridges on state roads are often used by local communities. Connecticut Public Act 18-182 updated the flood design standards for state-funded critical facilities and requires use of the most updated sea level rise scenarios (such as those developed by CIRCA or others) to be considered under local and regional planning in the state. Example facilities covered by the act include schools, elderly housing facilities, residences, and hazardous waste facilities. The base flood elevation for such facilities is the 0.2% annual chance flood elevation. For critical facilities within the coastal boundary, any floodproofing must exceed the base flood elevation by two feet plus any increase necessary to account for the most recent sea level rise scenario.

### DEPARTMENT OF PUBLIC HEALTH (DPH)

### **Connecticut Water Supply Planning**

CTDPH completed the Water Utility Coordinating Committee process in 2018 and finalized the Statewide Coordinated Water System Plan. This process identified future public water supply needs in Connecticut and the utilities best suited to meet those needs.

All public water systems serving 1,000 or more persons, or 250 or more consumers are required by DPH to prepare water supply plans to max-

imize efficient and effective development of the state's public water supply systems and to promote public health, safety and welfare. The water supply planning process provides for a coordinated approach to long-range water supply planning and regionally addresses water quality and quantity issues. The plan also includes an emergency contingency plan section.

### Western Connecticut Water Management Area

The Western Connecticut Water Management Area is one of three management areas in the state and includes the region's six municipalities. The Western Water Utility Coordinating Committee (WUCC) is made up of public water system representatives and Councils of Governments to discuss long-range water supply issues and to implement and maintain the Coordinated Water System Plan for the Western Public Water Supply Management Area, which was finalized in 2018.

### GOVERNOR'S COUNCIL ON CLIMATE CHANGE (GC3)

Originally, the GC3 was formally tasked with examining the effectiveness of existing policies and regulations designed to reduce greenhouse gas emissions and identify new strategies to meet the state's greenhouse gas emissions reduction target of 80% below 2001 levels by 2050. The GC3's membership now includes more than 20 members from state agencies, quasi-public agencies, businesses, local governments, and nonprofits; and is now tasked with two primary objectives:

- Monitor and report on the state's implementation of the greenhouse gas emissions reduction strategies set forth in the inaugural GC3's December 2018 report <u>Building a Low Carbon Future for Connecticut</u>: Achieving a 45% GHG Reduction by 2030.
- 2. Develop a statewide Adaptation and Resil-

ience Plan that encompasses the most current and locally scaled scientific information and analysis available with respect to the effects of climate change and provide updated recommendations for adapting to and improving the state's resilience to such changes in areas such as infrastructure, agriculture, natural resources, and public health.

In January of 2021, the GC3 released the Phase 1 Report <u>"Taking Action on Climate Change and Building a More Resilient Connecticut for All"</u>. Findings on sea-level, temperature, and precipitation in the state are summarized in Chapter 3.

### CONNECTICUT INSTITUTE FOR RESILIENCE AND CLIMATE ADAPTATION (CIRCA)

CIRCA's mission is to increase the resilience and sustainability of communities vulnerable to the growing impacts of climate change to the built, natural, and human environments. Housed at the University of Connecticut, CIRCA is a multi-disciplinary center of excellence that brings together experts in the natural sciences, engineering, economics, political science, finance, and law to provide practical solutions to problems arising due to climate change. CIRCA helps coastal and inland floodplain communities in Connecticut and throughout the Northeast better adapt to changes in climate and to make human-built infrastructure more resilient while protecting valuable ecosystems and their services. Initiatives focus on living shorelines, critical infrastructure, inland flooding, coastal flooding, sea level rise, and policy and planning.

CIRCA's Resilient Connecticut program has conducted a statewide effort to plan for regional resilience and adaptation. The guiding principle is to establish resilient communities through smart planning that incorporates economic development framed around transit-oriented development, conservation strategies, and critical infrastructure adapted to withstand occasional flooding. The program's ultimate goals are to develop vulnerability assessments (i.e., the flood and heat CCVI tools), which this plan has utilized, and to identify and advance complex projects that address unmet needs.

Through Phase II of Resilient CT, Resilience
Opportunity Areas (ROARs) were identified and prioritized for future concept development at Fairfield Metro (Bridgeport/Fairfield), Downtown Fairfield, and the South End/Lordship section of Stratford. Projects furthered in the ROARs will address one or more climate-related hazards, advance planning objectives, protect human health, and enhance quality of life.

More information on the program can be found at <a href="https://resilientconnecticut.uconn.edu/about/">https://resilientconnecticut.uconn.edu/about/</a>, as well as in the respective Fairfield and Stratford capability assessments.

#### SUSTAINABLE CT

A voluntary certification program to recognize resilient Connecticut municipalities, Sustainable CT provides a wide-ranging menu of best practices. Municipalities choose Sustainable CT actions, implement them, and earn points toward certification. Sustainable CT also provides opportunities for grant funding to help communities promote economic well-being and enhance equity, all while respecting the finite capacity of the natural environment. Since the commencement of the program, MetroCOG has worked closely with Sustainable CT and has housed summer interns to assist member municipalities with enrollment. Currently, the Towns of Fairfield and Stratford have Silver Certification Status and have both been recognized as climate leaders.

The Town of Trumbull has Bronze Certification Status. Bridgeport, Easton, and Monroe are participating communities.

### **MULTIPLE STATE AGENCIES**

State officials are well-positioned to track the occurrence of droughts in Connecticut and assist local communities. The State's Interagency Drought Work Group maintains a <u>website</u> at with links to resources that include the U.S. Drought Monitor; groundwater, streamflow, and reservoir levels; and the Palmer Drought Severity Index. The purpose of the <u>"Connecticut Drought Preparedness and Response Plan"</u> is to help assess and reduce the impact a drought by conserving essential water use during water shortages. The Plan was last updated in 2022 using the lessons learned during the 2015-2016 drought.

Private and Other Resources can be found in Appendix F.

## IV.3 Regional

MetroCOG's regional planning program furthers local and regional plans for sustainable land use, conservation, economic development, emergency management and natural hazard mitigation/resilience. As the host agency of the Greater Bridgeport and Valley Metropolitan Planning Organization (GBVMPO), MetroCOG is responsible for conducting federal transportation planning activities for both the Greater Bridgeport and the Valley Regions of Connecticut. MetroCOG also administers various state transportation funding programs. Often, regional projects, such as the Natural Hazard Mitigation Plan, complement or align with the agency's transportation program. Planning program activities that directly support natural hazard mitigation include:

### Geographic Information Systems (GIS):

MetroCOG's robust GIS program and data development and analysis capabilities are demonstrated throughout this plan. The municipal parcel viewers developed, hosted, and updated by MetroCOG provides local parcel, zoning, and land use information. The CRS communities of Fairfield, Stratford, and Trumbull utilize these viewers to identify parcels located in FEMA SFHAs.

"Continue to implement the 2014 Natural Hazard Mitigation Plan, updating the plan when appropriate, and undertaking initiatives to prevent damage from natural hazards, protect property and infrastructure, and improve emergency preparedness within the region's communities"

-Objective, Reconnect 1 Region

### Grant writing assistance and administra-

**tion:** MetroCOG regularly assists developing competitive applications for federal and state funding opportunities. For planning grants, MetroCOG often serves as the recipient, administrator, and project manager, which reduces local staff time.

### **RECONNECT 1 REGION**

The **Regional POCD** was endorsed in December of 2015 and serves as the long-term planning framework for the MetroCOG Region. During the 2024-2029 period of this NHMP, Metro-COG anticipates an update to the plan and will consider further integration of the NHMP in the regional POCD. Development of the POCD must be consistent with state statutes. The goal of the Natural Resources section of is "Preserve sensitive natural areas and protect regional assets, such as local watersheds, riparian zones, regional water supplies, and wetlands, while promoting an integrated network of park and recreation areas throughout the region." As the plan was endorsed in 2015, implementation of the 2014 NHMP was an objective, with specific strategies for drainage capacity, disaster planning, roadway and community facilities protection, and education..

Since 2014, MetroCOG has played a role in implementing the following strategies:

## **Disaster Planning**

Foster inter-agency cooperation and natural disaster contingency planning between local governments, public safety providers, state and federal agencies, and residents to ensure coordinated and efficient responses to natural disasters.

**MetroCOG's role:** MetroCOG staff are active participants in the DEMHS Regional Emergency Planning Team (REPT) for DEMHS Region 1 and

Emergency Support Function 1 (ESF-1): transportation.

## Protecting Roadways/Transportation Infrastructure

Work with the State Department of Transportation to identify infrastructure enhancements that can reduce the impact of natural disasters along the Region's busiest roadways and infrastructure.

MetroCOG's role: MetroCOG is responsible for administering the region's Local Transportation Capital Improvement Program (LOTCIP), which provides state funding to municipalities in lieu of federal funds, thus decreasing project timelines and oversight requirements for CTDOT. As the host agency for the GBVMPO, MetroCOG also plays a role in programming federal transportation funds. Both state and federally funded transportation infrastructure projects often include a resiliency/mitigation/climate adaption component, such as drainage improvements and enhanced stormwater management.

### Citizen Education

Educate residents, businesses, and stakeholders throughout the Region about natural hazards and disasters, and ensure they are fully informed about shelter locations, evacuation routes, and flood insurance, and technical assistance programs.

### MetroCOG's Regional Flood Hazard Web-

site: MetroCOG developed a series of webpages regarding flood protection and natural hazards in the region. <u>"Flood protection"</u> provides links to various flooding-related resources. Several municipalities provide links to this site for residents to learn more about a range of flood protection resources. MAG Greater E
2050 Bridgeport
Valley

METROPOLITAN TRANSPORTATION PLAN
2023-2050
ENDORSED MARCH 30<sup>TH</sup>, 2023

Greater Bridgeport & Valley
Metropolitan Planning Organization

METROPOLITAN TRANSPORTATION PLAN
2023-2050

ENDORSED MARCH 30<sup>TH</sup>, 2023

Figure IV.3.a Metropolitan

# METROPOLITAN TRANSPORTATION PLAN (MTP)

The Greater Bridgeport and Valley Metropolitan Planning Organization (GBVMPO) approved the MTP for the Greater Bridgeport and Valley Planning Region on March 30th, 2023. This plan identifies opportunities to improve mobility for all people and businesses throughout the Greater Bridgeport and Valley planning area. Federal regulations define the development and content contained in the MTP; it covers a minimum of 20 years and is updated every four years.

MetroCOG's MTP takes a comprehensive, system-wide approach to improving all modes of transportation, as well as potential impacts to and from the system for all residents of the Greater Bridgeport Region. Resiliency, sustainability, economic and quality of life considerations are addressed throughout the plan. Through an extensive public engagement process, a series of

goals were developed for the region, including "Promote Resilience and Environmental Sustainability within the Transportation System" and the following objectives:

- Support reduced and zero-emissions transportation.
- Ensure transportation infrastructure is prepared to withstand the effects of climate change.

A chapter on Resilience and Mitigation discusses climate change, transportation assets vulnerable to flooding/natural hazards and state and local initiatives/strategies to mitigate hazards. The Safety, Operations & Emerging Technologies chapter discusses the critical assets necessary for evacuations and emergencies.

# EPA/CLIMATE POLLUTION REDUCTION GRANT (CPRG)

MetroCOG is serving as the lead agency for the Bridgeport-Stamford-Norwalk Metropolitan Statistical Area (MSA) in the planning component of this initiative, which is focused on reducing greenhouse gas emissions and other harmful air pollution. For the award of an implementation grant to fund reduction measures, the program requires a Priority Climate Action Plan (PCAP) and, later a Comprehensive Climate Action Plan (CCAP). The PCAP was due on March 1st, 2024. During the next phase, EPA will award competitive grants to implement GHG reduction measures identified in the PCAP. See <a href="https://www.swctclimate.com/">https://www.swctclimate.com/</a>

# CONSERVATION TECHNICAL ADVISORY COMMITTEE (CTAC)

The Conservation Technical Advisory Committee (CTAC) is an advisory body to the MetroCOG. The primary responsibility of the CTAC is to serve as the regional forum for consideration of any

activity related to the enhancement of the natural environment within the region. These include the maintenance and implementation of the recommendations within the Pequonnock River Watershed Management Plan, guidance on brownfield projects, monitoring of coastal resilience initiatives and other activities as they relate to the protection and conservation of the natural environment within the region. Each MetroCOG municipality is formally represented on the CTAC with a member of the local Conservation Commission and a staff member with responsibilities related to conservation. Meetings of the CTAC are held quarterly and are open to the public. In addition to the appointed members, meeting attendees typically include local conservation organizations, residents, CTDEEP staff, and other regional stakeholders.

### WATERSHED BASED PLANS

Development of a watershed management plan is a key step in Watershed Management, leading to restoration of a polluted or otherwise impaired waterbody. US EPA has described Nine Elements that must be addressed in an approved Watershed Based Plan to qualify for funding under Section 319 of the Clean Water Act. Watershed management plans can widen the scope of Watershed Based Plans by addressing other water and land resource issues on a watershed scale, above and beyond the specific impairment identified on DEEP's Impaired Waters List.

Most of the watershed management plans that have been developed in the MetroCOG region have been local or NGO-lead initiatives. Metro-COG has assisted in the watershed management planning process. Since the majority of watersheds cover more than one municipality, they have been included in the regional section with municipalities noted.

## Ash Creek Estuary Plan, 2023

Bridgeport, Fairfield

The Ash Creek Conservation Association completed the revision of the original 2013 plan in 2023. The purpose of the <u>plan</u> is to guide efforts to mitigate against ecological collapse in the Estuary. Recommendations specific to natural hazard mitigation include:

Habitat Improvements: wetland mitigation, land use practices to protect sand dunes, upstream sewer shed modifications to improve downstream water quality, restoration of underground streams, and improvements to reduce erosion.

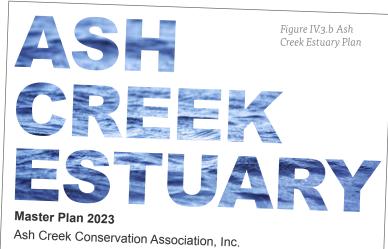
**Structural Improvements:** drainage inlet modifications to prevent debris entry, increased budgeting for catch basin maintenance, permeable pavement, and tide gate inspection.

**Community Coordination:** educational outreach on importance of estuary and stewardship, developing relationships with local organizations and school districts, and working with municipalities on enhancing ecological management capabilities.

# Mill River Watershed Management Plan, 2019

Easton, Fairfield and Trumbull

The goal of the Mill River Watershed plan is to expand on past work to address NPS pollution in the watershed, especially bacterial pollution and secondarily nutrient pollution, to improve water quality within the watershed in order to attain water quality standards and designated uses, including contact recreation, protect water supplies, and generally improve the environmental function of the river network and attendant watershed. The two highest priority subwatersheds are Canoe Brook and Greenfield Hill/Riverfield.



### Pequonnock River Watershed Based Plan, 2010

Bridgeport, Monroe, Trumbull

In 2010, a partnership between the City of Bridgeport and the Towns of Monroe and Trumbull was formed to develop the Pequonnock River Watershed Based Plan. The Pequonnock River flows through the three municipalities and the watershed covers about 29 square miles. While degraded water quality is a prime issue, flooding along the river is common. In Bridgeport, flooding occurs because of intense urban development along the river. Steep slopes and limited floodplain storage capacity worsens flooding in Trumbull, while lowlands adjacent to the upper reaches of the Pequonnock River in Monroe flood.

In general, the priority actions for the Pequonnock River watershed are intended to improve the water quality. However, many actions will have the secondary benefit of reducing flooding and the associated impacts. These include the installation of green infrastructure to increase the storage capacity of storm water runoff and efforts to protect, preserve and expand buffers and setbacks from wetlands and the river channel.

## Rooster River Watershed Based Plan, 2013

Bridgeport, Fairfield, Trumbull

The <u>Rooster River Watershed Based Plan</u> was developed through a partnership with the City of Bridgeport, the Towns of Fairfield and Trumbull, the Southwest Conservation District and the Connecticut Department of Energy and Environmental Protection. Actions that will mitigate flooding and possibly other hazards include:

- Reduce the impacts of storm water on hydrology and water quality through Low Impact
  Development (LID) practices and Green
  Infrastructure approaches.
- Implement municipal storm water management programs to comply with state and federal permit requirements.
- Identify and remove illicit wastewater and non-storm water discharges into the Rooster River and its tributaries.
- ROOSTER RIVER
  Watershed Based Plan
  September 2013

  Prepared by
  Fusion Plan

  Plan

  Prepared by
  Fusion Plan

  Plan

  Prepared by
  Fusion Plan

  Plan

- Protect and enhance forested areas and urban tree canopy within the watershed.
- Address flooding issues through a coordinated, watershed-wide approach. Fairfield has emphasized the need for coordination with Bridgeport on development in the upstream of the watershed, as well as with Trumbull to identify detention areas in the vicinity of the mall
- Preserve and protect existing open space and continue to protect/acquire open space that meets resource protection and recreational goals.

## Sasco Brook Watershed Based Plan, 2011

Easton, Fairfield, Westport

This <u>Plan</u> was prepared by the Sasco Brook Pollution Abatement Committee. The plan provides a five-year program to achieve a "Watershed Vision" based on the concept of perpetual stewardship, and an implementation strategy focused on cooperative, voluntary stakeholder actions to reduce nonpoint source pollution.

# Saugatuck River Watershed Based Plan, 2012

Bethel, Easton, Fairfield, Monroe, Newtown, Redding, Ridgefield, Weston, Westport, Wilton, and Norwalk

This <u>Plan</u> was prepared on behalf of the South Western Regional Planning Agency (now the Western CT Council of Governments) for the above municipalities. Strategies relevant to natural hazard mitigation include:

- Mitigate the impact of water diversions through adaptive management.
- Mitigate fish migration barriers through natural fishways, fish ladders, and barrier removals.

Figure IV.3.c Rooster River Plan

- Reduce water quality impacts associated with unmanaged stormwater runoff through implementation of stormwater Best Management Practices.
- Avoid future increases in stormwater-related impacts through conservation acquisition and promotion of low impact development policies.
- Pursue strategic land acquisition to protect headwater streams and other watershed lands.

### **FUTURE PLANS**

The Bruce Brook Watershed Based Plan is in development jointly by the City of Bridgeport and the Town of Stratford and is planned for completion in late 2024. The watershed is heavily developed. Much of the land use is comprised of residential with some commercial, industrial, and institutional uses mostly concentrated in the southern extent of the watershed.

## **IV.4** City of Bridgeport

### **GOVERNMENT**

The City of Bridgeport has a Mayor-Common Council form of government. The Mayor is the Chief Executive Official, while the twenty members of the City Council act as the legislative body for the City. The two major responsibilities of the Council are enacting ordinances necessary to govern the City and adopting the annual budget. Members of the City Council serve and are elected for two-year terms, while the Mayor is elected for a four-year term. The Chief Administrative Officer, appointed by the Mayor is responsible for coordinating department management and operational policies.

## **DEPARTMENTS & COMMISSIONS**

### **Central Grants**

The Central Grants Office reviews, prepares, and submits grant applications to various funding sources and monitors the budgetary and financial aspects of grant use for compliance.

# Emergency Management & Homeland Security

The mission of the Office of Emergency Management is to protect the lives and property of citizens in the City of Bridgeport. This is accomplished through providing 24-hour emergency assistance by mobilizing and deploying personnel and resources, updating emergency operations plans and strategies, training emergency personnel, managing the emergency operations system, and warning and informing the public of emergencies and disasters. The department is headed by the Director of Emergency Management and Homeland Security. The Community Emergency Response Team (CERT) program educates volunteers about disaster preparedness for the hazards that may impact their area and trains them in basic disaster

response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations.

### **Engineering Department**

The Engineering Department provides engineering services to the City of Bridgeport's Departments and Commissions. Services include but are not limited to zoning approvals and building permit reviews related to storm and sanitary sewers, drainage, flood and erosion control, traffic impact studies and necessary State and Local Permits. Public improvements and community infrastructure projects are also administered through the Engineering department. These improvements include bridges, roadways, traffic signal operations, sidewalks, drainage systems, and coastal protection. The City Engineer serves as Bridgeport's Floodplain Administrator.

The Engineering Department's **traffic division** is responsible for all aspects of traffic engineering including but not limited to; traffic signal systems, signs and pavements markings, on-street parking, on-street handicapped parking and safety zone programs.

Engineering maintains permanent records and provides information relative to City property including maps, field data, vertical and horizontal survey, street layouts, sewer records, established grades, abandonment of streets, bridges, parks, landfills, and hazardous waste areas.

# Health Administration & Social Services

The Health Department is responsible for promoting and protecting the health and well-being of individuals and communities through various programs, services, and initiatives. This includes disease surveillance, outbreak response, community health education, health inspections, and policy development and implementation.

The Health Department is applying to the state to conduct an air quality monitoring campaign and develop a preparedness and response procedure. This work will complement the air quality monitoring program run by a local NGO (Groundwork Bridgeport) and shared data will inform the initial response plan.

# Office of Planning & Economic Development (OPED)

is a multi-disciplinary organization responsible for economic development, neighborhood revitalization, business development, planning and zoning, historic districts, land use, design review, building permits and inspections and related issues. Its divisions include Building, Economic Development, GIS, Housing and Community Development, Planning, and Zoning. Guided by PLAN Bridgeport, these divisions work diligently to create healthy communities, robust economies, equitable opportunities, and livable neighborhoods.

- The Planning & Zoning Commission
  (PZC) is responsible for maintaining Zoning
  Regulations and adopting the Master Plan of
  Conservation & Development every decade.
  The PZC holds public meetings and hearings
  to consider applications for site plan review,
  special permits, coastal site plan review, and
  liquor approvals, as outlined in the Zoning
  Regulations.
- The Zoning Board of Appeals (ZBA)
   considers applications for variances of use
   and development standards and all motor
   vehicle facilities.

## **Park City Communities**

Formerly known as the Bridgeport Housing Authority, Park City Communities (PCC) provides nearly 2,600 public housing equivalent units that serve low income families, seniors, and people with disabilities. The PCC is diversifying its housing stock by developing partnerships with private co-developers for the provision of new mixed income housing.

### **Parks & Recreation Department**

Provides well-maintained park grounds and facilities to enhance the quality of life for City residents and visitors, and the livability of the community.

### **Public Facilities Administration**

Provides residents and taxpayers with trash and recycling pickup, street cleaning, roadway related maintenance, lines and signs division, snow plowing, sanding and salting, and leaf pickup. Falling under Public Facilities, the Sustainability Office serves as the point of contact and director of sustainability and resiliency, initiatives, programming, and planning within the City. The Sustainability Office coordinates and assists in areas related to energy and conservation, urban canopy management, ecological restoration, urban agriculture, climate change mitigation and adaptation, and resiliency.

## Water Pollution Control Authority

The WPCA (Water Pollution Control Authority) operates two wastewater treatment facilities and maintains the sewer system in the City of Bridgeport by collecting and treating wastewater generated by the residents of the City of Bridgeport and surrounding areas.

## Waterfront Advisory Board

The Bridgeport Waterfront Advisory Board is a group of community members and subject area experts partnering with the City to help guide implementation of the Waterfront Master Plan.

## Neighborhood Revitalization Zones

NRZs are volunteer groups made up neighbors, local business owners, and community partners.

There are 8 NRZs in Bridgeport. Each group meets regularly and each one has created a neighborhood development plan. Enacted by state statute, municipalities that wish to participate in the NRZ process may establish zones in one or more of their neighborhoods by a resolution of their legislative body. The objective of the NRZ process is to revitalize neighborhoods through the collaborative involvement of residents, businesses and government to determine the vision and priorities of the individual neighborhoods. The NRZ process provides a mechanism for local stakeholders, along with local municipal officials, to develop a strategic plan to revitalize their neighborhood.

### **WEBSITE**

### https://www.bridgeportct.gov/

The City of Bridgeport has Department of Emergency Management and Homeland Security: the main webpage for the department provides an overview of its mission and lists current alerts and updates. Additional links are provided for various emergency planning resources, including the following:

- Emergency Notifications: sign up form for weather and emergency alerts via the Citizen Alert System. Residents may indicate current special needs and whether they want notifications for emergencies, community events, or both.
- Community Emergency Response
   Team (CERT): Volunteer sign up and certification class notification, as well as a form to log-in service hours.
- Ready Bridgeport: Emergency Management's public education program provides staff and CERT volunteers to educate residents and businesses about hazards, creating an emergency plan, knowing who to call, where

to go and what to do. Information includes responding when an emergency occurs, safeguarding the home and family, and preparing for the recovery phase, to get back to a sense of normalcy faster. Events in workplaces, schools, community centers, or houses of worship may be requested via a form.

The City's homepage provides a link to **Bridge- port 311**, which allows citizens and city employees to automatically and immediately contact
the department responsible for an issue, such as
to request a recycling bin, report a pothole or
confirm a tax payment.

As the City's website is in transition, the Emergency Management department is in the process of providing additional information regarding hazard mitigation (anticipated for summer 2024). The previous version of the page included the following:

- City of Bridgeport Hazards: This webpage lists a series of links to one to two page pamphlets that explain how to prepare for a hazard and how to endure one. Among the natural hazards covered are:
  - Earthquakes
  - Extreme Heat
  - ♦ Extreme Cold
  - ♦ Flood Planning and Preparedness
  - ♦ Severe Storms
  - Thunderstorms and Lightning
  - ♦ Tornadoes
  - Winter Storm Planning and Preparedness
  - Hurricane Storm Surge (SLOSH) Map
  - ♦ Flood Zone Map
- Planning Toolkits: This webpage provides links to a series of one to two page pamphlets on how to prepare for a disaster,

- reasons to prepare and how to cope with a disaster. The webpage includes an emergency supply checklist.
- Hurricane Preparedness: This webpage provides links to various news and press releases by the Emergency Operations Center (EOC) and the Mayor's Office in advance of, during and after a hurricane. Links are provided to the websites of the National Weather Service, United Illuminating Company and Southern Connecticut Gas Company.

### **REVIEW OF EXISTING PLANS**

### Plan of Conservation & Development

Plan Bridgeport was adopted on April 22, 2019 and is available via <a href="https://planbridgeport.com/intro">https://planbridgeport.com/intro</a>. OPED is responsible for the City's POCD.

Plan Bridgeport presents several guiding principles for the next 10 years related to being a livable city, having a robust economy, being an equitable city, being a healthy community, valuing nature, and being a regional center. The goals and strategies presented in the plan are also aligned with four main strategic themes including waterfront, TOD, housing, and neighborhoods.

The POCD encourages waterfront redevelopment efforts while recognizing the risk of coastal storms and flooding. Redevelopment objectives include development of 3.5 miles of linear trail along the waterfront and 200 acres of redevelopment in the area. The POCD further encourages the City to support coastal resilience efforts either through barriers, elevation of structures, or reintroduction of marshes.

Another goal is to concentrate dense, mixed use and walkable development around upgraded

multimodal transportation infrastructure. The POCD recommends that the City improve pedestrian and bicycle access, construct Barnum rail station in East Bridgeport, and set a development goal of 4,300 housing units within one-half mile of Bridgeport station (Downtown). The development of housing is considered a critical need as 40% of the existing housing stock in the city is more than 70 years old, and the existing housing stock is too expensive for many families to afford. To this end, new development will be encouraged through the 2022 zoning changes, while redevelopment is encouraged for blighted and vacant properties as well as infill development.

Numerous goals and strategies in the POCD are related to hazard mitigation, including, but not limited to, enhancing the resiliency of Bridge-port's neighborhoods by encouraging development of neighborhood specific coastal resiliency plans, restricting development in high-risk flood plains, and supporting development of a comprehensive flood protection system for the South End neighbor-hood. Other strategies include implementation of the Pequonnock River Watershed Based Plan, the Rooster River Watershed Based Plan, and the Ash Creek Estuary Master Plan.

# All Hazards Emergency Operations Plan

The Department of Emergency Management and Homeland Security is responsible for maintaining this plan. The plan is updated annually. A Continuity of Operations Plan is also maintained by DEMHS. The city has mutual aid agreements for regional emergency management response.

## Stormwater Management Plan

The City's <u>Stormwater Management Manual</u> was updated in 2022. The City Engineer is responsible for the plan.

# BGreen 2020: A Sustainability Plan for Bridgeport, Connecticut

The BGreen 2020 plan was developed to guide the City's future development and land use policies. The plan continues to ground and inform future and ongoing sustainability and climate related planning in the city.

The BGreen Plan's intent is to establish goals and objectives to promote and encourage development that would reduce the City's carbon footprint, rely on alternative energy sources and change how people move about the City. The plan's overriding theme stresses that climate change and rising sea levels are occurring and will continue in the future. The City will face long term consequences that include stronger storm surges and greater coastal flooding. These hazards will threaten the City's infrastructure and vulnerable populations. While the Plan does not specifically address natural hazard mitigation, it includes a number of actions and strategies to reduce storm water runoff, increase resiliency to climate change, sea level rise and storm surges, and encourage sustainable development. Recommended actions include:

- Increase waterfront access opportunities;
- Expand street tree planting and urban forest programs;
- Limit storm water flows into the wastewater system;
- Maintain the storm water system to prevent and reduce flooding; and
- Develop green building guidelines and install green infrastructure.

## Waterfront Bridgeport Plan

Adopted in 2017, the Waterfront Bridgeport Plan (WBP) focuses on recreating and transforming Bridgeport's waterfront which still resembles the

Figure IV.4.d Concept for Sliver by the River



city's industrial past. The goals of this plan are to increase public access, create jobs and economic prosperity, repurpose vacant or abandoned properties, encourage water-based recreation and an active waterfront, and to boost resiliency against effects of climate change. The overall framework includes strategies regarding zoning and compliance, economic development, public access and amenities, design standards, natural restoration and resiliency, and waterfront advocacy and programming.

As part of the zoning and compliance aspect of this plan, it was suggested that a Waterfront Overlay Zone (WOZ) be created. Properties located within this zone would be subject to certain WOZ requirements. These regulations would come into effect when there is construction or placement of a structure, when a site being filled is significantly changed, a change in property or structure use, demolition of structures, or alterations or renovations of existing buildings. The proposed WOZ regulations address both the goals and design standards of the WBP.

The natural restoration and resilience aspect of this plan aims to restore the functional ecology of the shoreline and protect inland development with the implementation of green infrastructure approaches. The plan also looks to integrate resiliency into all redevelopment projects along the waterfront area, not just intermittently. The plan references the regulatory changes made in 2013 by New York City, which passed a Flood Resilience Zone Text Amendment. It was also suggested that existing zoning in Bridgeport be modified to allow for storm protections, such as elevating buildings above FEMA flood levels.

## Cultivating Community: An Urban Agriculture Master Plan for Bridgeport

Adopted by the Bridgeport Food Policy Council in 2019, the <u>plan</u> provides recommendations for actionable policies to improve urban agriculture in Bridgeport. Part of the Plan's vision statement is "a resilient food system that is capable of providing long term food security, adapts well to climate change, and reduces dependence on outside food sources."

# Neighborhood Revitalization Zone Plans

Serve as strategic plans for neighborhood revitalization. Neighborhood Revitalization Zones (NRZs) were established under state statute in 1995. The objective of the NRZ process is to revitalize neighborhoods through the collaborative involvement of residents, businesses and government to determine the vision and priorities of the individual neighborhoods. NRZ Plans include:

- Black Rock NRZ Plan (2008)
- East End NRZ Plan (2005)
- East Side NRZ Plan (2010)
- Hollow NRZ Plan (2017, amended 2022)
- Mill Hill NRZ Plan (2013)
- Reservoir NRZ Plan (2014)
- South End NRZ Plan (2014 Amended 2022)
- West Side/West End NRZ Plan (2007)
- Upper East Side NRZ Community Vision (2015)

OPED is working to update these plans to include neighborhood-specific coastal resiliency.

### Feasibility Study and Master Plan for Pleasure Beach Park

The Feasibility Study and Master Plan for Pleasure Beach Park (2012) includes a site analysis of this environmentally valuable barrier beach, as well as a vision plan and list of projects for the park. Recommendations related to hazard mitigation include:

- Reduce impervious surfaces.
- Support surface conveyance, infiltration
- and natural treatment of storm water.
- Remove invasive plant material and plant native and non-invasive species.

## Regional Plan Association Fourth Regional Plan

Adopted in 2017, this plan encompasses New York City, Long Island, the Hudson Valley, and northern New Jersey, as well as Fairfield and New Haven counties in Connecticut; Bridgeport as one of the Region's Nine Flagship Places for the plan. The plan is intended to guide or inform improvements to various aspects of the region with a focus on the changing coastline and restoration of natural systems. The plan acknowledges the changes and effects that have already been

experienced across the region related to climate change. Recommendations revolve around adapting to a changing coastline, bringing nature into communities, improving the natural and built systems, and creating a greener energy system with more capacity, specifically:

- Protect densely populated communities vulnerable to storms and flooding: many residents situated on the shoreline are elderly, low-income, or otherwise socially vulnerable. Complete projects underway, provide support to communities conducting resilience planning, and create a long-term adaptation plan.
- Migrate from places that likely cannot be protected. Improve buyout programs, implement long term adaptation plans, and being informed of risks will avoid costly outcomes (such as infrastructure and property damage).
- Bring nature into the community:
  - Incorporate green infrastructure approaches and consider implementing stormwater utility fees to eliminate combined sewer outflows which would help alleviate pollution and improve ecosystem health
  - Restore harbors and estuaries: maintain existing habitats, restore lost habitat, provide space for wetland migration, and clean contaminated sites.
  - Cool communities through green approaches and green infrastructure requirements.
  - Prioritize the protection of land to help adapt to a changing climate: increase funding and pursue collaboration between government and community-based groups.

- Build a regional trail system: improves community connectedness and boosts habitat migration.
- Upgrade infrastructure to higher standards of resilience: incorporate climate change resiliency and prioritize projects with more natural solutions.
  - ♦ Create a greener energy system with more capacity: modernize the electric grid and consider cleaner and more renewable alternatives. Manage demand with energy efficient buildings and variable pricing. Encourage energy reductions and adopting stricter efficiency regulations to reduce greenhouse gas emissions and improve air quality.
  - Electrify buildings and vehicles: large, older buildings play a major role in greenhouse gas emissions. Electric vehicles should be increasingly promoted with incentives and improving the vehicle charging network more extensive.

#### **Future Plans**

- The Bruce Brook Watershed Based Plan is discussed in the Regional section.
- Funding has been awarded by CT DEEP to complete a comprehensive vulnerability and resiliency needs assessment. The Sustainability Office is leading this planning process.

### LAND USE ORDINANCES

# Zoning Regulations & Subdivision Regulations

**2022 State Building Code:** statewide capability discussed earlier

### **Zone Bridgeport**

- January 1, 2022
- Responsibility: Office of Planning and Eco-

- nomic Development and the Planning and Zoning Commission
- The <u>City's Zone Bridgeport site</u> provides an interactive code and zoning map.
- Regulations include requirements for waterfront access and natural features. Buffers should be constructed to mimic natural systems (as opposed to hardscape buffers) adjacent to creeks and brooks. Different widths and characteristics are provided.
- Regulations include incentives for best practices for land use and hazard mitigation.
- Resilient development is encouraged; landscape provisions and practices are employed to address site specific environmental issues.
   Riparian buffers are also included.
- Any activity within wetlands, floodways, and floodplains is regulated by the City's Inland and Wetlands Commission; the state and city will not fund development in these areas.
- Rezoning procedures recognize natural hazard areas as limits to zoning changes that would allow greater intensity or density of uses.

**Subdivision Regulations:** The City's Subdivision regulations are in Section 10.4 of the Zoning Regulations. Subdivision of land within or next to natural hazard areas is somewhat restricted.

## Floodplain ordinance

- Code of Ordinances, 15.44 Flood Damage Prevention.
- FIRM panels are detailed in this section.
- 15.44.060 provides the basis for establishing special flood hazard areas.
- The City Engineer is the Floodplain Administrator.

### FINANCIAL RESOURCES

- Capital improvements project funds:
   City capital dollars have been allocated to address flooding issues.
- Federal funding programs: include HUD CDBG and assistance from NOAA and the FPA
- Impact fees for new development:
   Stormwater regulations for new development includes impacts fees.
- State funding programs: \$42 million has been bonded by the state legislature to address flooding in Bridgeport, the first project will occur at Ox Brook.
- The City is interesting in expanding financial capabilities through collaborative endeavors with non-profits and community oriented stakeholders and partners.

### **EDUCATION & OUTREACH**

**Ready Bridgeport:** Emergency Management staff and CERT volunteers provide events in workplaces, schools, community centers, and/or houses of worship to educate residents and businesses about hazards, creating an emergency plan, knowing who to call, where to go and what to do.

### Bridgeport is a Storm Ready community

and programming is done on extreme heat, cold, thunderstorms, hurricanes, flooding, Nor'easter, blizzards depending on the season. Emergency preparedness month has different featured topics each week.

**Urban heat island mapping campaign**: the Sustainability Office with support from public facilities, health, and NGOs such as Groundwork Bridgeport will collect data on air temperatures around the city. Data collection will be done mostly through affixing devices to public facilities

and municipal vehicles that travel in the city and supported by volunteer mapping events.

**Citizen Alert System:** weather and emergency alerts.

The Community Emergency Response
Team (CERT) program educates volunteers
about disaster preparedness for the hazards that
may impact their area and trains them in basic
disaster response skills, such as fire safety, light
search and rescue, team organization, and disaster medical operations. The City conducts 200
community awareness trainings annually. These
trainings include education and communications
on response procedures for residents of high
density public housing areas, especially those
located in the coastal area.

**Social media** was utilized for a community resiliency flooding series with the Mayor.

The local news and organizations that represent/ advocate for/interact with underserved and vulnerable communities assist with outreach about natural hazards. However, the City is working toward better and more frequent communication and coordination with the social service and non-profit agencies serving vulnerable populations.

## IV.5 Town of Easton

### **GOVERNMENT**

The Town of Easton is governed by a Board of Selectmen, made up of three Selectmen elected together for two-year terms. The Board is responsible for the administration of town affairs. The First Selectman serves as the Town's Chief Administrative Officer and highest elected official. Easton does not have a town charter and is governed by the Connecticut General Statutes. An annual Town Meeting is held to decide budgetary matters. The annual budget, prepared by the Board of Finance, is adopted at the Annual Town Meeting. Special town meetings may be called throughout the year by the Board of Selectmen or by petition of town residents.

### **DEPARTMENTS & COMMISSIONS**

Various town departments and commissions have jurisdiction and responsibility for ensuring the health, safety, and welfare of its residents.

### **Agricultural Commission**

The Agricultural Commission is charged with supporting, promoting, and encouraging agriculture and agricultural pursuits in the Town of Easton. The Commission acts in an advisory capacity to the Board of Selectmen and other Town boards and commissions on agricultural matters.

## **Aspetuck Health District**

Provides local public health services in the Towns of Westport, Weston, and Easton.

## **Building Department**

The Building Department issues permits and inspects work done to all buildings and other structures. All types of new construction are reviewed and permitted by the Building Department. The Building Department ensures buildings are constructed in conformance to all applicable

laws, codes, and ordinances.

### **Conservation Commission**

The Conservation Commission acts as the Town's Inland Wetlands and Watercourses Agency and enforces the State's regulations pertaining to wetlands and watercourses. The Conservation Commission reviews applications to conduct activities in regulated areas.

### **Emergency Management**

The Chief of Police serves as the Town's Emergency Management Director. In coordination with the Aquarion Water Company, the EMD is responsible for maintaining emergency operations plans in the event of dam failure.

# Land Preservation and Acquisition Authority

This authority is responsible for evaluating possible land for acquisition in fee or for the possible acquisition of development rights, consulting with other boards and officials, and making recommendations to the Board of Selectmen. Acquisition criteria includes potential use for open space, recreation, and/or housing.

### Parks and Recreation Commission

Oversees and manages parks and open spaces. The goals of the Commission are to preserve and protect open spaces and provide opportunities for active and passive recreation. The Parks and Recreation Department promotes, assists, and helps coordinate privately sponsored and managed recreation programs as well as providing and maintaining quality athletic fields. The Department is currently developing a Parks and Recreation Plan.

## **Planning & Zoning Commission**

The Planning and Zoning Commission enforces the Town's Zoning and Subdivision Regulations and studies and debates proposed revisions to the regulations. The Land Use Office provides technical assistance to the Planning and Zoning Commission, Inland Wetlands Commission, and the Zoning Board of Appeals. Office staff serve as the Town's Floodplain Administrator.

### **Public Works Department**

The mission of the Public Works Department is to maintain and improve the town's road system and perform responsibilities that include snow and ice removal, street sweeping, roadside mowing, tree and brush removal, drainage installation and catch basin cleaning.

The Town's Affordable Housing Plan recommended the development of a Housing Authority. This action is currently pending.

### **WEBSITE**

### https://www.eastonct.gov/

The Town's website was updated after the 2019 plan. The main page of the Town's website has a link to emergency information. Contact information for the Town's Emergency Management Director is posted on this page, as well as links for the National Weather Service, CT Alerts, United Illuminating, the American Red Cross, and other agencies. "Storm Response and Preparation" information and updates are provided under the Emergency Information and Selectman's Department pages.

### **REVIEW OF EXISTING PLANS**

# Plan of Conservation and Development

The <u>Town's POCD</u> was adopted on December 31, 2018 and amended in 2021. The 2021 amendment was a Transportation Concept Plan for Sport Hill Road. The Planning and Zoning Commission and the Land Use Department are responsible for the Plan.

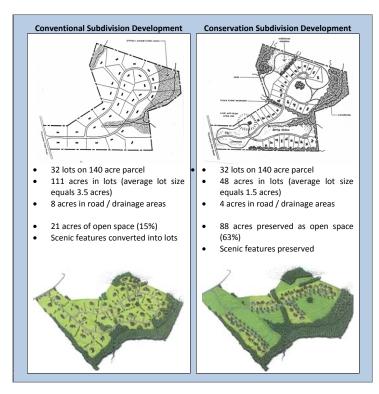


Figure IV.5.e Conservation subdivision, Easton POCD

The Town of Easton is a low-density residential community. Due to the high proportion of land that is set aside as public water supply watershed areas, the Town's land pattern provides substantial natural open spaces, wetlands and watercourse buffers and limited impervious surface land cover. Flooding problems are limited to certain areas along the Aspetuck River, but the flooding is generally limited due to the existing land patterns.

The POCD discusses various natural hazards that may affect the Town, including wind storms, flooding, drought, and other events such as winter storms. The Plan includes recommendations for regulations that will increase oversight and the control of activities within the floodplain, limiting the possibility of flooding and related damage to properties. Action E.1.a recommends "Consider updating the definition of buildable land" in the Zoning Regulations so that 100 year floodplains and 25% and steeper slopes are also excluded." Action E.3.a recommends modifica-

tion of the Town's Zoning Regulations to allow for a conservation design development approach, which the Town implemented (see reference to 5900 in Zoning Regulations section). This approach identifies a site's important natural features first and protects those features by guiding development around them. The Plan also states that the Town is committed to collaborating with MetroCOG in the Regional Hazard Mitigation Planning process.

### **Local Emergency Operations Plan**

This is a state required plan that covers all hazards and includes basic mitigation strategies to address issues such as storms and wind damage.

### Stormwater Management Plan:

The Public Works Department is responsible for the <u>Plan</u>, which is an MS4 requirement.

### Watershed Management Based Plans

These plans are discussed in the regional section.

### **Future Plans**

- Parks and Recreation Plan
- Forestry Plan for the floodplain portion of the South Park property.

### LAND USE ORDINANCES

The Planning and Zoning Commission and Land Use Department are responsible for all land use ordinances.

## **Zoning Regulations**

The last majori revision of <u>Easton's Zoning Regulations</u> occurred in 2019. The regulations were amended in 2023 and some amendments are planned for 2024.

# Sections relevant to natural hazard mitigation:

 4100: Floodplain Overlay District – FIRM panels are referenced in this section.  5900: Conservation Development – allowed by Special Permit in Residential District B,

## **Subdivision Regulations**

- Available <u>here</u>; last amended in October 2023.
- Section 3.03: Flood Protection is relevant to natural hazard mitigation.

### Floodplain Ordinance

The Town's Floodplain Ordinance "Flood Damage Prevention" is in Chapter 298 of the Town Code.

### FINANCIAL RESOURCES

- 5-year Capital Improvements Plan:
   The Town's budget includes a 5-year plan for capital improvements.
- Grant writing: The Town's Land Use Department provides grant writing. MetroCOG staff will assist with more labor-intensive applications. The Town is considering applying for CDBG funding to plan for affordable housing.
- Easton Agricultural Land Preservation Fund: established to acquire development rights of agricultural land and expenditures incurred in the preservation of agricultural land; criteria in ordinance.
- Land Acquisition Fund: established to acquire and maintain land and development rights; criteria specified in the ordinance.
- The Aspetuck Land Trust's mission is to preserve and conserve open space, including farm and forest land, and the natural resources located thereon, primarily in the towns of Easton, Weston, Fairfield, Westport, Monroe, and Bridgeport. Since the previous plan, ALT has assisted the Town of Easton with preserving watershed land on the Town's southern border (South Park Property).

 Trout Unlimited Mill River Improvement Project (MRIP): consists of restoring and protecting the Mill River, one of only nine Class A Wild Trout Streams left in the state. This stretch of the Mill River (located between Easton and Fairfield) was once a meandering stream but was straightened for the Merritt Parkway in 1938. Although on the edge of a suburban area, the Mill River is pure enough and cold enough to sustain wild trout. Past activities have included tree plantings, knotweed removal and revetments; the MRIP watershed plan will map out specific steps for the river's health and conservation involving CTDEEP and other state and municipal authorities and land trusts.

### **EDUCATION & OUTREACH**

**Community newsletters:** The First Selectman's office releases a weekly newsletter.

**Local news** is provided by The Easton Courier (digital). For legal notices, the Town uses the Fairfield Citizen.

## IV.6 Town of Fairfield

### **GOVERNMENT**

The Town of Fairfield operates under a Representative Town Meeting (RTM) form of government. RTM members are elected to two-year terms by the residents of the Town's ten voting districts; each district elects four members to the RTM. The Board of Selectmen is Fairfield's executive policy board and is comprised of three members. The First Selectman serves as the Chief Elected Official for a four-year term. The other two members are elected to two-year terms.

### **DEPARTMENTS & COMMISSIONS**

Various town departments, boards and commissions have jurisdiction and responsibility for ensuring the health, safety, and welfare of residents:

### **Building Department**

The Building Department ensures that all new construction and remodeling projects conform to state and local building codes as well as all other laws, ordinances, rules, and regulations related to construction.

## **Conservation Department**

The Conservation Department manages the Town's almost 1,200-acres of open space, restored salt marshes, regulates activities on inland wetland-regulated areas and 1,000-acres of shellfish grounds. The Conservation Commission, Inland Wetlands Agency, Land Acquisition Commission and the Shellfish Commission operate under the Conservation Department.

## **Health Department**

The mission of the Town's Health Department is to prevent disease and injury by promoting and protecting the health, safety, and well-being of the public and environment through education and action.

### **Human & Social Services Department**

Assists residents who are experiencing difficulty providing the basic necessities of life for themselves and their families. The Senior Center operates through this department.

# Office of Community & Economic Development

Develops and administers programs to stimulate and encourage economic development, revitalize, and strengthen neighborhoods, facilitate and promote affordable housing and preserve and enhance the overall well-being of the community. The Office administers the Town's HUD CDBG funds

## Office of Emergency Management

The Office of Emergency Management coordinates resources for Fairfield's first responders and plans and trains for response to extended situations. The Office prepares local emergency plans, including the Local Emergency Operations Plan. The Town's Emergency Operations Center is located at Police Headquarters and opens when necessary. Depending upon the incident, CERT, non-governmental agencies such as the Red Cross, and others may be invited. Communication lines are opened with Connecticut DEMHS Region 1 it to both receive information from the State and to transmit local situational information to the State. Requests for State and Federal assistance also go through this channel.

• The Town of Fairfield's Emergency Management Team is made up of the First Selectman, the Fire Chief (who is the Town's Emergency Management Director), the Police Chief, DPW Director, Health Director, top officials and staff of other Town agencies and the Superintendent of the Fairfield Public Schools. The Team conducts and coordinates the planning, training, drills, and exercises

- necessary for the Town to be able to respond to emergencies.
- Community Emergency Response
  Team (CERT) is a volunteer group that
  trains according to FEMA guidelines and
  who are ready and able to, under the direction of FEMA, help in a major emergency or
  disaster. The <u>CERT webpages</u> includes contact information and training information.

### **Public Works Department**

The Public Works Department oversees key areas of public works: engineering, roads, storm water drainage systems, parks, beaches, marinas, public buildings, wastewater treatment plants, and sewer collection systems. Operating under Public Works, the Engineering Department works with construction crews to survey and design layouts for town-built drainage and architectural plans for renovating town buildings, road alignment and widening, sidewalk installation, parking lots, handicap retrofits, sports field, and bridges. The Engineering Department is responsible for the Stormwater Management Plan.

The Flood and Erosion Control Board and the WPCA Board of Commissioners are local resident volunteer boards that also operate under the Public Works Department.

• The Flood & Erosion Control Board plans, constructs, reconstructs, and manages the Town's flood and erosion control system in coordination with town Engineering staff. Recently, the state expanded the authority of the FECB to include climate resilience duties, including the requirement to publish a biannual report, which must include a current inventory and description of the flood prevention, climate resilience and erosion control system; the extent and value of property, infrastructure and natural resources

protected; an analysis of the manner in which vulnerable communities are prioritized and protected; and the board's revenues and expenditures.

The WPCA Board of Commissioners
 is responsible for the operation and maintenance of the Town's wastewater treatment
 plant, compost facility, pump stations and
 205+ miles of sewer lines in coordination
 with the WPCA staff.

### Parks & Recreation Department

The Parks Department manages and maintains various recreational facilities, including 170 acres of active parks and five miles of beaches. The Department's facilities provide enjoyable park grounds that enhance the quality of life for Town residents. The Parks and Recreation Commission consults with the Parks & Recreation director and makes recommendations to Town Bodies regarding policies for the planning, development and use of the Town's Parks and Recreation programs and facilities.

## **Town Plan & Zoning Department**

The Town Plan and Zoning Department (TPZ) works with the development community to guide them through the Town's regulatory processes, neighborhood and redevelopment plans, and other siting issues associated with investment opportunities. The TPZ is responsible for preparing and maintaining the Town's Plan of Conservation and Development. The TPZ also administers the Town's floodplain management requirements and coordinates the Town's Community Rating System (CRS) applications and recertifications. Within the TPZ, the floodplain manager coordinates with staff to reduce the risk of flooding and become a more resilient community.

The Town Planning and Zoning Commission votes on applications to build commercial, mixed-use, and residential developments in Fair-

field; amendments to Town zoning regulations; changes in use for commercial properties; bond releases; and other zoning-related matters.

#### WEBSITE

### www. fairfieldct.gov

Fairfield's website was redesigned in 2023.

Emergency information for the Town of Fair-field is provided on the Town website under the major heading "Emergency Management". The Emergency Management page provides links to the Community Emergency Response Team (CERT), Fairfield Alert, Emergency Management, Emergency Preparedness Resources, Storm Information, and emergency-related contacts, including the Emergency Management Team:

- The Fairfield Alert system provides phone, email, text, and/or Everbridge Mobile App. alerts about emergencies and other important community news. The Town's homepage has a link to instructions on signing up for Fairfield Alert. This system replaced the Town's R911 system CodeRED.
- Emergency Preparedness Resources: This section outlines the various public notification methods used by the town to notify residents in case of emergency, including Fairfield Alert the Storm Information page, email list, and the Town emergency information hotline. The page also provides links to various emergency information brochures and pamphlets on disaster planning, severe weather preparation, power failures, and public health emergencies as well as a variety of informational websites.
- Storm Information Page: This page provides a feed of announcements related to Town office closing information, and a real-time road closure map updated with in-

formation reported to the Town's Emergency Operations Center. Links are also provided for information on storm preparedness, power outages, downed cable and telephone lines, and general storm-related resources. Separate pages host information about preparation for and recovering from hurricane/tropical storms and winter storms.

• Flood Protection Page: The Town Plan and Zoning Page hosts the Flood Protection Page, which provides links to various flooding-related resources and includes a link to the MetroCOG flood protection page. It explains how residents can access FEMA flood insurance information as well as providing information on the town's Flood and Erosion Control Board and other flood control measures. The also provides links to recent efforts conducted under FEMA grant programs.

### **REVIEW OF EXISTING PLANS**

# Plan of Conservation and Development

The Fairfield POCD was last adopted in 2016 to incorporate a variety of local and regional planning efforts. As the majority of the current POCD was carried over from the 2000 POCD with respect to goals and policies, a more comprehensive POCD update is currently underway with the goal of completion in 2024. The draft POCD recognizes the vulnerability of neighborhoods proximate to the Rooster River and Fairfield's other inland watercourses and wetlands due to flooding during heavy rainfall events, with some portions potentially recommended for down-zoning. Climate change has resulted in more frequent high rainfall events and even non-FEMA designated flood zone properties and roadways that are low-lying are subject to more regular flooding.

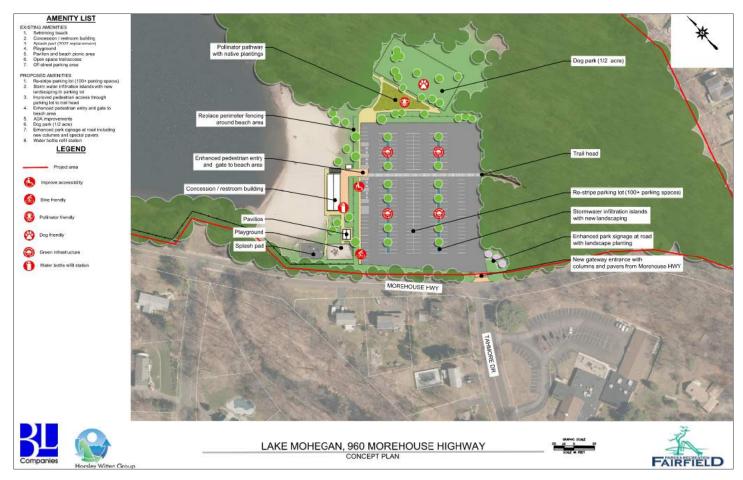
As a coastal community with a substantial and diverse shore area, the possible consequences from sea level rise and more extensive storm surges are considered an imminent threat to the Town. The existing POCD recognizes the inherent dangers from flooding and erosion of beach areas. A long list of actions to help protect the shoreline and reduce damage to property and personal injury is included, with key goals and objectives relating to preserving existing natural resources, limiting development in sensitive areas, protecting tidal and shoreline inland wetlands, acquiring sensitive parcels, and continuing participation in the National Flood Insurance Program.

## **Local Emergency Operations Plan**

The Town of Fairfield's Emergency Management Team is committed to being prepared for all types of emergencies and to preparing its citizens to most effectively deal with emergencies situations. Below is information on some helpful resources for being informed and prepared for severe weather, power outages and other emergencies. The Town's notification system and additional emergency information related to individual hazards is available are available on the Town's webiste. Fairfield has posted a template for actions relevant to businesses as well.

## Stormwater Management Plan

The Town's Stormwater Management Plan requirements are available <a href="here">here</a>. Neighborhood flooding in the Rooster River and downtown areas have been a focus of stormwater management, and <a href="project plans">project plans</a> have been developed. Green infrastructure is promoted when possible with the Town also looking at increasing the capacity of its storm water outflows.



### Parks and Recreation Master Plan

The Parks and Recreation Department and Parks and Recreation Commission are responsible for this **plan**, which was finalized in 2022. General Theme #7 focuses on green infrastructure such as bioswales and permeable pavement to reduce the risk of coastal flooding. Other recommendations include enhanced tree canopy, rain gardens, and rainwater harvesting.

## Watershed Management Based Plans

These plans are discussed in the regional section.

### **Future Plans**

- Land Acquisition Plan: The Conservation
   Department and Land Acquisition Commission are in the preliminary stages of putting together a parcel prioritization plan.
- Mill River (Lake Mohegan) watershed plan: Engineering is responsible for this plan.

 2024 Master Flood Erosion & Resilience Plan: Flood and Erosion Control Board.

### LAND USE ORDINANCES

# Zoning Regulations & Subdivision Regulations

- Can be viewed here
- Responsibility: Town Plan and Zoning Department Planning and Zoning Commission

# Relevant sections to natural hazard mitigation:

11.0 Beach District: This single-family residential zone limits lot coverage to no more than 20%. Additional development limitations in the district seek to reduce impacts to life and property along the Fairfield Beach Road barrier beach and for properties adjacent to Pine Creek.

- 23.0: Regulations for Flood Plain District. This
  district behind the Beach District largely contains town-preserved open space and town
  facilities such as the Waste Water Treatment
  Facility (WWTF), the Public Works garage,
  recreational facilities and a limited number
  of residential properties. Development in this
  area is limited.
- 26: Open Space Subdivision Plans: Allows for cluster subdivisions for conservation purposes.
- In all areas of the town, filling in the floodplain is prohibited. Property owners must cut rather than fill to modify grades. As properties are developed or redeveloped in the floodplain, they must provide the same flood storage.

### Floodplain Ordinance

Recent enhancement to the floodplain management regulations (Section 32 of zoning regulations) since the 2019 plan include:

- 1-foot freeboard requirement for coastal construction,
- In the Coastal A Zone, the LIMWA boundary is used in determining the lowest floor for new construction.
- Pending FIRM panel updates for the Saugatuck watershed (inland) which includes Sasco Creek, the Saugatuck River, the Mill River, and the Rooster River.
- 32.3.F-G: Equal conveyance and compensatory storage for floodplains adjacent to floodways; higher standard in riverine/freshwater areas.

#### Additional Information

 Inland wetland regulations: 100-foot setback for all soils, inland wetlands, and watercourses review area. • Land acquisition: The Conservation

Department and Land Acquisition Commission have begun to identify parcels that are entirely conservation/watershed lands or adjacent to conservation lands. They are in the preliminary stages of putting together a parcel prioritization plan for future uses of the Town's land acquisition fund.

### FINANCIAL RESOURCES

- Capital Improvements Plan: The Finance
  Department is responsible for this plan. The
  current version includes funding for resilience
  improvements in the downtown and Rooster
  River neighborhood, tide gate replacements,
  and sewer improvements.
- Community Development Block Grant (CDBG) Program: The Office of Community & Economic Development administers this funding program which focuses on supporting income eligible household and furthering the town's affordable housing goals.
- Inflow and Infiltration (I&I) fees are collected for new developments to fund sewer pipe repair that are part of the town's WWTF system.
- The town has an affordable housing fee that is applied to new primary structure developments that do not provide affordable housing units in order to fund projects that further the town's affordable housing goals.
- State: DECD Community Challenge funds for the East Trunk Line Phase 1 and 2 Projects.
- Other: Two generators for pumpstations at the Mill River through wastewater treatment funding. Potential Clean Water Funds for sanitation pump stations.

### **EDUCATION & OUTREACH**

- Community newsletters: The First Selectman's office releases a newsletter every other week. The current mailing list is over 3,000 recipients.
- Hazard awareness campaigns: A direct mailer is sent annually to approximately 2,000 repetitive loss properties. A similar mailer is sent to an additional 2,000 realtors, lenders, and insurance stakeholders.
- Community Emergency Response Team (CERT): annual training is provided.
- Fairfield Alert system provides phone, email, text, and/or Everbridge Mobile App. alerts about emergencies and other important community news.

## IV.7 Town of Monroe

### **GOVERNMENT**

The Town of Monroe is governed by a First Selectman and a nine-member Town Council, all of whom serve two-year terms. The First Selectman serves as the Chief Executive Officer of the Town and is responsible for the administration and supervision of all departments, agencies, and offices of the Town. The First Selectman holds the executive powers vested by law or by the Town Charter. The Town Council serves as the Legislative Branch and has the power to enact, amend and repeal ordinances and the has power to create or abolish by ordinance boards, commissions, departments, and offices of the Town, in addition to other general powers and duties.

### **DEPARTMENTS & COMMISSIONS**

Various town departments and commissions have jurisdiction and responsibility for ensuring the health, safety and welfare of Monroe's residents.

## **Building Department**

The mission of the Building Department is to maximize building safety for the general public and uphold the State Building Code, efficiency and public relations. The Building Department conducts plan reviews, issues permits and Certificates of Occupancies, performs inspections and coordinates all Town department approvals to achieve the maximum building safety for the general public.

## **Economic Development Commission**

The Monroe Economic Development Commission (EDC) conducts research into economic conditions and trends, makes recommendations to the appropriate officials and agencies and promotes economic development and assists with business development, recruitment and retention.

## **Emergency Management Department**

Falling under the Police and Fire Marshal, the Emergency Management Department coordinates resources for Monroe's first responders and plans and trains for responding to extended situations. The Emergency Management Department prepares local emergency plans.

The Community Emergency Response Team (CERT) program is administered by the Emergency Management Department and provides volunteer support to the Town's first responders. Basic training familiarizes members with the available fire, police, and emergency medical services and members are instructed as to how they can assist those services when they are called. Originally, CERT helped with sheltering townspeople during major hurricanes and snowstorms. Activities have expanded to include assistance with crowd control at large events; some of the Town's CERT members participate in Regional CERT field days and mutual aid training exercises. The Town's CodeRed system has a special category that provides for immediate notification of the CERT members when they are needed.

## **Parks & Recreation Department**

The Parks Division oversees and manages parks and open spaces. The Department's goals are to preserve and protect open spaces and provide opportunities for active and passive recreation. The Parks and Recreation Commission plans, promotes, organizes, supervises, develops and carries out parks and recreational programs and facilities for the Town. Open space is maintained at Wolfe Park, Webb Mountain Park, and the Housatonic Valley Rail Trail. Other town-owned open space is left in its natural state. Proactive tree trimming is pursued on an as-needed basis.

# Planning Department, Planning & Zoning Commission, and Inland Wetlands Commission

The Planning Department assists in guiding the orderly development and use of land to provide housing and employment opportunities; to stabilize the property tax base; to foster and enhance the visual image and vernacular character of the Town; and to protect wetlands and watercourses, open space and areas of sensitive and unique natural resources within the Town. The Town's Inland Wetlands Enforcement Officer serves as the Floodplain Administrator.

The Department provides administrative and professional technical services to the Planning and Zoning Commission, Inland Wetlands Commission, Zoning Board of Appeals, associated local boards and commissions, state and federal agencies, and the public.

## The Planning and Zoning Commission

is responsible for the Town's physical, social, and economic planning and coordinated development. The Commission prepares, adopts, and implements a Plan of Conservation and Development, reviews, and recommends municipal improvements, and adopts and amends both zoning and subdivision regulations. Native plantings are regulated through the Planning and Zoning Commission.

The Inland Wetlands Commission enforces the provisions of the State's Wetlands and Watercourses Act pertaining to wetlands and watercourses. The Commission reviews applications to conduct activities in regulated areas, issues permits, and considers amendments to the Town's regulations, and regulates invasive species. The Commission also provides enforcement and educational services. The Conservation and Water Resources Commission addresses the Town's broad environmental quality goals

through its work to enhance and restore Monroe's natural resources.

# Public Works Department & Engineering

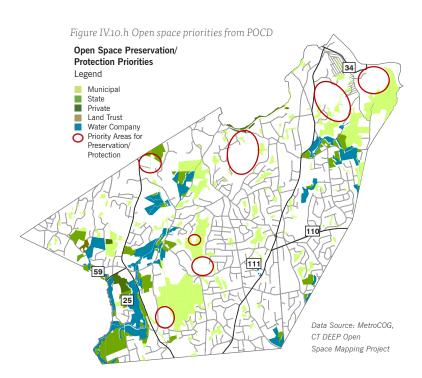
The mission of the Public Works Department is to enhance the quality of life of Monroe residents and maintain and improve the town's road system. Administered by Public Works, the Engineering Department provides technical assistance to the public and other town departments relating to development within the town, traffic issues, drainage and utility work.

### **WEBSITE**

## https://www.monroect.gov/

Emergency information for the Town of Monroe is provided on the Town website under the major heading "Public Safety". The Public Safety page provides links to the Police Department, Fire Departments, Emergency Medical Services, and the Community Emergency Response Team.

An additional page dedicated to Emergency Preparedness encourages residents to sign up for



emergency notifications through the CodeRED (R911) system, check the town webpage for urgent messages scrolling in a red banner at the top of the page, and to sign up for the Town's News and Announcements email list. The page also provides links to various emergency information brochures and pamphlets on disaster planning, severe weather preparation, power failures, and public health emergencies as well as providing links to a variety of informational websites. The main page of the Town's website has a link to sign up for emergency notifications through the CodeRED (R911) system.

### **REVIEW OF EXISTING PLANS**

# Plan of Conservation and Development

The <u>Plan</u> was adopted in May 2021 and an <u>Open Space plan</u> was later added to the POCD. The Planning & Zoning Department and the Planning and Zoning Commission are responsible for administering the POCD. The plan provides forward looking-growth strategies in both commercial and residential areas of the Town.

Under the Town's "Facilities and Services Goal," the Town incorporated the 2019 NHMP as a specific strategy: "Strategically implement recommendations of the MetroCOG 2019 Hazardous Mitigation Plan". Actions under this strategy include a hydrologic analysis and the upgrade of a generator at the high school to strengthen its use as an emergency shelter.

Through the Plan's community engagement process, residents expressed strong interest in protecting natural resources and preserving open space; the plan details actions that align with the "Natural Systems Protection" mitigation category. A Priority Theme of the Plan is to "Protect and Open Space and Natural Resources," which specifies that "Monroe should continue to protect

its open space and natural resources by expanding protected open space and mitigating the impacts of stormwater runoff." Regulatory actions are included, such as "The Planning and Zoning Commission, Conservation & Water Resources Commission, and Inland Wetlands Commission, should review the Town's land use regulations including zoning regulations, floodplain regulations, subdivisions regulations, and inland wetland regulations, to ensure that the regulations adequately protect environmental resources and encourage sustainable development. The respective Commissions should amend the regulations as necessary, and expand protections as needed, in favor of environmental protection that is fully supportive of the goals of this plan." Low Impact Development is also encouraged under this goal. The 1% and .2% flood plains were incorporated into the water resources map.

State of good repair and infrastructure maintenance, including stormwater infrastructure, align with the "Structure and Infrastructure" category. The Plan concludes with an implementation strategy that prioritizes each action and identifies Lead and Partner Organizations.

## **Local Emergency Operations Plan**

The Emergency Management Department (Police/Fire Marshal) completed the plan in 2023. The plan includes the Town's evacuation plan which was revised in 2021. The Monroe Senior Center serves as an emergency shelter and the Town is in the final stages of purchasing a community center which will also serve as an emergency shelter. Mutual aid agreements are in place for Fire, EMS and Police services

## Stormwater Management Plan

Public Works is responsible for this plan. Green infrastructure is promoted through the use of rain gardens, rain barrels and green roofs.

## Watershed Management Based Plans

The Pequonnock River Watershed Based Plan discussed in the regional section. The Inland Wetlands staff and Commission are responsible for carrying out this plan.

### LAND USE ORDINANCES

# Zoning Regulations & Subdivision Regulations

- Monroe's zoning regulations are available here.
- Monroe's subdivision regulations are available here.
- Responsibility: Planning and Zoning Department, Planning and Zoning Commission

# Relevant sections to natural hazard mitigation:

- 6.6 Flood Damage Control: floodplain ordinance
- 6.4.3: Refers to the Inland Wetland regulations regarding excavation and filling activities in wetlands, floodways, and floodplains.
- 9.2.2: Zoning Amendment Petition Requirements includes suitability assessment.
- The subdivision regulations provide for conservation subdivisions to conserve environmental resources.

### FINANCIAL RESOURCES

- Capital Improvements Plan: Forward-looking (five-year) capital expenditures are included in the annual budget approval. Department Heads are responsible for requesting hazard mitigation line items (to the finance department) for inclusion.
- The Town has access to several federal and state funding programs for natural hazard mitigation activities.

#### **EDUCATION & OUTREACH**

Monroe Sun and Channel 12 provides local news and regular updates are provided through the town website.

## IV.8 Town of Stratford

### **GOVERNMENT**

Stratford has a Mayor-Town Council form of government, with the Mayor designated as the Chief Executive Officer. The Town Council acts as the Town's legislative body and is comprised of ten members whom serve two-year terms. The Mayor is elected to a four-year term.

### **DEPARTMENTS & COMMISSIONS**

Various town departments, boards, and commissions have jurisdiction and responsibility for ensuring the health, safety, and welfare of residents.

### **Building Division**

The Building Division is responsible for the enforcement of all construction and building codes, and issues building permits and Certificates of Occupancies to property owners. The Building Inspector administers the Town's Floodplain Management Ordinance. Flood zone information is available through this office.

## **Emergency Management**

The Emergency Management Director (EMD) is the liaison (during emergencies) between the Mayor's Office and Town Emergency Services, local businesses, other cities or towns, and the State Department of Emergency Management and Homeland Security (DEMHS).

## Office of Economic Development

The Office of Economic Development promotes goals, strategies, and plans for attracting and retaining businesses to Stratford. The Office reviews and evaluates proposed projects.

# Health & Community Services Departments

The Stratford Health and Community Services
Departments are responsible for health emergen-

cy preparedness and planning efforts, and coordinates these efforts with state, regional and local agencies responsible for emergency planning.

## Office of the Mayor

The Mayor manages all Town personnel as Stratford's CEO. In addition to managing personnel, the Mayor oversees all Town operations whether they are emergency or non-emergency.

### **Chief Administrative Officer**

The Chief Administrative Officer heads mitigation efforts and is responsible for coordinating with the Emergency Management Director in the Emergency Operations Center (EOC), which opens during major events to coordinate resources and response.

### **Planning & Zoning Department**

The Planning and Zoning Department has the primary responsibility for managing land use in Stratford. The office handles applications for zoning compliance, changes and waivers, reviews plans for the subdivision of land, coastal site plan reviews, erosion and sedimentation control actions, and special case approvals. The office is involved in long-range planning and prepares the Town's Plan of Conservation and Development. These activities are guided by the Planning Commission, the Zoning Commission, and the Zoning Board of Appeals.

## **Public Works Department**

The mission of the Public Works Department is to maintain and improve the infrastructure of the Town of Stratford. The Department includes several offices and divisions, including engineering, highways, conservation, parks, the WPCA, sanitation, and the Town garage.

 The Engineering Division is responsible for construction administration and the management of municipal capital improvement

- projects, plan reviews, map record keeping, permitting and inspection for work relating to sewers, roads, sidewalks, and curbs.
- The Highway Division is responsible for maintaining the Town's highway system, including the pavement structure, storm drains, drainage inlets and outlets, and sanitary sewers.
- The Inland Wetlands and Watercourses Agency enforces the provisions of the State's Wetlands and Watercourses Act pertaining to wetlands and watercourses.
- The Parks Division provides clean, safe and aesthetically pleasing areas where the public can enjoy outdoor activities. The mission of the Parks Division is to improve the appearance and the functionality of park facilities, fields, playgrounds and beaches.
   The Division includes the tree crew which performs maintenance on town trees and shrubs.
- The Conservation Division is responsible for oversight to the Inland Wetlands and Conservation Commissions, management of the urban forest resources, open spaces, and other environmental projects. The Conservation Commission promotes the development and conservation of natural resources, including water resources. The Inland Wetlands Commission is responsible for protecting and regulating activities affecting inland wetlands and watercourses within the Town.

## **Stratford Housing Authority**

The Stratford Housing Authority is independent of the Town of Stratford. This quasi-public corporation owns and manages 514 family and elderly apartments, and, through the Federal Housing Choice Voucher Program, assists another 280 families residing in private apartments in the Town of Stratford.

### Stratford Public Schools

Several Stratford Public School facilities are used as emergency shelters, in the event residents have to evacuate an area.

# Waterfront & Harbor Management Commission

This commission is authorized by the CT Harbor Management Act, and acts as the Stratford Waterfront Authority and is responsible for preparing the Town's Harbor Management Plan.

### **WEBSITE**

### https://www.townofstratford.com/

Stratford's website was redesigned in 2023 and launched in early 2024.

Emergency information for the Town of Stratford is provided under the Emergency Operating Center page. This page provides a variety of information about the Emergency Management Director's role, as well as a variety of fire safety tips and information. The page also provides instructions for how to compile a basic emergency kit, as well as downloadable pamphlets pertaining to preparing for, and surviving and recovering from floods, winter storms, extreme cold, hurricanes, power outages, and using a generator.

Flooding: The Town has a <u>dedicated page for flooding</u> that discusses major causes and types of flooding. The webpage also provides guidance on preparing for floods, what to do during a flood, and how to recover from a flood. This page provides a series of links, helping users find information regarding weather forecasts, town closures and cancellations, utility outages, and links to other general storm-related resources.

### **REVIEW OF EXISTING PLANS**

# Plan of Conservation and Development

Plan Stratford 2023-2033 became effective December 1st, 2023.

The Town of Stratford is committed to protecting its residents from natural disasters. The strategy adopted in Plan Stratford 2023-2033 ("Plan") is to protect residents by implementing appropriate mitigation measures, followed by accommodating residents in floodplains through ensuring compliance with the latest FEMA regulations and updated state building code. Managed retreat is encouraged in coastal areas as a long-term strategy, where feasible.

The Town's Plan aligns well with mitigation action categories. Under Community Facilities, Infrastructure, & Utilities, Objective 2. "Prioritize improvements to the Town's stormwater infrastructure that reduce flooding and improve water quality in the Town's surface waters", numerous infrastructure-related actions related to flooding are identified. The third objective focuses on public education – "Educate residents about the importance of protecting the quality of water resources by preventing substances such as fertilizers, other contaminants, and debris from entering the storm water and sanitary sewer systems."

The Plan's Resiliency Vision is that "Stratford continues to be strong and resilient in the face of natural hazards and new social and economic challenges. The community is self-sustained, responsive, adaptive, and engaged in implementing financially sustainable solutions that help mitigate future risks." The Plan has specific climate resiliency goals, which includes both reducing the risk of and adapting to climate driven events such as flooding, erosion, and extreme heat. The "Climate Resiliency" section describes

recent challenges in the Town, and both existing and future mitigation opportunities in detail.

Throughout the plan, Low Impact Development is recommended as a strategy to avoid adverse impacts to the Town's wetlands, floodplain areas, and natural resources. Critical habitat, lands with natural floodplain functions, and land sensitive to climate change are prioritized for conservation and protection from development. Resilient design standards for waterfront development and ensuring dry land access out of high-density developments are also recommended within the Plan.

### **Local Emergency Operations Plan**

The plan was revised in December 2023. Identified shelters may vary dependent upon the type and severity of the event. Evacuation routes from the Lordship area traveling North are in the flood plain. In the rare event the area is cut off, the Town has contingencies with shelters in the neighborhood (i.e. Lordship firehouse) and the use of a variety of emergency seagoing vessels.

## Stormwater Management Plan

The <u>Plan</u> is an MS4 requirement and was updated in 2022. The plan focuses mainly on environmental quality in all watersheds. The plan suggests low impact development regulations, as per the CT DEEP Stormwater Quality Manual, but the Town has not yet adopted an ordinance. Ordinances have been suggested in the past but were not passed.

### Stratford Coastal Community Resilience Plan

This 2016 plan presents an overview of coastal flooding hazards facing the town in the future including sea level rise, tidal flooding, and extreme flooding. The vulnerability and risk assessment identifies 1) the employment growth district and, 2) the South End neighborhood as high risk for

being impacted by sea level rise. Other components at risk of sea level rise include sanitary sewer infrastructure, stormwater management systems and tide gates, hazardous materials facilities, state and primary roads, vulnerable populations, and natural resources. Specific flood mitigation projects are identified within the three resiliency strategies of Retreat, Accommodate, and Protect. Recommendations also addressed climate change adaptation.

# CIRCA Resilient Connecticut Phase III's Resilient Stratford South End Plan

This plan was finalized in November, 2023.

The South End neighborhood has high flood risks, both current and future, and a significant percentage of socially vulnerable populations, some of which are designated as Environmental Justice Communities, per CT DEEP. Stratford has moved forward with the implementation of recommendations from the 2016 resilience plan and the initiation of several flood protection projects have contributed towards the goal of creating a town-wide flood protection system. Challenges and barriers to implementation have stalled some strategies from the plan. In particular, potential interactions between the Great Meadows saltmarsh, key state road segments managed by CT DOT, and operations related to Sikorsky Airport have created permitting and negotiation challenges in identifying consensus solutions that would allow the Town to move forward with a flood protection strategy, all the while minimizing impacts to neighboring land uses in the South End.

The plan provides a detailed review of the proposed South End flood mitigation strategies from Stratford's community resilience plan, assesses ongoing implementation challenges, and recommends updated strategies for implementable projects. The plan deemed a coastal flood

## PROJECT B. LORDSHIP BOULEVARD/ROUTE 113 & MARINE BASIN SEGMENT OVERVIEW



protection system necessary to create a Resilient Stratford South End and will require:

- Several levee segments or reaches within the Town-wide Coastal Flood Protection System, designed to varying Design Flood Elevations (DFEs) based on practical construction constraints and technical feasibility, regulatory compliance and achieving benefit-cost analyses favorable for federal grant funding criteria;
- Incorporation of coastal flood protection with stormwater infrastructure improvements, including hard infrastructure and green infrastructure, pump stations, etc.;
- Incorporation of coastal flood protection with infrastructure to maintain tidal flow with adjacent wetlands and ponds, including tide gates, gate valves, etc.;

- Incorporation of coastal flood protection with other project initiatives planned by the Town, in particular the Town's existing and preliminary designed Stratford Greenway Extension Project;
- 5. Connection and integration of the proposed projects with other proposed levee segments, properties with high existing grade elevation and property planned for significant real estate development with grade elevation increases (in particular, the redevelopment of the former Stratford Army Engine Plant property [SAEP]); and
- 6. Minimizing adverse impacts to adjacent properties and infrastructure, including natural resources like the Great Meadows Marsh, a habitat for wildlife, fauna and the salt marsh sparrow.

### A Waterfront Vision

The Stratford Waterfront and Harbor Management Commission developed this <u>vision and plan</u> in 2022to inform the POCD update. Relevant to natural hazard mitigation, the vision includes:

- Public waterfront areas and facilities of the highest quality;
- Substantial and sustainable economic growth and community revitalization linked to the water;
- The highest water quality attainable; and
- Resilience to coastal hazards.

# Parks and Recreation Master Plan, 2017-202

The purpose of this plan is to provide Town management with a broad and comprehensive view of needs and desires for Town parks and recreation facilities, and encourages consideration in future Town budgets and CIPs.

## Roosevelt Forest Management Plan

The 2011 plan was developed to guide management of the 401-acre Roosevelt Forest in northern Stratford. At the time of the plan, the forest had not received any active forest management for more than 40 years. Major recommendations include improving trailheads and signage, development of management techniques including timber harvesting, and development of cooperative agreements with other groups for maintenance and public education activities.

### **Future Plans**

- The Bruce Brook Watershed Based Plan is discussed in the Regional section.
- Town-Wide Urban Forest Management Plan and Tree Inventory: The Town is in the process of applying for grant funding to support the development of both planning documents.
   Grant funding was recently awarded for a

Town-wide canopy assessment and the design and development of an Arboretum, and work will commence shortly on these efforts. In 2022 and 2023, the Town secured grant funding and planted over 250 trees within CT DEEP Environmental Justice Communities that experience low Tree Equity scores.

### LAND USE ORDINANCES

## **Zoning Regulations**

- Available here
- Responsibility: Planning and Zoning Department, Planning Commission, Zoning Commission, and Board of Zoning Appeals.

# Relevant sections to natural hazard mitigation:

- Section 4.4 Resource Conservation District
- Section 8.5 Waterfront Redevelopment Overlay District
- Section 10.1 Coastal Industrial District

The Town is in the process of updating their zoning regulations to: simplify the regulations, incorporate contemporary planning and zoning practices, and align the zoning code with recommendations from Plan Stratford, the Town's Complete Streets Policy, as well as Housing, Coastal Resilience, and Waterfront Plans. Goal #2.c of the update project specifies, "Integrate coastal/environmental, economic, and social resilience initiatives to be consistent with the Town's Waterfront Vision Plan." More information can be found here.

## **Subdivision Regulations**

- Available <u>here</u>
- The Planning and Zoning Department and Planning Commission are responsible for administering these regulations.

### Floodplain Ordinance

- Town Code, Chapter 102, Flood Damage Prevention.
- Section 102.7 specifies the FIRM panels.
- The Building Inspector is responsible for administering the ordinance.
- FEMA flood zones are accessible via the Town's GIS viewer.

### FINANCIAL RESOURCES

- Capital Improvements Plan: Actions in the NHMP have informed the 2025-2029 CIP, such as infrastructure improvements to help reduce the vulnerability of existing development to natural hazards. Funds have been allocated for stormwater pump station renovations, emergency response renovations, municipal pier renovations, and greenway/complete streets, as well as MS4 implementation. New infrastructure extensions into areas vulnerable to natural hazards are discouraged, although no official policy exists.
- Grants: The Town has a full-time Grant Writer on staff, who has assisted with obtaining flood protection funds, house raising funds, and Repetitive Loss study funds.
- Sewer Use Rate Fee: residents must pay \$484 per year to access the town's sewer system. The commercial and industrial consumption rate increased from \$4.62 to \$5.81 (2022-23 increase).
- Impact Fees for New Development:
   These fees include commercial project fees, private drinking well permit, and sewer connection charges (in effect since 2005).

   The sewer permit fee is \$240 with a \$3,500 dollar connection change for new sewer connections (February 2022).

 State funding programs include low-income energy assistance, affordable connectivity program, program for temporary assistance, and the CT Energy Assistance Program.

### **EDUCATION & OUTREACH**

- The Mayor's Weekly E-Newsletter: The Mayor's Office releases a weekly newsletter sent via email to subscribers. Currently, there are around 8,000 subscribers to the newsletter.
- The Mayor's Facebook: The Mayor
  has a Facebook page with around 5,300
  followers. The Facebook page is used for
  immediate alerts in addition to general Town
  happenings, proclamation postings, and
  highlights Town events or efforts.
- Local News: Provided by The Stratford
  Patch (digital) and through media releases
  put out by the Chief of Staff within the Mayor's Office.
- Everbridge Notification System: The
   Town of Stratford has an Everbridge subscription. Citizens may subscribe to "Stratford's Citizen Electronic Notification System" for notifications via a number of platforms (home phone, cell phone, e-mail, text, etc).
- The Town also utilizes social media and Block Captains for education, outreach, and emergency management. The Block Captain role was developed for communication with socially vulnerable communities throughout Town.

## IV.9 Town of Trumbull

### **GOVERNMENT**

The Town of Trumbull is governed by a Town Council and a First Selectman, each serving two-year terms. The administration of town affairs lies with the twenty-one elected members of the Town Council. The First Selectman is Trumbull's Chief Administrative Officer and highest elected official.

### **DEPARTMENTS & COMMISSIONS**

Various town departments and commissions have jurisdiction and responsibility for ensuring the health, safety and welfare of Trumbull's residents:

## **Building Department**

The Building Department reviews construction documents for compliance with State Building Codes and has the ability to issue building permits and provide inspections on construction projects.

### **Conservation Commission**

The Conservation Commission is a science-based advisory commission that oversees the protection and supervision of natural resources in Trumbull. The Commission acts in an advisory capacity to the Town's regulatory land use boards and makes recommendations regarding open-space, watershed plans, and natural resource preservation.

## **Economic & Community Development**

The Economic and Community Development
Department promotes goals, strategies and plans
for attracting and retaining businesses to Trumbull
and strengthens the Town's economic base in
a manner with the Town's goals and vision. The
Economic and Community Development Director
serves as the staff contact for the Town's Land
Acquisition Commission, which is authorized by
the Town to recommend parcels for acquisition.

Evaluation criteria includes the conservation, preservation, recreation, and other benefits the parcel would have to the Town.

## Office of Emergency Management

The mission of the Town of Trumbull's Office of Emergency Management is to provide programs and activities to Trumbull residents and departments to help them prepare for, cope with, and recover from the effects of natural and manmade disasters. The Office of Emergency Management does this through emergency management planning, preparedness, response, recovery and mitigation. The Fire Marshal serves as the Town's Emergency Manager.

## **Health Department**

The Trumbull Health Department (THD) serves as the official local public health entity and is committed to improving the quality of life for all it serves through the promotion of health, prevention of disease, and by assuring a safe and clean environment for residents.

## Parks Department & Commission

The Trumbull Parks Commission and Department are responsible for the care, management and control of all parks and grounds used for park and recreational purposes and all structures thereon. Together with other municipal departments, their mission is to maintain and enhance park and recreational facilities.

## Planning & Zoning Department

The Planning and Zoning Department handles all administrative functions of the Planning and Zoning Commission and the Zoning Board of Appeals and has the primary responsibility for managing land use in the Town. The Department is involved in long-range planning and prepares Trumbull's Plan of Conservation and Development.

# **Public Works Department**

The mission of the Public Works Department is to maintain and improve the infrastructure of the Town of Trumbull.

- The Engineering Department is the technical service advisory division of the Public Works Department, serves as the Town's Floodplain Administrator, and provides adequate controls to ensure responsible construction within the Town. The Department designs projects carried out by the Highway Department, provides technical advice to the Planning and Zoning Commission and Inland Wetlands and Watercourses Commission (IWWC), and provides engineering services and advice to other Town departments.
- The Inland Wetlands and Watercourses Commission evaluates Trumbull's wetlands and acts on any permit requests that affect designated wetlands. The Commission conducts field investigations of all properties in question and enforces the provisions of the State's Wetlands and Watercourses Act.
- The Town also has a five-member Water Pollution Control Authority.

#### **WEBSITE**

# https://www.trumbull-ct.gov

Emergency information for the Town of Trumbull is provided under the major heading "Public Safety". The Public Safety page describes the Office of Emergency Management and encourages residents to sign up for the Trumbull Citizen Alert Emergency and Community Notification (R911) program. The page also provides links to the Community Emergency Response Team, Emergency Management Office, Emergency Medical Services, Fire Departments, and Police Department. Additional pages are also dedicated to Emergency Preparedness and

Storm Information as described below. Parking bans, closing information, and other cancellations due to storms are posted in a red banner in the header of the Town's website.

- Emergency Preparedness Information: This section encourages residents to sign up for the Everbridge reverse 911 program as well as alerts from the local electric utilities (United Illuminating and Eversource). The page provides instructions on preparing for a disaster by creating a first aid kit, stockpiling food, gathering tools and supplies, making a family emergency plan, and protecting possessions. Links are provided for assistance in preparing for winter storms, hurricanes, tropical storms, and extreme cold or heat.
- Storm Preparedness Page: This page
  provides a series of links to where to find
  information regarding forecast information,
  town closures and cancellations, utility outages, and links to other general storm-related
  resources.

# REVIEW OF EXISTING PLANS

# Plan of Conservation and Development

- <u>Trumbull, Beautifully Connected</u> (2014) was adopted in 2014.
- Responsibility: Planning and Zoning Department, Planning and Zoning Commission

The Plan contains a section devoted to minimizing impacts from flooding and natural hazards, describing practices such as avoiding the placement of new development in vulnerable areas, avoiding placing vulnerable populations in vulnerable areas, and ensuring critical facilities are accessible during an emergency. Additional strategies related to hazard mitigation include the importance of protecting wetlands, limiting

development within buffers as a flood control measure, green infrastructure, low impact development and a more reliable and resilient electrical system.

The Plan describes the Town as largely built-up and residential. As an inland community, Trumbull is more often affected by flooding caused by severe and extensive rain events. The Plan encourages the promotion of greenway trails (such as the Pequonnock River Trail) to interconnect parks and open spaces. Ensuring adequate wastewater capacity to meet future development is also emphasized in the Plan. The Plan recommends that Trumbull enter into the FEMA Community Rating System, which subsequently occurred.

# **Local Emergency Operations Plan**

Trumbull's Emergency Management Team includes the First Selectman's Office, Police Department, Fire Marshal's Office (Emergency Management Director), Fire Departments, Public Works, Social Services, and staff from other town departments including the Board of Education.

The LEOP was last reviewed, updated and adopted in 2023. The plan addresses evacuation and sheltering. Dam inundation areas are identified in both the LEOP and local dam owners EAP's (Canoe Brook & Pinewood Lakes)

The Town has identified high-hazard areas and has pre-scripted messages for properties in inundation areas through the Trumbull Citizen Alert system.

# Stormwater Management Plan

The Town's Stormwater Management Plan requirements are available <u>here</u>. The Town's Engineering Department is responsible for the Plan.

# Watershed Management Based Plans

These plans are discussed in the regional section.

#### LAND USE ORDINANCES

# **Zoning Regulations**

- The Town's Zoning Regulations are available here.
- Responsibility: Planning and Zoning Department, Planning and Zoning Commission

# Relevant sections to natural hazard mitigation:

- Article II.2.2 Planned Residential Conservation Zone. Purpose of the zone is to use a floating zone to promote imaginative, well-designed residential development projects comprised of single family, detached dwelling units that conserve open space and to protect the natural environment.
- Article XI Flood Damage Prevention Ordinance. Article XI.3.2 refers to the FIRM, with copies available in the Town Clerk's office.
- Article XIV-Open Space Subdivision. Purpose
  of the zone is to provide an opportunity for
  the preservation and protection of the Town's
  natural resources by permitting a transfer of
  density by way of reduction in the minimum
  lot size normally required in specified zones
  for residential development. In return, dedicated areas are designated as Open Space;
  provided that the total number of lots in such
  subdivision approximates the number otherwise permitted under the regulations.

# **Subdivision Regulations**

- The Town's Subdivision Regulations are available here.
- The IWWC commission must approve the location of a development before the Planning and Zoning Commission can approve it.

## **EDUCATION & OUTREACH**

- Trumbull is a National Weather Service designated StormReady community.
- Trumbull Citizen Alert Emergency and Community Notification program.
   Residents can choose text message, email, or phone call notifications. The Town also provides access to the Everbridge reverse 911 system.
- Media: Trumbull Community Television (Charter Spectrum channel 194 and Frontier Vantage channel 6019), local radio (WICC) and local newspapers (Trumbull Times and Connecticut Post).

# IV.10 Summary of Local Capabilities

In summary, each municipality regulates floodplains, development in the floodplain and determines substantial improvements (SI) and substantial damages (SD) as detailed in the following table.

# IV.10.1 FLOODPLAIN REGULATIONS & SUBSTANTIAL IMPROVEMENTS (SI) / SUBSTANTIAL DAMAGE (SD)

	Regulation/		NFIP	SI			
Municipality	Ordinance*	Reference	Coordinator	Timeframe	Freeboard?	SI/SD Determination	
City of Bridgeport	Code of Ordinances	15.44 Flood Damage Prevention	City Engineer	10-year window	At or above BFE	The Engineering Department reviews permit applications and works with OPED (Building and Zoning) to determine SI/SD. These permits are then subject to Section 15.44 of the City Code.	
Town of Easton	Zoning Regulations	4100: Floodplain Overlay District	Planning & Zoning Commission	10-year window	2-foot minimum above BFE	The Planning and Zoning Commission reviews special permit applications and works with the Land Use Department to determine SI/SD. These permits are then subject to Section 4100 of the Zoning Regulations	
Town of Fairfield	Zoning Regulations	32: Flood Protection	Town Plan & Zoning Staff	1-year window	1-foot above BFE	The Town Planning & Zoning Department reviews permit applications to determine SI/SD. Permits are subject to Section 32 of the Zoning Regulations. The town annually reviews its Repetitive Loss list through its participation in the CRS program and seeks to mitigate those properties where possible.	

<sup>\*</sup>in all cases, the state building code prevails

# IV.10.1 FLOODPLAIN REGULATIONS & SUBSTANTIAL IMPROVEMENTS (SI) /SUBSTANTIAL DAMAGE (SD)

Municipality	Regulation/ Ordinance*	Reference	NFIP Coordinator	SI Timeframe	Freeboard?	SI/SD Determination
Town of Monroe	Zoning Regulations	6.6 Flood Damage Control	ZR - Town Planner or ZEO; Original - Inland Wetlands EO	1-year window	At or above BFE	The Planning & Zoning Department reviews development permit applications to determine SI/SD. Permits are subject to Section 6.6.4 of the Zoning Regulations.
Town of Stratford	Town Code	Chapter 102 Flood Damage Prevention	Building Inspector/ Floodplain Administrator	1-year window	SFHA: At or above BFE VE: 1-foot above BFE	The Building Department and the Planning and Zoning Department are primarily responsible for reviewing development permit applications to determine SI/SD. Permits are subject to Chapter 102 (Flood Damage Prevention) of the Town Code. The town annually reviews its Repetitive Loss list through its participation in the CRS program and seeks to mitigate those properties where possible.
Town of Trumbull	Zoning Regulations	Article XI - Flood Damage Prevention Ordinance	Town Engineer	10-year window	At or above BFE	The Town Engineer reviews development permit applications to determine SI/SD. Permits are subject to Article XI of the Zoning Regulations. The town annually reviews its Repetitive Loss list through its participation in the CRS program and seeks to mitigate those properties where possible.

<sup>\*</sup>in all cases, the state building code prevails

# V MITIGATION

Chapter III profiled hazards in the region and the impact, extent and probability of the hazard. Risks were assessed by data collection, research of past events, GIS and HAZUS-MH analyses and the planning process described in Chapter II and Appendices C and D. The risk assessment was utilized to identify assets most vulnerable to specific hazards. As a result of these risk assessments, problem statements were developed to inform goals and objectives and to determine mitigation actions. The NHMP discusses mitigation actions at both the regional and local scale.

As this plan is an update to the 2019 NHMP, past mitigation actions were reviewed to determine whether they had been implemented, their effectiveness and their current applicability to the region and/or respective community. Actions that were deemed "continuous" capabilities have been removed as applicable.

A cost benefit review tool, STAPLE+E was utilized to understand the social, technical, administrative, political, legal, economic, and environmental costs and benefits of each mitigation action. Based on this review, actions were prioritized for future implementation. STAPLE+E and 2024 actions are discussed in Chapter VI.

# V.1 Problem Statements

Key problem areas and critical issues for each municipality were identified through the risk and vulnerability assessments. The following problem statements were formed through the planning process and were utilized to develop a vision for the plan, a series of goals and objectives, and mitigation actions.

# V.1.i CITY OF BRIDGEPORT

- Low lying neighborhoods and streets Black Rock, Downtown, the East End, East Side and South End – are susceptible to coastal flooding from excessive storm surge from hurricanes, tropical storms, extratropical storms, and nor'easters.
- Several sections of the City are served by combined sewer systems. These combined systems can be overwhelmed by excessive runoff from heavy rain events and cause overflows of wastewater from the sewage treatment plants.
- Vulnerable and at-risk populations, including low income, minorities, persons with limited English proficiency, elderly and disabled persons disproportionately live in flood prone areas.
- Housing stock in areas at risk of coastal flooding from extreme weather is older and less able to withstand the forces of storm surges.
- Seaside Village, a housing cooperative, is at risk from severe flooding and has barriers to mitigation such as a complex combined sewer system and historic status.
- Several coastal features are vulnerable to damage from extreme weather, including Ash Creek, Seaside Park, Pleasure Beach and Johnson's Creek.
- Access to some parts of the City can be cutoff due to flooding, especially at underpasses of the Metro North New Haven Line and Interstate 95.
- Despite many years of planning and studies, flood risks remain present along confined urban watercourses such as Ox Brook, Island Brook, and the headwaters of Yellow Mill Channel.

- The City operates two wastewater treatment plants, both of which are located in flood hazard areas and flooding can cause overflows of waste water and pollution to enter Long Island Sound.
- As the impacts of climate change become more severe and the number of extreme heat days increase, vulnerable populations and groups will have exacerbated impacts
- Air quality impacts remain an important concern as the impacts of climate change increase and incidents of poor air quality become more frequent
- The City operates the Citizen Alert System to notify residents about approaching extreme weather or mandatory evacuation orders, but reaching those with limited English proficiency remains a challenge.
- Schools are used as emergency shelters. The schools are appropriate for short term shelter needs but are not appropriate for long term use as shelters, especially for people with medical needs.

When the prior edition of this plan was being developed in 2019, the State of Connecticut was actively working toward implementation of "Resilient Bridgeport", which, when executed, will provide flood protection to a large part of the City's South End. Resilient Bridgeport is a collaborative, integrative approach to coastal resiliency in the City. The project is funded by the United State Department of Housing & Urban Development through the Community Development Block Grant - Disaster Recovery (CDBG-DR) and National Disaster Recovery (CDBG-NDR) Programs. The funding is being administered by the Connecticut Department of Housing (DOH) and includes various other leveraged state and federal funds.

#### V.1.ii TOWN OF EASTON

- A large proportion of Easton is forested with excessive damage resulting from the downing of limbs and trees occurs due to severe winds. Downed trees cause power disruptions throughout the Town and restricts access to residential neighborhoods. The rural development patterns of Easton mean that few alternate routes around downed trees exist, effectively isolating impacted areas.
- A water purification and filtration plant is located at the base of Easton Lake
- Reservoir: the Region's public drinking water supply could potentially be severely limited if the plant is damaged during an extreme storm.
- Increased temperatures may put the town at risk for infestations of invasive species that impact the local landscape, especially concerning due to the rural and heavily forested nature of Easton.

#### V.1.iii TOWN OF FAIRFIELD

- Coastal flooding from excessive storm surge from hurricanes, tropical storms, extra- tropical storms, and nor'easters is a problem for areas of Fairfield south of US Route 1, especially the area just north of Fairfield Beach and Jennings Beach (and behind Fairfield Beach Club), which sits in a basin.
- Increasingly heavy rainstorms have contributed to pluvial flooding across Fairfield due to overwhelmed storm drain systems and reduced capacity for infiltration on private properties, regardless of flood status.
- Extreme high tides, such as king tides have become problematic to coastal roadways and properties. Multiple intersections in the Town regularly flood due to heavy rain

events, storm surge, and extreme high tidewhich is anticipated to increase with sea level rise + unprecedented summer and winter storms

- Coastal infrastructure, including roads, coastal shoreline protection elements, and water and sewer infrastructure are at risk of coastal flooding, coastal erosion, and sea level rise.
- Sanitary pump stations must be evaluated and potentially replaced to ensure public health and flood protection.
- Long term and delayed habitat responses to drought conditions are of concern and include planning for additional tree planting to mitigate potential heat island effect.
- The northern part of Fairfield is forested and excessive damage and downing of limbs and trees occurs from high winds and heavy snow fall. Downed trees cause power disruptions throughout the area and restrict access to these residential neighborhoods.
- Because of the development patterns in this part of the Town, few alternate routes around downed trees exist, effectively isolating impacted areas.
- Undersized culverts and low lying rail underpasses create chokepoints that cause isolated flooding in several areas. The most prominent is the culvert that carries Ash Creek under Interstate 9The neighborhood north of this location experiences recurring flooding from even moderate intensity storms.
- Remnants of hurricane Ida caused flooding and scour issues at several culverts and bridges located in the Greenfield Hill and Stratfield sections of Town.
- Additional concern from rising temperature may create opportunities for invasive species to heavily impact Fairfield's ecosystem

(terrestrial floral and fauna plants may severely impact town forests and tree health and aquatic species may impact recreational opportunities, change habitats, and displace native populations.) There is additional concern that increased heat may bring public health hazards such as tick associated diseases.

## V.1.iv TOWN OF MONROE

- A dirt road near Hammertown Road has severe flooding in a swampy area. The area is hard to manage due to the type of pavement (dirt) would need to be paved and graded.
- As Monroe is at lower risk natural hazards, compared to many municipalities in the region, the town will likely need to act as a hub for safety during emergencies, which will lead to needing additional resources (generators, shelters).
- Monroe continues to maintain and explore shelter facilities in case there is a need for the town to act as a regional hub.
- Notwithstanding the above statements,
   Monroe is traversed by several streams and
   associated areas of flood risk, where flood
   losses can occur in the future.

## V.1.v TOWN OF STRATFORD

 Coastal flooding from excessive storm surge from hurricanes, tropical storms, extratropical storms, nor'easters, and heavy rain events during high tide is a problem for the South End neighborhood, as well as during bluesky extreme high tides events. This area also includes an industrial and commercial district located along CT-113. The adjacent Lordship area does not experience as much flooding from storms because it is mostly coastal upland with an elevation above base flood

- heights. However, the neighborhood can become isolated as access is cut-off by flood waters.
- During thunderstorms and heavy rain events over a short period of time, inland flooding occurs in the South End, under railroad viaducts, and along several smaller brooks and streams, especially in the Stratford Center area, Oronoque Village, and along Bruce Brook and Raven Brook. These streams become overwhelmed by excessive runoff from heavy rain events. Several sections have been channelized and the structures exacerbate the flooding potential. Multiple intersections in the Town regularly flood due to heavy rain events, storm surge, and extreme high tides.
- Stratford has multiple critical facilities located in flood hazard or flood prone areas. The Town has been proactive in floodproofing these buildings as they are undergoing updates, but additional funding for mitigation measures is needed. Examples include the animal shelter and a number of sewage pump stations.
- Wind causes tree limbs to fall, block roads, and cause power outages. The urban tree canopy of the Town is composed of many older trees and some species are not suitable for their locations.
- With limited options for addressing flooding from severe rain events, the Town is interested in green infrastructure. A study is needed to determine where it would be most effective.
- Drainage-related flooding during intense precipitation is a concern townwide, and areas of emerging flood risk are located in Lordship. One of the typical areas of risk is lower Washington Parkway in the vicinity

of West Hillside Avenue. Other areas may emerge, including Third Avenue and Fifth Avenue, as well as individual streets and groups of streets not yet identified.

#### V.1.vi TOWN OF TRUMBULL

- Inland flooding is a recurring problem for areas of Trumbull along the Pequonnock River. Problematic locations include Trumbull Center in the vicinity of Daniels Farm Road, the Twin Brooks Park area, and west of Route 127 south of the Unity Park area. Increased flooding due to high rainfall events in the past years has put Trumbull High School, which is used as a shelter, at risk.
- Trumbull does not operate its own waste-water treatment facility. Instead, sewage is collected by a sanitary sewer system that connects to the treatment plants located in Bridgeport. Due to the undulating topography of Trumbull, pump stations are located throughout the Town. Many of these stations are situated in flood hazard areas.
- There are four Class C dams located in Trumbull, and the failure of these structures would greatly impact residential neighborhoods downstream of the impoundments.
- Most streets throughout the Town are lined by mature trees that are susceptible to damage from high winds and heavy snow fall. Downed trees cause power disruptions throughout the Town and restricts access to some residential neighborhoods. The Town public works personnel can clear debris but must coordinate efforts with the utility company to ensure power to any downed lines has been deactivated and that the right trees are placed in new planting areas.
- Undersized culverts create chokepoints that cause isolated flooding in several areas.

<sup>\*</sup>Addition during public comment period

Problem areas include: Daniels Farm Road over the Pequonnock River, Lake Avenue over the inlet to Canoe Brook Lake and Melrose Avenue over Island Brook.

Aging WPCA sewer infrastructure is 50
years old in some locations and there have
been sewer line collapses due to high use.
Increased precipitation and storms have
increased use of the sewers.

# V.2 Vision, Goals & Objectives

The primary goal of the 2024 NHMP is to reduce the loss of life, personal injury and damage to property, infrastructure, natural, cultural and economic resources from natural disasters. This goal has remained consistent since the original 2006 NHMP.

## **GOALS**

Goals represent the plan's long term vision for addressing the impact of and building resiliency to natural hazards throughout the Region.

The individual goals and objectives of the NHMP cover six functional areas. The Planning Team/Advisory Committee reviewed the goals and objectives from 2019 plan. The team agreed that

#### **Vision Statement**

"The communities of the MetroCOG Region recognize the need, in light of recent severe and extreme weather events, to increase resilience to the devastating effects of natural hazards and mitigate future impacts through adaptation of existing infrastructure, improved planning and assessment, expanded education and awareness, and proactive response to emergencies caused by natural hazards."

they support the vision of the plan and address the impacts of new hazards that are now included in the plan, such as drought and extreme temperatures.

#### Prevention

**Goal:** Continue pre-disaster mitigation planning that assesses impacts from natural hazards and identifies effective strategies to mitigate future events and increase hazard resiliency.

# **Objectives:**

- Adopt and keep current the Natural Hazard Mitigation Plan.
- Adopt and enforce nationally recognized building codes and design standards in high hazard areas.
- Implement management practices and techniques that go beyond minimum requirements.
- Integrate the natural hazard mitigation objectives and strategies detailed in the NHMP with local land use policies and zoning regulations.
- Continue to participate and comply with guidelines and requirements of the National Flood Insurance Program (NFIP).
- 6. Improve storm water management planning and adopt policies to reduce runoff.
- 7. Implement "No Adverse Impact" policies.
- 8. Implement low impact development techniques and green infrastructure policies and design guidelines.

# **Property Protection**

**Goal:** Protect buildings from the impacts of natural hazards and implement projects to safeguard against the impacts of natural hazards.

# **Objectives:**

1. Rebuild damaged buildings to meet mini-

- mum design standards so as to withstand the impacts of natural hazards.
- Acquire repetitive loss properties, as deemed necessary.
- 3. Ensure that code plus construction is considered to reduce wind damage risk during building elevation projects.

# Structural & Infrastructure Projects

**Goal:** Protect infrastructure from the impacts of natural hazards and implement projects (structural and infrastructure) to safeguard against the impacts of natural hazards.

# **Objectives:**

- Rebuild damaged infrastructure and buildings to meet the minimum design standards to withstand the impacts of natural disasters.
- 2. Implement floodplain management techniques above and beyond minimum NFIP requirements.
- 3. Construct flood control measures.
- 4. Maintain drainage systems.
- Increase the capacity of drainage systems, including the separation of combined sewer systems, utilization of low impact development techniques and construction of green infrastructure.
- Ensure that green, green/gray, and gray (hard) shoreline infrastructure are all utilized in the region as appropriate.

# Natural Systems Protection

**Goal:** Protect and restore natural systems and features that mitigate the impact of natural hazards.

# **Objectives:**

- 1. Prohibit removal of natural vegetation dunes and use of riprap along stream channels.
- 2. Restrict development in floodplains and sensitive coastal areas.

- 3. Protect and restore riverbanks, wetlands, salt marshes, and dunes.
- 4. Establish vegetative riparian buffers.
- 5. Preserve floodplains as open space and acquire floodplain lands for open space.
- 6. Restore and replenish beaches.
- 7. Implement tree trimming programs that maintain healthy and appropriate urban forest and tree canopy.

# **Education & Awareness**

**Goal:** Educate residents, businesses and stake-holders throughout the region about natural hazards and increase the awareness of severe and extreme weather events.

# **Objectives:**

- 1. Inform residents of shelter locations and evacuation routes.
- 2. Encourage homeowners to purchase flood insurance.
- 3. Educate citizens about actions to take in the event of extreme weather before, during and after.
- 4. Educate residents on the importance of wetlands and the need for the protection and maintenance of wetlands.
- Conduct outreach to educate and advise homeowners about risks to life, health and safety.
- Hold workshops to facilitate dissemination of information on technical assistance programs.
- 7. Encourage residents and businesses to prepare for extreme weather and for actions to take when an event occurs.
- 8. Develop pamphlets on emergency procedures and management and make available at city and town halls, libraries and on municipal websites.

 Accomplish a robust education program in communities that have joined and participate in the FEMA Community Rating System (CRS).

# **Emergency Services Protection Actions**

**Goal:** Improve upon and ensure the continuity of emergency services during severe and extreme weather events.

# **Objectives:**

- Conduct planning studies on evacuation policies, sheltering needs and capacity, hydrology, "Make Safe" procedures, and natural features.
- 2. Protect critical facilities and infrastructure necessary for emergency response.

# V.3 Development of Mitigation Strategies

### **SUCCESS STORIES**

Many mitigation success stories can be found in the MetroCOG Region. These successes demonstrate a strong capacity for the MetroCOG communities to continue implementing mitigation projects. Below are a few local mitigation action success stories that align with the six goals:

#### Prevention

- The City of Bridgeport's Zone Bridgeport was a comprehensive zoning regulations rewrite included low impact development (LID) and resilience standards.
- The Town of Easton incorporated LID in their zoning regulations.
- The Town of Trumbull incorporated LID and green infrastructure guidelines into their stormwater regulations.

# **Property Protection**

The **Town of Stratford** has secured FEMA funding for a Repetitive Loss Area Analysis and is in the process of advertising an RFP.

# **Structural & Infrastructure Projects**

- Fairfield's Wastewater Treatment
   Plant flood control structures and pump stations have been showcased throughout the region.
- In Monroe, the Town coordinated with CTDOT on culvert upgrades and drainage improvements along CT-25.
- The Town of Stratford has worked closely with stakeholders and residents of the South End neighborhood to identify flood mitigation strategies. Through this work, the Town is preparing an application to the BRIC program for flood control structures.

# **Natural Systems Protection**

- In partnership with the City of Bridgeport
  and the Town of Fairfield, the Ash Creek
  Conservation Association completed
  the revision of the original 2013 estuary plan
  in 2023. Both municipalities coordinate with
  the ACCA to identify strategies to mitigate
  erosion and restore the estuary.
- The Town of Trumbull promotes "Right Tree, Right Place" and obtained a Tree City USA designation in 2024.

## **Education & Awareness**

- The City of Bridgeport annually provides over 200 outreach events to residents about preparing for emergency and natural hazard events.
- The Town of Trumbull has focused on outreach to vulnerable residents and was designated a Storm Ready Community in 2023.

# **Emergency Services Protection**

• The City of Bridgeport and Town of Stratford provide information to local businesses and property owners to prevent the accidental release of chemicals during or after a natural hazard event. The City of Bridgeport also installed cameras at several parks and harbors along the coastline to better understand storm surge and enhance evacuation plans. Town of Fairfield plans to install a microgrid at the WWTP. The Town of Stratford has secured funding to install a generator at one of their high schools.

# UPDATES ON REGIONAL & STATEWIDE EFFORTS

Since adoption of the 2019 plan, a range of initiatives at the state and regional scales have included mitigation/resilience components. These initiatives are detailed in Chapter IV and summarized below.

# MetroCOG Region

- EPA/Climate Pollution Reduction
  Grant (CPRG): MetroCOG is serving as
  the lead agency for the Bridgeport-Stamford-Norwalk Metropolitan Statistical Area
  (MSA) which is focused on planning to
  reduce greenhouse gas emissions. A Priority
  Climate Action Plan (PCAP) was developed
  in early 2024.
- The Connecticut Institute for Resilience and Climate Adaptation's (CIRCA) Resilient CT Phase I and II were finalized for Fairfield and New Haven Counties.
- The Metropolitan Transportation Plan for the Greater Bridgeport and Valley Planning Region was approved in 2023 and has a goal of "Promote Resilience and Environmental Sustainability within the Transportation System."

- MetroCOG hosts a summer intern through the Sustainable CT program.
- MetroCOG staff participates in the DEMHS Regional Emergency Planning Team (REPT) for DEMHS Region 1 and Emergency Support Function 1 (ESF-1): transportation.

# Statewide Efforts

- In January of 2021, the Governor's Council on Climate Change (GC3) released
  the Phase 1 Report "Taking Action on Climate Change and Building a More Resilient
  Connecticut for All".
- The five-year update to the State Hazard Mitigation Plan (HMP) occurred in 2023-24 and was utilized as a resource in the update of the MetroCOG plan.
- The State Historic Preservation Office (SHPO) released the Connecticut Cultural Resources Information System (ConnCRIS), an online viewer of Connecticut's cultural resources. The viewer built on the resiliency concepts integrated in the 2017-2018 State Historic Preservation Plan and can be used to identify cultural resources vulnerable to flooding.
- CTDEEP has developed a series of training resources for businesses to assess the vulnerability of their location to climate-related natural hazards and to prevent damage and/ or contamination from toxic on-site materials, including the CT Toxic Users & Climate Risk Viewer layer.
- The Office of the State Building Inspector updated the state building code in 2022.
- The State's Interagency Drought Work Group updated the "Connecticut Drought Preparedness and Response Plan" in 2022.

# DEVELOPING REGIONAL ACTIONS

For the 2024 NHMP Update, MetroCOG regularly communicated through the Planning Team/Advisory Committee's regional meetings and smaller, local meetings. In addition, MetroCOG worked with each community and other stakeholders to solicit input from local organizations, adjacent communities and the public (see Chapter II and Appendices C and D). Input included the identification of hazards, assessment of risks and the development of strategies to establish a more resilient Region.

Mitigation actions are considered at the regional and local levels. Regional actions are general in nature and can be regarded as best practices. Mitigation actions at the local level address the unique characteristics of a community or the concerns expressed by the community. The method of implementation will also vary by municipality.

Each mitigation action aligns with one or more of the following six categories and reflects the organization of the plan's goals.

- Prevention: actions that will keep problems from getting worse
- Property Protection: actions that address individual buildings
- Public Education & Awareness: actions that will inform the public
- Natural Systems Protection: actions that will protect natural resources
- Emergency Services Protection: actions that will protect emergency services before, during and immediately after an occurrence
- Structural & Infrastructure Projects: actions that will control the hazard

Natural hazards are not governed by state, regional or local boundaries and typically

impact a large geographic area. The following mitigation actions are general and address the regional scale and impact of natural hazards. These provide a basis for hazard mitigation in the region as well as a template for identifying specific mitigation projects.

# **Inland & Coastal Flooding**

Through the risk assessment, vulnerability assessment and discussions throughout the planning process, the communities of the MetroCOG Region were found to be most at risk from flooding, both inland and coastal. Common impacts of include damage to personal property, buildings, and infrastructure, closure of roads, disruptions of critical services, and injuries to persons in flood prone areas. General mitigation actions include:

#### Prevention

- Incorporate flood mitigation in local land use regulations.
- Enforce flood management regulations.
- Regularly evaluate stormwater management regulations and programs
- Participate in regional watershed councils to prepare and evaluate watershed management plans.
- Improve storm water management planning and adopt policies to reduce storm water runoff, such as, requiring development projects have "zero discharge."
- Comply with the NFIP and maintain FEMA elevation certifications.
- Implement floodplain management techniques above and beyond minimum NFIP requirements, including increasing "freeboard" heights, adopting "No Adverse Impact" policies, notifying repetitive loss property owners, and participating in the Community Rating System (CRS) program.

 Conduct hydrologic and hydraulic studies to evaluate risks and flood mitigation strategies.

# **Property Protection**

- Adopt and enforce building codes and increase "freeboard" requirements.
- Remove existing structures from flood-prone areas.
- Flood-proof basements and other areas.
- Encourage elevation of structures.

#### Structural & Infrastructure

- Limit the amount of impervious surface.
- · Prohibit filling in floodplain areas.
- Increase capacity of storm water drainage systems and separate combined sewer systems.
- Increase capacity of detention and retention ponds and basins.
- Maintain drainage systems by clearing sediment, removing debris and routinely repairing and cleaning storm drains.
- Elevate structures, roads, and bridges above base flood elevation.
- Construct flood control measures, such as berms and dikes, and use hardened material to prevent erosion.
- Install bioengineered bank stabilization techniques.

# **Natural Systems Protection**

- Protect and restore natural flood mitigation features.
- Protect and restore riverbanks, wetlands and dunes.
- Use vegetative buffers.
- Establish riparian buffers.
- Preserve floodplains and wetlands as open space.

- Acquire floodplain lands and wetlands for open space.
- Establish a green infrastructure program that requires more trees to be planted or preserved, encourages the use of porous pavement, and planting of vegetative buffers.
- Develop stream buffer ordinances.
- Continue beach nourishment programs.
- Limit or restrict development in floodplain areas.

## **Public Education & Awareness**

- Increase awareness of flood risk and safety.
- Encourage homeowners to purchase flood insurance.
- Educate citizens about safety during flood conditions.
- Conduct outreach to educate and advise homeowners about risks to life, health, and safety.
- Hold workshops to facilitate dissemination of information on technical assistance programs.

# **Emergency Services Protection**

- Flood proof critical facilities in vulnerable locations, such as wastewater treatment plants, EOCs, police and fire stations, and emergency shelters.
- Locate critical facilities, such as wastewater treatment plants, EOCs, police and fire stations, and emergency shelters outside floodprone areas.

#### Sea Level Rise

Many of the mitigation actions that address the impact of coastal and inland flooding will also mitigate the impacts of sea level rise. Sea level rise causes land loss in low-lying coastal areas. Sea level rise also exacerbates erosion and

flooding as new areas become vulnerable to storm surge, wave action, and tides.

#### Prevention

- Map and assess vulnerability to sea level rise, including modeling of various "what if" scenarios. At a minimum, utilize the sea level rise projection prepared by CIRCA and adopted by Public Act 18-82.
- Use GIS to map at-risk areas and structures.
- Regulate and manage development in highrisk areas and create a sea level rise overlay zone.
- Prohibit reconstruction and redevelopment in areas susceptible to chronic flooding.

# **Property Protection**

- Protect buildings by acquiring structures in high-risk areas and either demolish or relocate.
- Raise buildings above potential sea levels.

#### Structural & Infrastructure

- Protect infrastructure by acquiring structures in high-risk areas and either demolish or relocate.
- Raise infrastructure above potential sea levels.

## **Natural Systems Protection**

- Preserve open space and wetlands in highrisk areas.
- Acquire open space in high-risk areas.
- Protect and restore natural buffers.
- Implement dune restoration projects.
- Promote conservation and management of open spaces and wetlands within sea level rise areas.

#### **Public Education & Awareness**

 Increase awareness and educate the public about sea level rise. Encourage homeowners to purchase flood insurance.

# **Emergency Services Protection**

 Locate critical facilities, such as wastewater treatment plants, EOCs, police and fire stations, and emergency shelters outside areas vulnerable to sea level rise.

#### Summer Storms & Tornadoes

Severe summer weather comes in the form of thunderstorms and tornadoes, and is accompanied by lightning, hail and high winds. These events pose a threat to lives, property, and vital utilities primarily from downed trees, limbs, power lines and flying debris. Although infrequent in the Region, a tornado is a violently rotating column of air that has contact with the ground and is often visible as a funnel cloud. The destruction caused by tornadoes ranges from light to catastrophic depending on the intensity, size, and duration of the storm.

#### Prevention

Adopt and enforce building codes.

#### Structural & Infrastructure

- Install lightning protection and grounding on communications infrastructure and critical facilities.
- Install surge protection on critical electronic equipment.

#### **Public Education & Awareness**

- Develop a lightning brochure for distribution at recreation facilities and parks.
- Ensure the public is aware of emergency cooling centers during severe hot weather.

# **Emergency Services Protection**

 Ensure adequate power to critical facilities such as EOCs, police and fire stations, and emergency shelters.

- Improve communication and cooperation with local utilities regarding downed trees and power lines, "Make Safe" crews and power restoration.
- Ensure emergency access to vulnerable populations and critical facilities.

# Winter Storms

Severe winter storms may include snow, sleet, freezing rain, or mixed precipitation, and are often accompanied by high winds. The damage from these storms includes downed trees, widespread power outages, road closures and limited access to critical facilities, and can result in injury and death.

#### Prevention

- Adopt and enforce building codes.
- Improve tree maintenance.

#### Structural & Infrastructure

- Protect power lines and infrastructure.
- Establish and follow standards and guidelines for tree pruning around power lines and routine inspection of hazardous trees.
- Establish debris management and clearing capabilities.
- Reduce the impacts to roads by planning for snow removal and debris clearing.
- Maintain and improve snow clearing equipment.

#### **Public Education & Awareness**

- Increase awareness and educate the public about proper tree maintenance.
- Educate citizens about safety during winter storms and power outages.
- Provide residents with the locations of warming centers and shelters during a power outage.

# **Emergency Services Protection**

- Ensure adequate power to critical facilities such as EOCs, police and fire stations, and emergency shelters.
- Improve communication and cooperation with local utilities, "Make Safe" crews and power restoration regarding downed trees and power lines.
- Ensure emergency access to vulnerable populations and critical facilities.

#### Extreme Heat

#### Prevention

- Stay in cooler temperatures during extreme heat conditions
- Learn to recognize the signs of heat related illness

# **Property Protection**

- Install cooling devices to regulate the temperatures.
- Add insulation to keep heat out.
- Cover windows with drapes or shades

#### Structural & Infrastructure

- Limit the amount of impervious surface.
- Add insulation to buildings to keep the temperature regulated

## **Natural System Protection**

 Plant shade trees in appropriate locations to block sunlight in high traffic areas

#### **Public Education & Awareness**

 Educate citizens about safety during extreme heat events.

# **Emergency Services Protection**

 Ensure the public is aware of emergency cooling centers during severe hot weather and power outages.  Inform residents of upcoming predicted warm weather events though region wide services, such as social media.

#### Extreme Cold

#### Prevention

- Ensure buildings are hardened for extreme temperatures.
- Ensure that woodstoves, fireplaces, or kerosene heaters are inspected on a yearly basis Install smoke detectors in case of emergency
- Have fuel delivered ahead of schedule to ensure heat is maintained
- Ensure thermometers, carbon monoxide detectors, and smoke detectors are working

# **Property Protection**

- Insulate any waterlines that may run along exterior walls so that water supplies are less likely to freeze
- Prepare and emergency supply list inclusive of blankets, battery powered flashlights, and matches.

#### Structural & Infrastructure

 Weatherproof structures though weatherstripping, insulation, doors and insulated storm windows.

#### **Public Education & Awareness**

- Educate citizens about safety during winter storms and power outages.
- Provide residents with the locations of warming centers and shelters during a power outage.

# **Emergency Services Protection**

- Inform residents of upcoming predicted cold weather events though region wide services, such as the MetroCOG website and social media platforms
- Promote having a gathered survival kit ahead

of extreme cold conditions that includes food, water, medicines

# Drought

#### Prevention

Promote responsible use of water year round

# **Property Protection**

Explore potential incentives for the purchase of low-flow appliances

#### Structural & Infrastructure

- Promote pervious pavement options for increased groundwater recharge
- Explore the potential for water system interconnections through conversations with Aquarion

# **Natural Systems Protections**

Educate stakeholders of low impact lawn and garden water management

#### **Public Education & Awareness**

- Participate in regional watershed councils to prepare and evaluate watershed management plans.
- Coordinate outreach efforts to farmers, garden clubs, and golf courses to ensure responsible water use.

# **Emergency Services Protection**

 Inform residents of upcoming predicted drought events through regional broadcasts including town websites, regional platforms, news outlets, and e-mail lists.

#### Wildfires

- Pursue the extension of public water supply for fire protection into outlying areas.
- Pursue the installation of dry hydrants in areas without adequate fire protection.
- Ensure off-road emergency vehicles are available to access wildfires.

 Provide educational information to homeowners and businesses within the wildlandurban interface.

# **Earthquakes**

#### Prevention

- Ensure that the earthquake sections of the State Building Code are enforced in new construction
- Ensure that some critical facilities can withstand earthquakes that exceed the criteria established in the State Building Code

#### **Public Education & Awareness**

 Ensure that the public is provided information on what to do if a moderate earthquake occurs

Property damage from earthquakes is primarily caused by the failure and collapse of structures. The Region is not at high risk to earthquakes.

#### All Hazards

- Secure and install backup generators adequate to meet the needs of critical facilities and evacuation locations, short- and long-term.
- Expand the use of GIS to inform municipal staff, residents, businesses and regional stakeholders of potential natural hazards and strategies to mitigate, prepare and/or respond to the impacts of natural hazards.

# NATIONAL FLOOD INSURANCE PROGRAM (NFIP)

As described in Chapter III, inland and coastal flooding has severely impacted communities throughout the MetroCOG Region. All communi-

ties in the MetroCOG Region participate in the NFIP as presented in Table V.3.1. Communities that participate in the NFIP must adopt a local flood damage prevention ordinance with established minimum building standards for the floodplain. All new buildings and substantial improvements to existing buildings are required to be protected from damage by floods with a 1% annual chance of occurring (the 100-year flood). Any new floodplain development may not aggravate existing flood problems or increase damage to other properties.

All communities in the MetroCOG Region have adopted and continue to enforce floodplain management regulations that are consistent with those required by the NFIP. Continued compliance with NFIP standards, active participation in the NFIP and application to the Community Rating System will mitigate the financial impacts of future flood events.

# MITIGATION ACTIONS FOR REPETITIVE LOSS PROPERTIES

Due to multiple claims under the NFIP, Repetitive Loss Properties are costly to insure and strain FEMA resources. FEMA offers grant programs to assist communities and states in implementing actions that reduce or eliminate the long-term risk of flood damage to focus on repetitive loss properties. The primary objective of these programs is to eliminate or reduce the damage to property caused by repeated flooding. Funds are provided to implement various mitigation measures that will reduce future flooding losses. Possible mitigation actions include acquisition or relocation of severe repetitive loss properties and elevating existing structures.

V.3.1 National Flood Insurance Program (NFIP), Local Participation						
	Bridgeport	Easton	Fairfield	Monroe	Stratford	Trumbull
NFIP Entry Date	10/15/1980	9/30/1983	8/15/1978	4/17/1985	6/1/1978	12/4/1979
Effective FIRM	7/8/2013	6/18/2010	7/8/2013	6/18/2010	7/8/2013	6/18/2010

Source: CTDEEP

# V.4 Review of Prior Hazard Mitigation Actions

In the 2006, 2014, and 2019 NHMPs, local actions were recommended to mitigate the impacts of natural hazards and address the specific concerns of each respective community. The following narrative of mitigation strategies explains the overall concerns of each community during the 2019 NHMP Update. The mitigation strategy matrices in the 2019 NHMP were the result of discussions with municipal staff, the concerns gathered through the public outreach process and the STAPLE+E review method.

# V.4.i CITY OF BRIDGEPORT

The natural hazards impacting Bridgeport most frequently include coastal flooding from tropical storms and hurricanes and inland flooding from heavy rain events. Inland flooding is worsened by the past channeling and/or burying of water courses. Addressing the impacts of coastal and inland flooding continues to be priorities in Bridgeport, as they were in the 2006, 2014, and 2019 NHMPs. NHMP recommendations continue to be revised and expanded to include a diverse and comprehensive set of strategies to address the impacts caused by a variety of natural hazards.

The City continues to be guided by the BGreen Plan to prioritize and proactively address rising sea levels and the impacts of climate change. Improvements to and expansion of infrastructure and structural solutions remain as priority actions, but as in the 2019, NHMP, green infrastructure, low impact development and comprehensive, region-wide watershed management are also recommended as strategies to mitigate the impacts of natural hazards.

New priorities for preventive and natural resource protection strategies were also identified as part of the update. Since the 2019 NHMP, the City's zoning regulations were updated to include a freeboard requirement and low impact development and resilience standards. In the 2024-2029 planning period, the City will factor climate change/resilience into critical infrastructure improvements and priority development areas. Further, the City has prioritized an action to increase the ability of natural systems to mitigate flooding and climate-induced natural hazards. Continuing past strategies such as watershed management plan implementation, green infrastructure installation and open space acquisition in high-risk areas will play a role.

As structural projects in the City occur, opportunities to further integrate and coordinate sewer separation projects should continue, such as upgrading to a separated sanitary sewer system during road improvements. Continuing to secure funding for the various phases of ongoing projects and completing these projects remains a City priority.

The 2019 NHMP emphasized pre-disaster planning and effective public education. Since 2019, Bridgeport has begun to focus on neighborhood resilience and urban heat hazard mapping. Public education, outreach and early warning to residents is crucial to insuring a resilient community. These strategies have ensured that the public has the information to adequately prepare (and recover) in the event of a disaster.

The increased outreach to residents and businesses has provided education and information to residents of high density public housing, vulnerable populations, the transit dependent and those with special needs about what to do before, during and after severe weather events. The City

of Bridgeport will continue to provide universal shelters, which provide facilities for people with special needs and accept pets.

Hazards caused by severe ice, wind, snowstorms and heat are also concerns. During periods of severe heat, ensuring that vulnerable populations are aware of and have access to cooling centers is a crucial task. A plan to address City operations protocols for varying levels of snowfall and securing additional equipment for snow removal have helped in recovering from heavy snow events. Increasing the effectiveness of emergency communications – among City departments and

to the public will continue as new technologies become available and will be utilized during a variety of natural hazard events.

MITIGAT	MITIGATION ABBREVIATIONS				
Code Mitigation Type					
EA	Education and Awareness				
ES	Emergency Services				
NSP	Natural Systems Protection				
PP	Property Protection				
PR	Prevention				
ST	Structural/Infrastructure				

2019 Mitigation Actions are presented in Table V.4.i.1. Mitigation types and their abbreviations can be found above.

V.4.i.	V.4.i.1 2019 MITIGATION ACTION STATUS, CITY OF BRIDGEPORT				
2019 ID	Action for 2019-2024	Mit. Type	Updates	Revision	
1	Complete CAV and initial steps to enter into the CRS program.	PP, PR, PE, ES, NSP	This action is in progress, COVID delayed on site visit from FEMA regional. The City is awaiting site visit from FEMA to gain approval and enter program	NA*	
2	Revise Zoning Regulations to include low impact development (LID) and resilience standards.	PR	This action was completed. It did have the intended results and was achieved through broad community input	Remove	
3	Consider freeboard of greater than one foot as part of the Zoning Regulation rewrite.	PR	This action was completed. It is included in the comprehensive city-wide zoning update	Remove	
4	Factor climate change impacts into City-funded critical infrastructure improvement plans by requiring that the standards similar to those of Public Act 18-82 be applied to City-funded projects. As a first step, produce guidance document by 2021.	PR, ST, PP	This action has not been completed due to lack of staff time	NA*	
5	Complete the components of the "Resilient Bridgeport" project execution that are scheduled for 2019-2024.	ST, PP	Not completed. Additional funding was need to complete this project, the elements are at 90% design	NA*	
6	Make additional progress with combined sewer separations and CSO abatement as outlined in plans developed in 2018.	ST	In progress, just finished another separation. Upgrades to the two wastewater treatment facilities in city are in process, which will increase capacity of plant to manage, thereby reducing CSO impacts	NA*	
7	Pending funding, proceed with the Storm water Authority Feasibility Study. Consider incentives to reduce the amount of impervious surface in the City.	PR	This action has not been completed due to staff time	NA*	

<sup>\*</sup>NA = Not Applicable

V.4.i.	1 2019 Mitigation Action Status	, Сіту	of Bridgeport	
2019 ID	Action for 2019-2024	Mit. Type	Updates	Revision
8	Pursue a target of 30 additional GI installations on City-owned land and along streets in the 2019- 2024 planning timeframe. Select some locations from the Regional Framework for Coastal Resilience.	st, Nsp	In progress. Several green infrastructure installations have occurred, with some downtown, several on Seaview Avenue, and a couple dozen spread throughout the city in various locations. Approximately 12 have been installed in the city in various capacities and locations	NA*
9	Identify opportunities for floodplain easements on properties.	NSP	In progress. This will be informed by the flood control studies being completed in the near future. The City has identified some properties for acquisition and are in process of acquiring these properties and planning to turn them into expand areas for management	See action 11
10	Secure waterfront easements as available.	NSP	In progress. This was included as a requirement in zoning code for public access	Considering combing with action 9
11	Identify open space to acquire in high risk areas.	NSP	In progress. The City actively looks to acquire waterfront property and prioritize acquisition.	NA*
12	Identify parcels within potential marsh advance- ment zones that may be acquired, including properties along Cedar Creek that have low potential for redevelopment.	NSP	This action is in progress. The City is actively looking for marsh advancement opportunities	See action 13
13	Conduct study of Ash Creek sedimentation to determine if sedimentation will enhance longevity, stability, and sustainability of the ecosystem	ST	Not completed, City and its partners are examining opportunities to raise the wetland through thin layer deposition in collaboration with state and non-profit partners.	Considering combing with action 12
14	Identify potential areas of erosion along Ash Creek that may require mitigation, and secure funding for feasibility studies.	ST	In progress. The Ash Creek Estuary Master Plan was updated in 2023. Several thousand native plugs have been installed on the Sand Spit in collaboration with ACCA and the Town of Fairfield, restoration efforts continue, as well as shoreline protection plans and additional restoration.	NA*
15	Implement findings of the Lower West End resiliency planning to draw appropriate businesses to the northwest bank of Cedar Creek, such as water-dependent and floodable land uses.	PP	Not applicable	NA*
16	Continue to remove derelict structures in flood zones and other areas of high risk; and redevelop or convert to open space. The target for 2019- 2024 is ten additional properties.	NSP	This action is in progress, the Pleasure Beach bridge remnants were removed this year	NA*
17	Repair/replace the State Street Ext/Commerce Drive Bridge and upgrade the catch basins and drainage system.	ST	In progress this project is about to go to bid, permit approval were recently granted	NA*
18	Execute design of the flood mitigation project for Island Brook and Ox Brook.	ST	In progress, the city is starting on the flood control study. Conceptual designs will be development and downstream studies for each flood control project, with the goal of identifying implementation actions and projects for state bonded funding	NA*

<sup>\*</sup>NA = Not Applicable

V.4.i.	V.4.i.1 2019 MITIGATION ACTION STATUS, CITY OF BRIDGEPORT					
2019 ID	Action for 2019-2024	Mit. Type	Updates	Revision		
19	Execute design of the flood mitigation project for northeast Bridgeport.	ST	In progress, the city is starting on the flood control study. Conceptual designs will be development and downstream studies for each flood control project, with the goal of identifying implementation actions and projects for state bonded funding	NA*		
20	Pursue funds for design of a demonstration project for green coastal bank protection opportunities along the Yellow Mill Channel.	ST, NSP	In progress actively looking for funding	NA*		
21	Pursue funds for design of a demonstration project for green coastal enhancement and restoration opportunities (similar to the action for Yellow Mill Channel, above).	ST, NSP	In progress, include in updated plan	NA*		
22	Continue to work with the Town of Stratford to complete the Bruce Brook improvements near Barnum Avenue.	ST	In progress, project is being led by town of Strat- ford and is in design and permitting. The City is looking to install a floating trash collection device in Bruce Brook to help address issues	NA*		
23	Execute the design to address drainage and flooding at Seaview Avenue where it crosses the railroad line, potentially coinciding with the proposed Barnum RR Station.	ST	In progress, coordination among stakeholders and identifying drainage issues. Bridge structure is aging	NA*		
24	Select one recommendation from the Pequan- nock River Watershed Plan to improve water quality and alleviate flooding, and secure funding.	ST, NSP	In progress, actively looking for funding	NA*		
25	Select one recommendation from the Rooster River Watershed Plan to improve water quality and alleviate flooding, and secure funding.	ST, NSP	Water quality monitoring is continuing.	NA*		
26	Pilot test an automated viaduct closure system for one viaduct. Create signage system, sensor on bridge for water level, underpass flooded don't drive	ES	Not completed, due to lack of funding and staff time	NA*		
27	Conduct a feasibility study for increasing the heights of the breakwaters.	ST	Not completed due to staff resources, the breakwaters may have elevated in past couple of years by Army Corp	NA*		
28	Raise the remaining unmitigated electrical boxes at Seaside Park in areas vulnerable to flooding.	PP	Not applicable	NA*		
29	Conduct a feasibility study for increasing the heights of the seawalls.	ST	Not completed due to lack of staff resources	NA*		
30	Implement outreach programs to educate citizens regarding flood management ordinances, flood insurance programs, and other flood relevant issues, including creditable activities in the CRS program and GIS.	PE	In progress. The city would like to increase the frequency of these in the future	NA*		

<sup>\*</sup>NA = Not Applicable

V.4.i.	1 2019 Mitigation Action Status	<b>,</b> CITY	of Bridgeport	
2019 ID	Action for 2019-2024	Mit. Type	Updates	Revision
31	Increase community awareness and preparedness through education and outreach via the religious community, public libraries and higher education and implement neighborhood specific emergency and communications plans.	PE	In progress and combined with #30 going forward.	NA*
32	Finalize specific neighborhood plans for emergency management and communications and implement plan provisions. Each plan should be translated into the top five languages spoken in the City of Bridgeport.	ES	Completed, the City did achieve intended result, just finished a few months ago. The City looks to update them as needed and continue communication and promotion of these plans	NA*
33	Increase education and communications on response procedures for residents of high density public housing areas, especially those located in the coastal area.	PE	About 200 community awareness trainings conducted annually. This is to a variety of audiences including, church groups, NRZs, schools, non-profits, places of workshop, and for profit business	NA*
34	In high density and public housing develop- ments, post the evacuation routes and evaluate additional transportation needs.	ES	Not completed, carry forward, we have some signs in the city for evacuation routes but not located in the building, evacuation routes are so fluid depending on the incident, the route will challenge.	NA*
35	Assess/augment local areas of the public refuge system across the City and ensure residents are aware of uses and procedures during emergencies.	ES	Shelter information provided during and ahead of emergencies, all schools are prepared for short term and long term shelters	NA*
36	Encourage homeowners to purchase flood insurance.	PP	Occurs after every storm, if people are using insurance need to purchase insurance	NA*
37	Help reduce the disbursement of toxic substances from flooded homes and facilities by conducting outreach regarding this topic.	ES	Hands out pamphlets about what to do/how to store. Gives out mops and resources to help people clean up	NA*
38	Once during the timeframe of this plan update, assess capacities and needs of sheltering, cooling, and medical network across City as well as adjoining municipalities in the Greater Bridgeport Region.	ES	Standard practice done on a more frequent than annual basis	NA*
39	Secure funding to install a warning siren system in areas vulnerable to inland and coastal flooding to alert residents to evacuate.	ES	Connected to CT Alert, alert all homeowners in jurisdiction and geocode to specific areas, also utilize social media and having PD and FD do PA systems, would be interested in flood gates or lighting, siren system does not seem feasible for this municipal setting and application	NA*
40	Pursue funding to complete a feasibility study for raising bridges and their connecting roads in one specific pilot area.	ST	Not completed, funding resources are being explored	NA*
41	Secure funding to upgrade Emergency Operations Center equipment to include a complete camera board for situational awareness and display board for public facilities equipment tracking.	ES	Not completed, funding resources are being explored	NA*

<sup>\*</sup>NA = Not Applicable

V.4.i.	1 2019 Mitigation Action Status	, CITY	of Bridgeport	
2019 ID	Action for 2019-2024	Mit. Type	Updates	Revision
42	Secure funding to install a camera system to more thoroughly understand storm surge and to enhance evacuation.	ES	Completed, cameras were installed at Seaside Park, Bridgeport Harbor, Pleasure Beach and Black Rock Harbor	NA*
43	Closely monitor Marina Village reconstruction to ensure that the project is flood resilient.	PP	In progress, reconstruction is not complete but project is being closely monitored by staff	NA*
44	Carefully regulate the 60 Main Street and ferry terminal site redevelopments to ensure that the projects are flood resilient; these are key waterfront sites and the City has an opportunity for supporting innovative designs.	PP	In progress, PSEG reuse study underway, funding from State (refine)	NA*
45	Incorporate flood resiliency in the WWTP upgrades that occur in the near future.	PP	Not applicable	NA*
46	Complete permitting and design of Johnson Creek Living Shoreline demonstration project.	NSP	In progress, include in updated plan, funding is currently being pursued with TPL	NA*
47	Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.	PE	Hands out pamphlets and information, Tier II facili- ties are required to ensure that they are adequately stored and protected during natural hazards	NA*
48	Secure funding from SHPO to conduct a historic resources survey focusing on potential historic resources in coastal flood risk areas.	PP	No longer relevant (funding from SHPO) Local capacity is able to complete this task without additional funding	Remove
49	Work with CT DEEP to complete a formal validation of the RL list and update the mitigation status of each listed property.	PP	In progress currently. Every time a building permit comes in it is being closely monitored at each property to ensure it doesn't exacerbate any situations	NA*
50	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.	PP	In progress, private property issues cause delays.	NA*

<sup>\*</sup>NA = Not Applicable

# V.4.ii TOWN OF EASTON

Easton is sparsely developed, and a large proportion of the Town is preserved as either existing and former water company owned lands, or farmland. The impacts from natural hazards are somewhat limited, compared to other portions of the MetroCOG region. Since 2019, the Town updated their zoning regulations to incorporate low impact development recommendations, especially pertaining to land management practices. Previous recommendations for Easton were oriented towards infrastructure projects aimed at mitigating the impacts of flooding. These recommendations, such as warning residents in areas that may become isolated or blocked during severe weather, remain priorities to the Town during emergencies.

Previous damage to trees, and the resulting power outages and from severe winds and downed trees during thunderstorms, hurricanes, tropical storms, nor'easters, and snowstorms have also impacted the
Town of Easton.
Priority strategies to mitigate
the impacts of
these hazards
include tree
maintenance
programs,
education

MITIGAT	MITIGATION ABBREVIATIONS			
Code	Mitigation Type			
EA	Education and Awareness			
ES	Emergency Services			
NSP	Natural Systems Protection			
PP	Property Protection			
PR	Prevention			
ST Structural/Infrastructure				
	· · · · · · · · · · · · · · · · · · ·			

of residents on proper tree maintenance, and coordination with utility tree trimming programs. Tree management and maintenance plans were implemented since 2019. During disasters, enhanced communications with utilities and access to emergency services on roads blocked by downed trees and snow are also necessary.

2019 Mitigation Actions are presented in Table V.4.ii.1. Mitigation types and their abbreviations can be found to the left (above).

V.4.ii.1 2019 MITIGATION ACTION STATUS, TOWN OF EASTON				
2019 ID	Action for 2019-2024	Mit. Type	Updates	Revision
1	Increase funding for the routine tree maintenance and inspection program and remove a greater number of hazardous trees and branches each year.	PP	The town has increased the number of inspections of trees for safety purposes and plans to coordinate with the utility companies, as needed. Additional budgeting would allow for increased tree maintenance.	NA*
2	Consider the costs and benefits associated with registering in the Sustainable CT program, which includes some objectives aligned with hazard mitigation.	PR, NSP, PE	Easton is now a registered member of Sustainable CT and intends to work with the MetroCOG hosted Sustainable CT intern in summer of 2024.	Annually explore benefits of participating in Sustainable CT.
3	Consider the pros and cons of incorporating low impact development (LID) in the upcoming regulations revision, and incorporate if found appropriate.	PR, NSP	Completed. In 2019 Easton updated their zoning regulations to include subdivision best management practices (Section 4.017 of 6500.	Remove from list
4	Secure funding from SHPO to conduct a historic resources survey focusing on potential historic resources in flood risk areas.	PP	Currently working with the First Selectman to get Easton approved as a Certified Local Government, which if approved would bring Easton nearer the top of the list for historic preservation funding.	NA*

#### V.4.ii.1 2019 MITIGATION ACTION STATUS, TOWN OF EASTON 2019 Mit. ID Action for 2019-2024 Type **Updates** Revision 2 of the bridge replacement projects on Southpark have been completed. Funding for 1 of the projects Complete bridge replacement projects funded ST 5 has been acquired though the state bridge design. NA\* by the LOTCIP program. In the coming year the town will have a more solidified timeline. Coordination with DEEP yearly. Easton has not Work with CT DEEP to complete a formal obtained access to or received the RL list. Easton validation of the RL list (currently one property) PP does not have any updates on the mitigation status Combine with 7 6 and update the mitigation status of each listed of any RL properties. No letters have been drafted property. or sent to the RL property owners. Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for Coordination with property owners as needed on PP Combine with 6 7 mitigating flooding in those areas. This should a yearly basis. be accomplished with a letter directly mailed to each property Lack of funding has precluded this project from Acquire a generator for the Senior Center to 8 ES being completed. The town will be looking into NA\* enhance its use as a heating and cooling center. funding both emergency management upgrades

<sup>\*</sup>NA = Not Applicable

## V.4.iii TOWN OF FAIRFIELD

In Fairfield, more attention has been given to coastal and riverine areas since major weather events, such as hurricanes and heavy rainfalls hit the Town. The Town continues to maintain their Class 8 rating in the CRS Program, continues to develop tree health, cutting and maintenance plans, and continues to requires any new streets to utilize underground utilities.

Fairfield has made significant strides in implementing actions related to hazard mitigation.

Fairfield is about to embark on a major townwide Flood, Erosion and Resilience plan (2024 Town of Fairfield Flood, Erosion and Resilience Plan) which will be used to inform future mitigation and adaptation strategies for the Town.\*

The Wastewater Treatment Plant in Fairfield experienced flooding of up to two feet due to the coastal storm surge of the Long Island Sound after Hurricane Sandy. The town used funding sources through HUD and CTDOH to design and construct a flood control structure and pump stations that will protect the WWTP and surrounding town facilities from a 0.2% annual chance

flood event (500 year). The project involved permitting through Federal, State, and local agencies. The project was completed in 2022 and was showcased in the region.

MITIG	MITIGATION ABBREVIATIONS			
Code	Mitigation Type			
EA	Education and Awareness			
ES	Emergency Services			
NSP	Natural Systems Protection			
PP	Property Protection			
PR Prevention				
ST	Structural/Infrastructure			

Due to the impact of hurricanes, snowstorms, and weather-related events, utility issues continue to be on the forefront. Innovative management techniques to properly mitigate associated risks. Many of the Town's actions from 2019 that have been completed or partially implemented are being utilized to inform 2024 mitigation strategies.

2019 Mitigation Actions are presented in Table V.4.iii.1. Mitigation types and their abbreviations can be found above.

\* Addition during public comment period

V.4.iii.1 2019 MITIGATION ACTION STATUS, TOWN OF FAIRFIELD					
2019 ID	Action for 2019-2024	Mit. Type	Updates	Revision	
1	Secure funds and proceed with construction of the Riverside Drive tide gate system	ST	Construction is starting in 2024, funding has increased.	NA*	
2	Ensure that the current dam failure EAPs are filed with pertinent Town departments.	ES	The town is looking to see if any dams need improvement or alteration throughout town that could cause hazards & for fish passage.	NA*	
3	Advance the South Benson Road pumping station to final design/ construction.	ST	DPW and Engineering are currently coordinating on this project, and it will likely be pushed back until 2030 when more resources become available	NA*	
4	Pursue an executable phase of the Riverside Drive/Ash Creek flood protection system by focusing on design of a segment that affects only Town-owned land.	ST	The town is taking a similar approach to how they collaborated on the Ash Creek/ Riverside Drive project and want to mimic the approach for the design phase	NA*	
5	Secure funds for a microgrid at the WWTP to include adjacent and nearby municipal buildings.	PP, ES	The project is progressing and will likely be completed in summer of 2024	NA*	

V.4.ii	V.4.iii.1 2019 MITIGATION ACTION STATUS, TOWN OF FAIRFIELD					
2019 ID	Action for 2019-2024	Mit. Type	Updates	Revision		
6	Address equipment in library basements to prepare for when flooding occurs.	PP	This action has been lowered as a priority for the town. As staff time become available, the town will reevaluate.	NA*		
7	Coordinate with the Army Corps of Engineers to determine a feasible option for future improvements to the Pine Creek dike system.	ST	The study has been completed, but nothing has been implemented. Fairfield tried to break up the project, but it would not be possible. It is estimated at 1 billion dollars. This will be explored in the upcoming 2024 Master Flood Erosion and Resilience Plan.**	NA*		
8	Secure funds for beach nourishment in accordance with the engineered beach study and design.	NSP	Town is adressing NOV.  Profiles for four of the five town beaches have been developed and preliminarily reviewed. The town plans to add Penfield Beach once the FEMA NOV has been satisfied and secure approval for all five engineered beach profiles. **	NA*		
9	Relocate/increase capacity for sanitary sewer trunk lines in areas of significant flood risk.	ST	The town anticipates starting this in spring 2024	NA*		
10	Secure funds for implementation of a portion of the Downtown Green Infrastructure Study and Conceptual Plan.	ST, NSP	The town anticipates getting into construction in 2024 for the first portion.	NA*		
11	Allocate funds for replacements of culverts to alleviate flooding in the Rooster River, Royal Avenue, and Camden Street areas.	ST	The town is still in progress of purchasing 3 Camden properties	NA*		
12	Determine whether the culvert at Merwins Lane can be replaced to increase capacity.	ST	The town looked into FEMA Mitigation Funds, but found they would not be cost effective. The town needs to purse permitting and downstream owners permission, as it would created runoff.	NA*		
13	Identify the next steps to set aside land for detention/watershed storage in the Rooster River watershed.	ST, NSP	Project Implementation has begun and permits have started. The public comment period will end in 2024	NA*		
14	Conduct a feasibility study for elevating Fairfield Beach Road, including public outreach and incorporation of public input.	ST, ES	The town has continued to think innovately about elevating Fairfield Beach Road, which continues to flood in rain events. The town has considerd raising the road for emergency access, but was on hold due to budget/existing staff. It is estimated the cost would be upwards off \$500k+ and raising the road by a foot would still be in floodplain. The town is exploring higher levels of elevation.	NA*		
15	Conduct a study to determine the feasibility of extending the dike in Southport along Harbor Road	ST	DEEP Permitting has been acquired in 2024. This will be explored in the upcoming 2024 Master Flood Erosion and Resilience Plan.**	NA*		
16	Determine the feasibility of installing pumping stations beneath the railroad underpasses to remove floodwaters to alleviate flooding to the railroad underpasses.	ST	Project completed.  A study was completed by CIRCA outlining a series of possible solutions for underpass flooding, this will be finalized in the upcoming 2024 Master Flood Erosion and Resilience Plan.**	Remove from list + create pumping station action		

# V.4.iii.1 2019 MITIGATION ACTION STATUS, TOWN OF FAIRFIELD

	.1 2019 MITIGATION ACTION STATE		WN OF T AIRFIELD	
2019 ID	Action for 2019-2024	Mit. Type	Updates	Revision
17	Select one action from the Rooster River Watershed Management Plan and secure funding for its execution. Focus on an action that has multiple hazard mitigation benefits. Detention Basins + 150 Villa Ave purchase.	ST, NSP	Some state bond money has been received and the town is applying for a 319 grant, WMP 24-29	NA*
18	Conduct outreach and feasibility study for the conceptual dune ridge design that addresses the Penfield/Shoal Point area.	st, Nsp	Outreach was conducted 4/4/24  An expanded study for this section will be explored in the upcoming 2024 Master Flood Erosion and Resilience Plan.**	NA*
19	Train and equip neighborhood storm response teams (i.e., CERT), for neighborhoods that have in the past been cut off from emergency services by floodwaters or downed trees, as well as to assist lower-income populations.	ES	Certification process will be recurring.	NA*
20	Develop tree planting guidelines that are aligned with hazard mitigation goals.	PP	Town had engagement with utilities after winter storm damage to discuss management. The forest management plan has been uploaded to the Fairfield website and will continue to evolve though new state and local recommendations.	NA*
21	Conduct a feasibility study for elevating Turney Road, including public outreach and incorporation of public input.	ST, ES	The project is starting with fixing culverts, tide gates, and sewer siphons. The project will determine if the road needs to be raised  The 2024 Master Flood Erosion and Resilience Plan will determine if the road needs to be raised.	NA*
22	Provide and install generators to senior housing complexes and other complexes that serve vulnerable populations to allow them to shelter in place.	ES, PP	The town will need to evaluate the need for generators at locations in town	NA*
24	Enhance flood protection at the DPW (immediate and surrounding areas) garage or consider feasibility of moving garage to an alternate location.	ST, PP	The hardening portion of the project was complete.	NA*
25	Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.	PE	Coordination with DEEP has not occurred.	NA*
26	Secure funding from SHPO to conduct a historic resources survey focusing on potential historic resources in coastal flood risk areas.	PP	The town has become aware of ConCriss	NA*
27	Work with CT DEEP to complete a formal validation of the RL list and update the mitigation status of each listed property.	PP	2026 is recertification, the town will update closer to the date.	NA*

<sup>\*</sup>NA = Not Applicable

#### V.4.iii.1 2019 MITIGATION ACTION STATUS, TOWN OF FAIRFIELD 2019 Mit. ID Action for 2019-2024 Type **Updates** Revision Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for 2027 is recertification, the town will update closer PP 28 mitigating flooding in those areas. This should NA\* to the date. be accomplished with a letter directly mailed to each property owner. Coordinate with CRS participation. Change to "ID need for gener-Contact the owners of properties that experiators at senior ence frequent flooding (which may not be RL housing and 2028 is recertification, the town will update closer properties) to suggest options for mitigating PP other complexes 29 to the date. that serve vulnerflooding. This should be accomplished with a letter directly mailed to each property owner. able populations to allow them to shelter in place" Achieve additional objectives associated with PR, Volunteers have worked with MetroCOG intern to 30 the Sustainable CT program, focusing on those NA\* NSP progress sustainable CT goals aligned with hazard mitigation. Work with USGS or NOAA to establish a The project will require significant coordination and tide gauge in Long Island Sound to provide is anticipated to have a very high cost for installareal-time water level data. The nearest USGS ES tion and subscription. The action is lower priority NA\* 31 gauge is in Stamford and the nearest NOAA due to cost, but as funding becomes available, the gauge is in Bridgeport. town will explore more. Develop a written plan for inspection of Townowned bridges that may experience scour No longer a priority, the scour action plan has 32 during flood events. The plan should set a ST NA\* been completed. timeframe for inspections after floodwaters have receded. Provide suggested "code plus" strategies to

PP

Funding sources are being explored

Combine with

28, 29

33

make structures more resilient to wind when ap-

plications are processed for elevating buildings.

<sup>\*</sup>NA = Not Applicable

### V.4.iv TOWN OF MONROE

The 2019 NHMP included recommendations focused on mitigating the impacts of flooding through maintenance and infrastructure improvements. The recommended CT-DOT lead upgrades to culverts and drainage improvements on CT-25 have been completed, which has reduced flood risk.

All properties in Monroe are served by on-site septic systems. Systems close to the Pequonnock River and the river's branches may fail due to heavy rains and subsequent flooding and cause an increase in pollutants entering the river. The recognition of the impact that failing septic systems may have on the quality of local waterways continues to be a concern since the 2019 NHMP. The need to upgrade septic systems to sanitary sewers in certain areas was emphasized by focus groups in the Town's new Plan of Conservation and Development (POCD). Monroe continues

to diversify
how storm
water management and
flooding are
approached.
Infrastructure
projects and
regular mainte-

Mitigation Abbreviations							
Code	Mitigation Type						
EA	Education and Awareness						
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NSP	Natural Systems Protection						
PP	Property Protection						
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ST	Structural/Infrastructure						

nance remain as stormwater management and flood mitigation strategies. However, low impact development BMPs received greater focus in the 2014 and 2019 NHMPs and were included in the Town's new POCD. Riparian buffers along waterways and an emphasis on storm water retention and quality are some of the examples of the priority placed on the protection of natural features.

2019 Mitigation Actions are presented in Table V.4.iv.1. Mitigation types and their abbreviations can be found above

V.4.iv.1 2019 MITIGATION ACTION STATUS, TOWN OF MONROE						
2019 ID	Action for 2019-2024	Mit. Type	Updates	Revision		
1	During the update of the POCD, include an appropriate focus on stormwater management that sets policy for LID and green infrastructure, and encourages update of regulations to formalize the current practices of requiring onsite management of stormwater.	PR, NSP	The town completed the POCD update and set focus on stormwater management.	Complete, remove for 2024		
2	Work with Aquarion to ensure that informal practices of Stepney Dam impoundment drawdown is formalized in Aquarion operations plans.	ST, ES	The town has worked with Aquarion to ensure operations plans.	Complete, remove for 2024		
3	Work with Aquarion to ensure that informal practices of Pequonnock River water diversions are formalized in Aquarion operations plans.	ST, ES	The town has worked with Aquarion to ensure operations plans.	Complete, remove for 2024		
4	Conduct a townwide hydrologic analysis that addresses flooding, stormwater, and water conveyance needs to identify projects that can be implemented to reduce risks to infrastructure and people.	ST	Funding and staff time has been a barrier. The town will revisit when funds and staff are available. Right now it is a low priority as there is not too much flooding in town currently.	NA*		

<sup>\*</sup>NA = Not Applicable

V.4.iv.1 2019 MITIGATION ACTION STATUS, TOWN OF MONROE					
2019 ID	Action for 2019-2024	Mit. Type	Updates	Revision	
5	Implement one additional project identified in the watershed management plan, with a focus on flood risk reduction.	PR, NSP	Funding and staff is a barrier. Town will revisit hen funds and staff are available (low priority) Not too much flooding in town currently.	NA*	
6	Acquire and install a generator for the high school that enables its use as a shelter.	ES, PP	Has not occurred yet, funding has been an issue but the town plans to prioritize this action moving forward seeking funds in various emergency man- agement pools	NA*	
7	Ensure that CT DOT completes the upgrades of culverts on Route 25.	ST	The town has worked with DOT for upgrades and has completed the project	Complete, remove for 2024	
8	Ensure that CT DOT completes the Route 25 drainage and flood risk reduction projects.	ST	The town has worked with DOT for upgrades and has completed the project	Complete, remove for 2024	
9	Prepare a hydraulic study of the part of Sammis Brook where a beaver dam has been a problem in the past, and determine if improvements are needed to reduce flood risk.	ST	Lack of funding and staff time has not been available. This action is currently a low priority for the town as there have been no complaints or issues.	NA*	
10	Address (in the Subdivision Regulations) tree heights and appropriate street trees.	PP	Not complete due to staff turnover and availability. In the next year town will likely be able to focus more on the action as a priority.	NA*	
11	Consider the costs and benefits associated with registering in the Sustainable CT program, which includes some objectives aligned with hazard mitigation.	PR, NSP	Monroe has worked with Sustainable CT to register, went through book to find where town can tap into additional funding to satisfy requirements but team is no longer in tact. Clothing recycling program has been integrated in town. New staff started during the planning process which will help move program further.	NA*	
12	Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.	PE	The town has provided a link to DEEP resources on the Monroe website. Most resources have been residential over commercial due to the nature of the town.	NA*	
13	Secure funding from SHPO to conduct a historic resources survey focusing on potential historic resources in flood risk areas.	PP	The town is aware of the ConCriss viewer and can use as needed	NA*	
14	Work with CT DEEP to complete a formal validation of the RL list (the sole listed RL property is not located in Monroe).	PP	Town does not think RL list will be composed as there are not many flooded properties	Remove as no RL properties in Monroe.	

<sup>\*</sup>NA = Not Applicable

#### V.4.v TOWN OF STRATFORD

The impacts of past hurricanes, tropical storms, nor'easters, extreme high tides, and an increase in heavy rain events has expanded and diversified the range of mitigation strategies considered by the Town since the 2019 NHMP Update. Recommendations from the Town's 2016 coastal resilience plan continue to be implemented, such as the floodproofing project at the wastewater treatment plant. However, flooding continues to be a problem, especially at intersections and areas in which land is low-lying.

The Town has participated in all phases of Resilient CT, with Phase III focused on forming strategies to mitigate coastal flooding in the South End neighborhood. Stratford continues to prioritize low impact development techniques, implements ordinances to reduce storm water runoff, increases protection and maintenance of beaches, and enhances the flood protection features of all natural areas (i.e., forests, marshes and open space). Furthermore, Town staff periodically provide informational materials and in-person presentations to residents regarding green infrastructure as a flood mitigation strategy, the importance of registering for the Town's emer-

gency notifica-
tion system, and
how to prepare
for hazardous
events while
being aware of
local resources
during the time
of an emergency. $$

MITIGATION ABBREVIATIONS							
Code	Mitigation Type						
EA	Education and Awareness						
ES	ES Emergency Services						
NSP	P Natural Systems Protection						
PP Property Protection							
PR Prevention							
ST Structural/Infrastructure							

Stratford has been actively managing the urban tree canopy and anticipates developing an Urban Forestry Plan during this NHMP cycle, in addition to developing a Town-wide canopy assessment and tree inventory. The forestry plan will encourage utilities to follow recommended arboriculture practices and a regular tree maintenance plan will also emphasize a "right tree-right place" approach throughout Town. Ensuring adequate power generators at shelters and educating the public on preparing for severe weather are other recommendations that reflect planning and preparation as a community priority during high wind, ice, and snow events.

2019 Mitigation Actions are presented in Table V.4.v.1. Mitigation types and their abbreviations can be found above.

V.4.v.1 2019 MITIGATION ACTION STATUS, TOWN OF STRATFORD					
2019 ID	Action for 2019-2024	Mit. Type	Updates	Revision	
1	Develop comprehensive stormwater regulations that address both quality and quantity control measures including MS4 requirements and Low Impact Development (LID) techniques.	PR	Action in progress, but low priority due to lack of dedicated staff time. The action will be focused on the TOD district in the Town Center and will be modeled on the State's stormwater ordinance.	NA*	
2	Elevate private homes in Lordship area to meet or exceed FEMA requirements for Base Flood Elevation. Phase I to include homes on Washington Parkway. Pursue funding through Predisaster mitigation grants to elevate five homes on Washington Parkway.	PP	Town staff applied for 2019 PDM/FMA grants to elevate 3 repetitive loss properties in the neighborhood. One of the properties, which is identified as a severe repetitive loss property, was awarded a \$278,750 FMA grant but recently prepared cost estimates indicate significant increases in construction costs due to inflation and the application was withdrawn. In 2022, staff applied for a house elevation grant (FEMA FMA) for another Washington Parkway property. An additional property is one is currently under consideration.	NA*	

V.4.v.1 2019 MITIGATION ACTION STATUS, TOWN OF STRATFORD					
2019 ID	Action for 2019-2024	Mit. Type	Updates	Revision	
3	Pursue funding to mitigate existing and future risks to the South End and employment growth area identified in the Stratford Plan of Conservation and Development. Funds may be used to install flood control systems and/or elevate and extend seawalls where necessary.	ST, PP	In 2022, Town partnered with CIRCA's Resilient CT Phase III to conduct advanced planning and analyses for mitigation options in the commercial/industrial area near Lordship Blvd and Access Rd. PD and the BCA of the finalized solution will be presented to staff in mid-2024 and a BRIC application will be submitted in the fall.  A design workshop was held in the industrial area in December 2022 and was well attended by residents, business owners, employees, and Town officials. Valuable feedback on flooding in the neighborhood was provided. More information can be found here.	NA*	
4	Maintain a list of properties that have experienced repetitive loss from storms and flooding (with owner interest for future acquisition) and pursue open space funding as it becomes available. Acquire properties based on this list (this action calls for list development and applications for funding in the timeframe of this plan; acquisitions are deferred to future editions of this plan).	NSP	The town has put out a survey relevant to the process and is in the repetitive loss portion	NA*	
5	Pursue funding to design and initiate multiple culverts and channels on Surf Avenue at the I-95 overpass along with the flood wall to reduce chronic coastal flooding.	ST	The Town has one more permit to secure for Surf Avenue. Some funding has been appropriated.	NA*	
6	Design and initiate multiple culverts and channel improvements on Bruce Brook including channel from RR tracks to Barnum Avenue, Barnum Avenue culvert, and channel between Sage and Bowe Avenues. Continue to apply for additional implementation funding to construct in phases.	ST	Applied and got round 1 funding from Community Investment Fund for Bowe Ave portion of the project. Design of Phase I and II underway. There have been Right of Way Challenges	NA*	
7	Secure funding to build Short Beach to the elevations and grades of survey design recommendations conducted by US Army Corps of Engineers.	ST	The action was not completed as Short Beach is intact and doing well. The action is no longer relevant	REMOVE	
8	Secure funding to implement flood protection measures around the wastewater treatment plant by raising the existing flood control berm.	ST	In 2020, Town was awarded \$2.5 million in FEMA PDM funds to construct a dyke around the WPCF (critical infrastructure). Staff entered into a contract with FEMA to proceed with design and implementation. A design consultant was selected through a competitive selection process and construction will be bid out.	NA*	
9	Secure funding to design and build twin 6' X 8' box culvert with regulating tide gate to allow tidal flushing while preventing tidal flooding along Lordship Blvd.	ST	The project became tied to a larger CIRCA flood mitigation project.	NA*	

<sup>\*</sup>NA = Not Applicable

V.4.v.1 2019 MITIGATION ACTION STATUS, TOWN OF STRATFORD						
2019 ID	Action for 2019-2024	Mit. Type	Updates	Revision		
10	Pursue funding to evaluate the feasibility of daylighting of streams and prioritize actions to reduce hazards.	ST, NSP	ID locations if possible- one of which was looked at in South End CIRCA Study	NA*		
11	Continue with the project to increase the width of the channelized stream downstream of Broadbridge Ave to reduce flooding at a condominium parking lot. The replacement and enlargement of the structured channel and natural channel that conveys Tanners Brook from Broadbridge Ave South to King St has been designed and is in the permitting phase. Funds have been allocated for construction. Execute construction in the timeframe of this plan.	ST	This project has been completed. The channel was widened from King St to Broadbridge Ave and a portion of the existing concrete channel was removed in favor of a naturally sloped stream bank. A FEMA LOMR was completed post construction.	NA*		
12	Pursue funding to complete the bridge project to elevate Broad St over Ferry Creek. Town currently pursuing funding through LOTCIP grant.	ST	Application to LOTCIP was unsuccessful and Town is looking for alternative funding sources. Currently, the Town is going through the permitting phase and construction is anticipated for 2025	NA*		
13	Reduce I/I through execution of projects utilizing the Clean Water Act grant funds.	ST	The initial project was completed; I/I reduction projects will continue with other CWA-funded projects.	NA*		
14	Secure funding to design and build a 36" relief pipe to Long Brook and proceed to construction.	ST	This project did not move forward and should be removed.	REMOVE		
15	Execute the West Broad St project to reduce drainage-related flooding and flooding associated with Tanners Brook.	ST	This was completed. Outcomes included increased drainage and reduced flooding.	NA*		
16	Secure funding to respond to future needs as appropriate at Oronoque Village. Specifically, acquire additional equipment to provided enhanced emergency management related to the development.	ES	Health Department has provided residents with emergency preparedness information. Town staff have provided on-site instructions on how to enroll in the Stratford Electronic Notification System for timely emergency notifications. Additional equipment for emergency management is needed.	NA*		
17	Pursue funding to floodproof municipal buildings in the town by raising equipment and generators and installing projectile-proof windows where necessary.	PP	Currently working with IT and Mayor on a Continuity of Operations Plan (COOP). Municipal building updates will always include flood-proofing based on priority and need. The South End community center is undergoing renovations and floodproofing is part of the project.	NA*		
18	Secure funds to replace the stormwater culverts under Old Spring Road with new box culverts.	ST	This was completed. The culvert and bridge were replaced.	NA*		
19	Implement the best approach to maintain the functionality of the Birdseye boat ramp under flooded conditions to ensure continued use during disasters.	ES	A consultant was hired to assess approaches to maintain functionality in 2018. The Town has budgeted \$14,000 but implementation has not occurred. The EMS Department is currently seeking approval from DEEP and the Town Council for implementation.	NA*		

<sup>\*</sup>NA = Not Applicable

V.4.v.1 2019 MITIGATION ACTION STATUS, TOWN OF STRATFORD					
2019 ID	Action for 2019-2024	Mit. Type	Updates	Revision	
20	Pursue funding to implement structural flood proofing on Masarik Avenue/Benton Street.	PP	The Town is undertaking a drainage study of the South End neighborhood to identify opportunities to mitigate the impacts of inland flooding. The project is currently in the kickoff phase,	NA*	
21	Mitigate bank erosion at Diane Terrace and engage private properties on that street.	ST	Due to private properties, there have not been plans for implementation and it is a low priority. The Town will continue to evaluate potential opportunities for mitigation.	NA*	
22	Secure funds to floodproof the animal shelter adjacent to the Wastewater Treatment Plant.	PP	This project will be included as part of a larger municipal building floodproofing and prioritization project (see 17).	Combine with action 17, flood-proofing.	
23	Conduct a feasibility study to determine whether the Lordship seawall can be modified to increase its resilience to future storms.	ST	The seawall is intact and due to adjacent private property issues, an implementation project is not a high priority. A feasibility study for seawall improvements would need to evaluate larger-scale resilience improvements in the overall area, as well as private property impacts.	NA*	
24	Secure funds for pumping station improvements to incorporate resiliency; and implement the improvements.	ST	This project was for sanitation pump stations and has been completed	NA*	
25	Pursue funding to address the impacts of hazards on natural areas, focusing on individual studies for Roosevelt Forest, Booth Memorial Park, Far Mill River, and Wooster Park. The studies should identify ways to enhance defensive/protective features for additional flood protection in the long term.	NSP	Due to funding and staff time, studies have not occurred and this project remains a low priority.	NA*	
26	Educate private land owners to understand the importance and benefits of maintaining and leaving vegetation in place to stabilize riverbanks	PE	Educational presentations (an MS4 compliance measure) have included green infrastructure. Inland wetlands permitting includes an education component.	NA*	
27	Secure landowner permissions and funding for design and execution of the bank stabilization project at Russian Beach.	ST, NSP	Due to private property issues, the Town has not been able to mitigate erosion. There are 2 storm- water outfalls and the Town will address issues at outfall easement areas as needed.	NA*	
28	Develop a tree replanting plan and maintenance plan consistent with recommended arboriculture practices and that is supportive of the "right tree, right place" policy. The Town's Tree Warden will work to establish a regular tree planting program and obtain grants (as available) in support of the initiative. Tree Warden will also develop an ordinance that mandates a tree replanting program/schedule in accordance with "right tree, right place" policy.	PP	The Town has created a mechanism for residents to request trees in the ROW and a tree budget exists. Trees have been planted in parks; an Urban Forest Council grant funded 250 tree plantings. The Town continues to seek grants for urban forestry planning.	NA*	

<sup>\*</sup>NA = Not Applicable

V.4.v.1 2019 MITIGATION ACTION STATUS, TOWN OF STRATFORD					
2019 ID	Action for 2019-2024	Mit. Type	Updates	Revision	
29	Develop, adopt, and implement a PPI as part of the Town's participation in the CRS program.	PE	The Town will revisit this action as town staff are available to move forward. Currently this action is a low priority until staffing resources increase.	NA*	
30	Update the evacuation plans and make these routes available on the new Regional GIS system. The evacuation routes will also be made available to the public on the Town's website.	ES	A new Stratford website was recently released and is being optimized. Stratford works with Metro-COG for GIS services as needed.	NA*	
31	Pursue funding to provide adequate back-up power to Birdseye Municipal Complex, Flood Middle School, Stratford Housing Authority units, and the Baldwin Senior Center; and to make improvements to the existing generator at Stratford Fire Station.	ES, PP	The Town secured approximately \$40,000 in CIP funds for an emergency generator at Bunnell High School. Plans exist for implementation over a 2-3 year timeline, and for updated maintenance of current generators. Generators will be installed at other sites as funding is available.	NA*	
32	Pursue funding to update evacuation plans to factor lack of access to transportation routes during peak events such as a severe hurricane, and display them using digital signage at select locations. Integrate notification of voluntary and mandatory evacuation orders into these messages.	ES, PE	The Town has used the digital signage for events and warnings and has obtained a new digital sign. Signs are limited to a small number of characters, which prevents the display of detailed information.	NA*	
33	Clearly define roles of the Community Emergency Response Teams (CERT) to optimize response functions of emergency services.	ES	Stratford does not have CERT team yet. EMS has requested resources from the Mayor which would support training. The MRCI medical reserve has been used in the same roles as CERT and works with the Health Department.	NA*	
34	The Town's EMS has identified the need to rehabilitate the dispatch center which has outdated technology and equipment. Pursue funding to rehabilitate the dispatch center with new technology and furniture, and conduct evaluation to improve the data center.	ES	Stratford has added two work stations, which has allowed for expansion.	NA*	
35	Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.	PE	The EMD works with the fire marshal to maintain the Tier II report.	NA*	
36	Secure funding from SHPO to conduct a historic resources survey focusing on potential historic resources in coastal flood risk areas.	PP	A regional coastal resources study was completed by the state. A GIS application supports viewing/ identification of historical resources in flood zones.	NA*	
37	Work with CT DEEP to complete a formal validation of the RL list and update the mitigation status of each listed property.	PP	FEMA has provided a RL list exists for the current year and an analysis is being conducted. This action will be combined with existing (38, 39) and a new action.	Combine with 38,39,43	

<sup>\*</sup>NA = Not Applicable

#### V.4.v.1 2019 MITIGATION ACTION STATUS, TOWN OF STRATFORD 2019 Mit. ID Action for 2019-2024 Type **Updates** Revision Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for Combine with This action will be included in the larger RLAA PP mitigating flooding in those areas. This should 38 project (see 39). 37,39,43 be accomplished with a letter directly mailed to each property owner. Coordinate with CRS participation. In 2021, Town staff applied to BRIC program for conducting a Repetitive Loss Area Analysis as an amendment to the Hazard Mitigation Plan. This was recently approved and the contract paperwork is currently being executed. Project will commence immediately upon execution of the contract. This will be prepared in accordance with Activity 510 requirements of the CRS Program Resources Prepare a Repetitive Loss Area Analysis (RLAA) Manual. combine with PP in support of the Town's CRS program including 39 43,37,38 In December 2022, the Town received final exeeducation and outreach to homeowners. cuted contract from FEMA for the Repetitive Loss Area Analysis (RLAA) applied in 2021. The initial application was for 75% federal share and 25% non-federal share. However, this was amended in 2022 by FEMA to include 90% federal share and 10% non-federal share. Town staff will be advertising the RFP shortly to solicit proposals from interested consultants to conduct this analysis.

<sup>\*</sup>NA = Not Applicable

#### V.4.vi TOWN OF TRUMBULL

Mitigating the impacts of inland flooding in certain areas of the Town of Trumbull, emergency management and outreach, as well as coordinated power restoration are priorities in the Town of Trumbull. Previous recommendations in the 2019 NHMP were primarily oriented towards infrastructure improvements, floodplain improvements, and tree management. Like the other communities discussed in the NHMP, recommendations made by Trumbull stakeholders expanded on those from 2019 to include a diverse set of measures to mitigate the impacts caused by a variety of natural hazards. These efforts have been complemented by Trumbull's acceptance into FEMA's CRS program as a Class 8 community.

The Town's Plan of Conservation and Development, created in 2014 promotes low impact development and green infrastructure approaches to protect natural resources as development occurs. Since 2019, Trumbull stormwater regulations have been updated align with the POCD by incorporating GI and LID. The town's POCD is currently being updated for 2024.

Inland flooding continues to be a recurring concern for the Town of Trumbull. In addition to natural mitigation measures, improvements to infrastructure and structures are a Town priority as well. This priority has not changed since the 2019 NHMP. However, the number of recommendations regarding infrastructure and structural improvements decreased in the 2024 NHMP, in favor of emergency management practices and ensuring property owners are informed and educated on flood management concerns.

Formerly, a reliant and resilient electrical system was a key concern in Trumbull's POCD and increased in priority due to long term power outages after hurricanes and summer and winter

storms. Creating a sense of place through tree lined streets has played an important role in the Town's atmosphere and quality of life,

MITIGATION ABBREVIATIONS					
Code	Mitigation Type				
EA	Education & Awareness				
ES	Emergency Services				
NSP	Natural Systems Protection				
PP	Property Protection				
PR	Prevention				
ST	Structural/Infrastructure				

but downed limbs and trees brought power lines down and prevented access to many roads – further delaying power restoration and creating mobility concerns for residents and travelers.

Outreach and education to residents continue, and the Town has obtained Tree City USA designation for 2024.

Dovetailing with issues of mobility concerns and lack of power, improved access to information about services for at-risk residents during disasters, ensuring adequate generators at shelters, providing charging stations, and facilitating multiple avenues of communication with residents were some examples of recommendations regarding community assistance. Trumbull was recently designated a Storm Ready Community in 2023 and continues to conduct public outreach related to hazard awareness, and the services available to at-risk populations.

2019 Mitigation Actions are presented in Table V.4.vi.1 on the next pages. Mitigation types and their abbreviations can be found above.

V.4.vi	.1 2019 MITIGATION ACTION STATU	s, Tov	/n of Trumbull	
2019 ID	Action for 2019-2024	Mit. Type	Updates	Revision
1	Conduct a feasibility study to determine where green infrastructure can be installed.	PR, NSP	The Trumbull Zoning stormwater regulations have been updated to incorporate GI and LID.	Combine with actions 2/3
2	Prepare a draft of municipal regulations that can be used to require low impact development and green infrastructure.	PR, NSP	The town conducted did a pervious paver study in the area at the Longhill Green + conducted a feasibility study to determine if pavers could be placed there.	Remove for 2024 Create new action for LID/GI
3	Secure funds and develop a scope of work to study a portion of the Town's drainage easements and drainage network.	ST	LOCIP and Road aid has helped fund the project and it has been completed. The town will determine future actions after study is complete	Remove
4	Secure funds and develop a scope of work to study one of the Town's watercourses and watersheds. Island Brook will be prioritized next.	ST	The town is starting the Island Brook portion of the project in 2024	Remove
5	Annually send a letter to property owners in RL areas to inform them of options for elevating or acquiring structures to reduce flood risk.	PP	Occurs as part of CRS requirements. The town sent February notifications for 2024.	NA*
6	Provide 100 year flood plain locations on the GIS Website for residents.	PE	Trumbull works with MetroCOG as needed for GIS services	NA*
7	Floodproof remaining sewer pumping stations in accordance with master plan, as designs are completed.	PP	There are 13 of them, 3 of them have gone through. 1 has been updated completely, 2nd/3rd in construction 2024. 3 more are in line to be updated-likely to be done in next 5 years	NA*
8	Secure funds and complete study to determine how water level in Pinewood Lake can be controlled to mitigate downstream flooding.	ST	The town completed a study downstream. Twin brooks has had work done last year. Next steps involve: drainage projects on Twin brooks drive	REMOVE
9	Determine if bridge and culvert replacements at Twin Brooks and Trumbull Center will effectively reduce flooding, and secure funding if found to be cost effective.	ST	Twin brook is completed. Trumbull Center is a state culvert and likely will not replace	remove
10	Allocate funds and conduct design for enlarged conveyance at Daniels Farm Road/Pequannock River and downstream in the Twin Brooks Park area.	ST	Coordinate with state on project, as state would need to take the lead to make culvert bigger. Revise for 2024	Combine with action 9
11	Determine if floodplain enhancement at the bend of the Pequannock River near Route 127 is feasible and would be effective for flood mitigation, and secure funding if found to be cost effective.	ST	Town had discussion of compensatory storage of an area but has not move forward with the action.	Combine with action 9
12	Allocate funds and retain consultant to review dam safety files and EAPs for dams in Trumbull; and determine which dams may have the ability to be modified for flood mitigation capabilities.	ST	Pinewood & Canoe Brook (High Haz) are regularly updated, Thrushwood Dam is being reconstructed. The town will not allocated funds and retain consultant for private dams. Publicly owned are well maintained. Town owned dams are not as large of an issue. The large issue is the majority are private owned. There are private property concerns and little progress has been made. The town plans to send out letters to private dam owners for state regulation requirements	NA*

<sup>\*</sup>NA = Not Applicable

## V.4.vi.1 2019 MITIGATION ACTION STATUS, TOWN OF TRUMBULL

2019 ID	Action for 2019-2024	Mit. Type	Updates	Revision
13	Expand awareness of the benefits and opportunities of green infrastructure and pervious pavement.	PE	The high school is in the process of installing energy efficient lighting in the auditorium and softball fields. Town is exploring options of solar for schools, for three new roofs in town.	Combine with 1&2; add new action for solar at town owned properties.
14	Improve tree management through outreach and public education.	PE	Trumbull hosted a 1,000 Trees for Trumbull in July 2023 and has secured \$12,000 in annual budget funding for selecting, planning, ordering, and planting. Distribution has been discussed for several locations in the town, such as Twin Brooks Park, a plan sale at the library, and plantings at various town buddings. Additional outreach information sent home with elementary school students has also been planned. Obtained Tree City USA designation for 2024.	NA*
15	Expand outreach to residents on the importance of wetlands and drainage swales for risk reduction from flooding. Look to increase the protection of additional floodplains.	PE	The town ensures regularly wetlands/conservation/engineering review and anticipates providing additional information each year thought distribution of flyers to residents (pinewood/ canoe brook) detailing flood reduction strategies. People in lake area and nearby areas will be contacted and the radius will be expanded.	NA*
16	Expand outreach efforts regarding how to prepare for extreme weather and what to do in the event of a natural disaster, including enhancing the Town's website, preparing pamphlets to be available at Town Hall and the Trumbull Library and enhancing hazard-related mapping.	PE	Trumbull has conducted public outreach at events, social media, and designated a Storm Ready Community in 2023. Public outreach involved Climate Coffee and Conversations events, as well as Pints & Policy. Public events will be hosted on a regular basis related to Hazard awareness. The town will adapt as new material becomes available	Combine with action 17
17	Improve access to information on services for at-risk populations during disasters.	PE	Town makes a large effort to contact group homes and at risk populations. Works with social services director and messages out in various ways for educations (for all residents). The coordination will occur prior to any hazard impacting the town.	NA*
18	Improve access to and availability of information on services during an emergency.	PE, ES	There have been website modifications to better inform folks of emergencies in town. The town will make updates to the website as information becomes available and relevant on a regular basis.	NA*
19	Evaluate the need for emergency access into and from the Trumbull Corporate Park and the Westfield/Trumbull Shopping Mall.	ES	Trumbull Corp park needs emergency access but funding has limited ability to move. Will require public land. Low priority due to funding and private property but as funds become available will revisit	NA*

<sup>\*</sup>NA = Not Applicable

#### V.4.vi.1 2019 MITIGATION ACTION STATUS, TOWN OF TRUMBULL 2019 Mit. ID Action for 2019-2024 Type **Updates** Revision The town has a Long-Term Disaster Recovery Committee in place as a part of the Disaster Recovery Conduct outreach to local small businesses with strategy. The Committee comprises town staff, volunteer members of the Economic and Commuthe aim of preventing the accidental release PE 20 and pollution from chemicals stored and used at nity Development Commission, and other business NA\* their facilities during or following natural hazard and community stakeholders, while they have been tasked with economic based concerns, they will ensure hazard safety. The town also relies on DEEP There are several historic buildings in the flood Secure funding from SHPO to conduct a historic zone. The town is aware of them but unsure what PP resources survey focusing on potential historic 21 NA\* will be done with them. They are aware of the Conresources in flood risk areas. Criss Application and plans to use it as needed. Work with CT DEEP to complete a formal val-Occurs as part of the requirements through CRS on Combine with PP 22 idation of the RL list and update the mitigation a yearly basis. action 5 status of each listed property.

PR,

NSP

Trumbull obtained Bronze certification in Septem-

made to obtain a higher ranking through working

with the Sustainable CT MetroCOG intern.

ber 2023 though Sustainable CT, progress shall be

NA\*

23

Take steps to become certified in the Sustain-

able CT program, focusing on actions that

achieve hazard mitigation benefits.

<sup>\*</sup>NA = Not Applicable

## VI IMPLEMENTATION

This section describes the process by which recommendations developed based on the discussions in the previous chapters will be implemented. The funding sources and planning mechanisms through which recommendations will be implemented are described. Plan monitoring and evaluation, public participation and the role that the Advisory Committees and CRS program will play in these activities is explained.

The strategies with which to implement mitigation recommendations are discussed at the local and regional scales. The mitigation action matrices from the previous section have been used as the framework to form an implementation plan for each community. A description of technical and financial resources is summarized in a table and detailed in Chapter IV and in Appendix F.

# VI.1 Adoption & Responsibilities for Implementation

MetroCOG will guide the updated NHMP through the FEMA approval process and will assist the governing bodies of member communities throughout the process of adopting the updated NHMP.

The updated NHMP will be considered current for five years from the date that the first MetroCOG community adopts the plan. Once the plan has been formally adopted by the community's governing body, the community is eligible for certain funding programs administered by FEMA. Communities that have not adopted the plan will not

be eligible for these programs but will not prevent the eligibility of other communities that have adopted the plan.

After adoption by the community and as funding becomes available, local officials will be responsible for assigning the appropriate resources to implement mitigation actions.

If and when recommendations from this NHMP are implemented, they will most likely be administered by the municipal departments that oversee these activities. These departments include Engineering, Public Works, Planning, and Emergency Management. MetroCOG will work with local communities to pursue mitigation actions by providing technical assistance to identify and pursue funding opportunities detailed later in this section.

## VI.2 Planning Mechanisms

Each community in the MetroCOG Region will integrate recommendations of the NHMP through existing planning mechanisms, such as Plans of Conservation and Development (Table VI.2.1), Zoning Regulations, building codes, Capital Improvement Plans, operating budgets and local programs or initiatives. By taking advantage of existing mechanisms (detailed in Chapter IV), the

VI.2.1 LOCAL POCD STATUS						
Municipality	Date of POCD	Is Hazard Mitigation Included?	Is an Update Underway?	Will Hazard Mitigation be Included?		
Bridgeport	2019	Yes	No	NA		
Easton	2018	Yes	No	NA		
Fairfield	2016	Yes	Yes	Yes		
Monroe	2021	Yes	No	NA		
Stratford	2023	Yes	No	NA		
Trumbull	2014	Yes	Yes	Yes		

recommendations of the NHMP are more likely to be successfully implemented. Using regional platforms, such as the MetroCOG hosted Conservation Technical Advisory Committee (CTAC), as a place to discuss best planning practices, , the municipalities are to enabled to peer share and bring expertise back to their communities.

As these hazard mitigation recommendations become institutional practices throughout the MetroCOG Region, new mechanisms to implement these actions are anticipated. New public-private partnerships, strengthened relationships with community organizations and local incentives will further realize the goals of the NHMP.

## VI.3 Progress Monitoring, Public Participation & Plan Maintenance

Each municipality has a local coordinator, often the floodplain manager for their respective community, who will be responsible for a local annual review of the NHMP and will convene a meeting of public officials to discuss progress. At these local meetings, the status of local actions will be discussed, and new mitigation actions will be added if appropriate. Minutes from the local annual NHMP meetings will be provided to MetroCOG to track plan maintenance.

The Conservation Technical Advisory Committee (CTAC) of MetroCOG will monitor the regional progress of the NHMP implementation. Each MetroCOG municipality is formally represented on the CTAC with a member of the local Conservation Commission and a staff member with responsibilities related to conservation. Meetings of the CTAC are held quarterly and are open to the public. In addition to the appointed members, meeting attendees typically include local

conservation organizations, residents, staff of the CTDEEP and other regional stakeholders. Throughout the process of developing the NHMP, the CTAC has provided guidance and will continue to monitor the implementation of mitigation actions post-adoption.

The agenda of each quarterly CTAC meeting will include an item regarding the NHMP. CTAC members will provide updates on the implementation of recommended NHMP mitigation actions in their respective communities. MetroCOG will keep track of these updates through the implementation matrix framework and offer a space for municipalities to voice diverse perspectives that may contribute to regional implementation opportunities. These meetings will also be utilized to measure the effectiveness of the plan, with a focus on three areas:

- Implementation of mitigation actions.
- If a natural hazard event occurs, post-disaster effectiveness of implemented mitigation actions.
- Issues faced in implementing actions and peer sharing of best practices based on past experience.

MetroCOG will annually report on the progress of implementing NHMP recommendations and will be responsible for coordinating an annual meeting with the CTAC to review the plan. In addition to CTAC members, participants in the review will include representatives of the departments listed in the implementation matrices including the local coordinators. Matters to be reviewed will include an assessment of the goals and objectives of the NHMP, a review of hazards or disasters that occurred during the preceding year, an evaluation of the mitigation activities that have been accomplished to date, a discussion of why implementation of mitigation activi-

ties may be behind schedule, and recommendations for new projects and revised activities

Futher, MetroCOG regularly collaborates with member municipalities on a range of projects. This regular collaboration will also be utilized for informal updates on plan implementation and the effectiveness of the plan. The maintenance schedule for the NHMP (post adoption) is presented in Table VI.3.1.

Continued public involvement will be sought regarding the monitoring, evaluation of and up-

VI.3.1 Post Adoption Plan							
2024-205 2025-2026		2026-2027	2027-2028	2028-2029			
MetroCOG staff will search for funding related to regional projects & provide guidance & technical assistance to municipalities on funding opportunities	MetroCOG staff will continue to search for funding related to regional projects & provide guidance & technical assistance to municipalities on funding opportunities	MetroCOG staff will continue to search for funding related to regional projects & provide guidance & technical assistance to municipalities on funding opportunities	MetroCOG staff will continue to search for funding related to regional projects & provide guidance & technical assistance to municipalities on funding opportunities	MetroCOG staff will continue to search for funding related to regional projects & provide guidance & technical assistance to municipalities on funding opportunities			
Municipalities will integrate the NHMP recommendations into local plans, budgets, & ordinances.	Municipalities will integrate the NHMP recommendations into local plans, budgets, & ordinances.	Municipalities will integrate the NHMP recommendations into local plans, budgets, & ordinances.	Municipalities will integrate the NHMP recommendations into local plans, budgets, & ordinances.	Municipalities will integrate the NHMP recommendations into local plans, budgets, & ordinances.			
Quarterly meetings of the CTAC hosted by MetroCOG will include updates to/by municipalities about the status of mitigation actions. Plan effectiveness will also be reviewed.	Quarterly meetings of the CTAC hosted by MetroCOG will include updates to/by municipalities about the status of mitigation actions.  Plan effectiveness will also be reviewed.	Quarterly meetings of the CTAC hosted by MetroCOG will include updates to/by municipalities about the status of mitigation actions. Plan effectiveness will also be reviewed.	Quarterly meetings of the CTAC hosted by MetroCOG will include updates to/by municipalities about the status of mitigation actions. Plan effectiveness will also be reviewed.	Quarterly meetings of the CTAC hosted by MetroCOG will include updates to/ by municipalities about the status of mitigation actions. Plan effectiveness will also be reviewed.			
Local coordinators will host a meeting with staff to track progress of mitigation actions.  A summary of the meeting ill be recorded to inform the next iteration of the NHMP.	Local coordinators will host a meeting with staff to track progress of mitigation actions.  A summary of the meeting ill be recorded to inform the next iteration of the NHMP.	Local coordinators will host a meeting with staff to track progress of mitigation actions.  A summary of the meeting ill be recorded to inform the next iteration of the NHMP.	Local coordinators will host a meeting with staff to track progress of mitigation actions.  A summary of the meeting ill be recorded to inform the next iteration of the NHMP.	Local coordinators will host a meeting with staff to track progress of mitigation actions.  A summary of the meeting ill be recorded to inform the next iteration of the NHMP.			
			MetroCOG will begin working with member municipalities to begin a draft of the 2029 update to the NHMP, which will include meeting with town staff to determine the status of each action listed in the 2024 iteration, and selecting new priorities for the 2029 plan.	MetroCOG, CTAC, and municipalities will submit the draft update of the NHMP to CT DEEP, DEMHS, and FEMA. Adoption of the plan will be through local legislative bodies.			

dating of the NHMP. Public input may be solicited through community meetings and input to webbased information gathering tools. Public comment on changes to the Plan may be sought through notifications posted to the websites of the Metro-COG, as well as through the websites and social media accounts of individual municipalities.

## VI.4 Community Rating System Program

FEMA's Community Rating System (CRS) is a voluntary program that offers discounts on flood insurance premiums to communities that undertake activities beyond minimum flood insurance standards. Activities include public outreach and information on flood protection, open space protection, storm water management and floodplain mitigation. The Towns of Fairfield, Stratford and Trumbull continue as Class 8 communities in the CRS Program. The City of Bridgeport submitted a Letter of Intent in 2018 but faced some application delays to the COVID-19 pandemic. Due to the rigorous requirements of the CRS Program, the NHMP will be monitored, evaluated, and updated as a CRS activity.

The CRS program requires that communities with ten or more repetitive loss properties (Category C communities) prepare a floodplain management plan that covers the repetitive loss areas. All coastal communities in the MetroCOG Region are Category C Repetitive Loss Communities. To enhance its CRS participation, the Town of Stratford has begun to prepare a Repetitive Loss Area Analysis (RLAA).

Multi-jurisdictional Natural Hazard Mitigation Plans that are prepared in accordance with the CRS Floodplain Management Planning process qualify for floodplain management planning credit in the CRS Program. Each CRS community has been awarded approximately 200 points for adopting the NHMP. CRS Program requirements for the NHMP, post-adoption, are as follows:

- An annual evaluation report on progress towards plan implementation must be prepared at least once each year and submitted with the community's annual CRS recertification. The report must be submitted to the governing body, released to the media, and made available to the public.
- If a community receives credit as a result of participation in a multi-jurisdictional plan that includes action items for each community, the annual evaluation report must cover those action items. This can be done either by a multi-jurisdictional planning committee or through separate submittals by each community. However, a community will not receive credit if it did not participate in the meeting at which the annual report was prepared. Therefore, the submittal needs to show who participated in the preparation of the report.
- The community must update the plan at least every five years.

As public information activities are an important and required component of CRS, NHMP public participation requirements and recommendations of the NHMP regarding public education and awareness are being implemented through the CRS Program.

## **VI.5 Mitigation Priorities**

The 2024-2029 actions are presented after a discussion of the top five priorities for each community. Federal and state funding resources to implement these actions are in Table VI.8.1 and detailed in Appendix F.

#### STAPLE+E

Throughout the planning process, a wide range of actions to mitigate and increase resiliency to the impacts of natural hazards were identified and discussed. Prioritizing each action will determine its effectiveness in reducing or preventing future impacts. The STAPLE+E method was used to prioritize the mitigation actions.

The STAPLE+E method evaluates the costs and benefits of a specific action against social, technical, administrative, political, legal, economic and environmental criteria. This method is commonly used by planners and public administrators. Based on this review, actions were prioritized for future implementation. The previous NHMPs used a similar approach. As in the 2019 NHMP, Technical and Economic criteria were given a greater weight (x2) for both benefit and cost to reflect the importance of these factors in the prioritization process.

The STAPLE+E cost benefit review evaluates the following:

#### Social

- 1. Is the proposed strategy socially acceptable to the Region or municipality?
- 2. Are there equity issues involved that would mean that one segment of the Region or municipality is treated unfairly?

#### Technical (weighted x2)

- 1. Will the proposed strategy work?
- 2. Will it create more problems than it will solve?

#### **Administrative**

- Can the Region or municipality implement the strategy?
- 2. Is there someone to coordinate and lead the effort?

#### **Political**

- 1. Is the strategy politically acceptable?
- 2. Is there public support both to implement and maintain the project?

#### Legal

- Is the Region or municipality authorized to implement the proposed strategy?
- 2. Is there a clear legal basis or precedent for this activity?

#### Economic (weighted x2)

- What are the costs and benefits of this strategy?
- 2. Does the cost seem reasonable for the size of the problem and the likely benefits?

#### **Environmental**

- How will the strategy impact the environment?
- 2. Will the strategy need environmental regulatory approvals?

The benefit of each criteria was ranked as low (1), medium (2) or high (3). Costs were ranked as low (-1), medium (-2) or high (-3). Criteria received a 0 if there was no cost or benefit, or if the criteria were not applicable to the mitigation action.

The overall STAPLE+E process was informed through public outreach and coordination with the Planning Team/Advisory Committee, as actions identified through these forums obviously had some community or stakeholder support. Typically, these actions received a high ranking for the administrative, social and/or political benefits. High administrative and technical rankings were given to actions that were underway or in the process of implementation, since the community actively has capacity to implement the action.

The economic costs of actions were evaluated based on a monetary estimate. Minimal cost actions require little staff time or municipal resources and could possibly be implemented through volunteer assistance. Low-cost actions were less than \$100,000. Moderate cost actions were between \$100,000 and \$500,000 and high-cost items were over \$500,000. Some very high cost actions were also included.

The results of the STAPLE+E review will inform how actions are prioritized and implemented. The top five priority actions for each community represent a cross section of the primary concerns in each and begin this Chapter. The STAPLE+E worksheet for each community is in Appendix G.

Development patterns in the region have not significantly changed since the 2019 NHMP. The impacts of hurricanes, tropical storms, heavy rain events, and extreme high tides continue to reinforce local awareness of the need to plan for and mitigate the potential impacts from flooding, high winds and other natural disasters. Each community's capabilities relative to NHMP implementation are detailed in Chapter IV and summarized in the following pages. Capabilities necessary to implement specific actions are provided in the matrix of actions.

### VI.6 Top 5 Local Priorities

The top five priorities for each municipality were selected though meetings with local officials, regional coordination, and the public participation process. The full list of priorities for each municipality appears are below, sections VI.6.i to VI.6.vi.

All local actions for 2025-2029 can be found in tables VI.7.i.1 to VI.7.vi.1 in Section VI.7.

## VI.6.i BRIDGEPORT, TOP 5 PRIORITIES

- Factor climate change impacts into Cityfunded critical infrastructure improvement plans by requiring that the standards similar to those of PA 18-82 be applied.
- 2. Identify open space to acquire in high risk and repetitive loss areas.
- 3. Carefully regulate the 60 Main Street and ferry terminal site redevelopments to ensure that the projects are flood resilient; these are high-visibility, key waterfront sites and the City has an opportunity for supporting innovative designs.
- Prioritize nature-based solutions to mitigate natural and climate induced hazards as relevant in projects
- Support the creation of resiliency centers/ hubs for each neighborhood in the city

#### VI.6.ii EASTON, TOP 5 PRIORITIES

- 1. Secure funding from SHPO to conduct a historic resources survey focusing on potential historic resources in flood risk areas.
- 2. Complete bridge replacement projects.
- 3. Work with CT DEEP to complete a formal validation of the RL list (currently 1 property) and update the mitigation status. Contact the owners of RL 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
- Acquire a generator for the Senior Center to enhance its use as a heating and cooling center.
- Upgrade generator at the PWD yard support all required facilities

## VI.6.iii FAIRFIELD, TOP 5 PRIORITIES

- Identify beach area stormwater drainage system areas for upgrade
- 2. Elevate/Replace Sanitary Pump Stations
- 3. Town Resilience Plan Update
- 4. Downtown Stormwater System Improvements
- 5. Rooster River Sediment Removal (to improve conveyance)

#### VI.6.iv MONROE, TOP 5 PRIORITIES

- Conduct a townwide hydrologic analysis that addresses flooding, stormwater, and water conveyance needs to identify projects that can be implemented to reduce risks to infrastructure and people.
- 2. Acquire and install a generator for the high school that enables its use as a shelter.
- Prepare a hydraulic study of the part of Sammis Brook where a beaver dam has been a problem in the past, and determine if improvements are needed to reduce flood risk.
- 4. Address (in the Subdivision Regulations) tree heights and appropriate street trees.
- 5. Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

## VI.6.v STRATFORD, TOP 5 PRIORITIES<sup>1</sup>

Pursue funding to mitigate existing/future
risks to the South End, the adjacent commercial and industrial area, and Lordship.
as identified in POCD based on findings/
feedback from Phase III of Resilient CT. Funds
may be used to reconstruct drainage systems,

- install flood control systems and/or elevate/ extend seawalls as necessary. \*
- Construct multiple culverts and channels on Surf Avenue at the Interstate 95 overpass along with the flood wall to reduce chronic coastal flooding.
- 7. Finalize design and implement flood protection measures around the wastewater treatment plant by raising the existing flood control berm.
- 8. Reduce inflow and infiltration through execution of projects utilizing the Clean Water Act grant funds.
- Prioritize floodproofing needs as part of municipal building updates. Includes raising equipment and generators and installing projectile-proof windows where necessary.

## VI.6.vi TRUMBULL, TOP 5 PRIORITIES

- Annually send a letter to property owners in RL areas to inform them of options for elevating or acquiring structures to reduce flood risk and coordinate with DEEP to complete a formal validation of the RL list and update the mitigation status of each listed property.
- 2. Floodproof remaining sewer pumping stations in accordance with master plan, as designs are completed.
- Allocate funds and retain consultant to review dam safety files and EAPs for dams; determine which dams may have the ability to be modified for flood mitigation capabilities.
- 4. Expand outreach to residents on the importance of wetlands and drainage swales for risk reduction from flooding. Look to increase the protection of additional floodplains.
- 5. Improve access to and availability of infor-
- 1 Note Actions numbered 1, 6, 7, 8 & 9 are Stratford's Top 5 Priorities

mation on services during an emergency for all Trumbull residents.

## VI.7 Mitigation Action & Implementation Tables

This 2024 NHMP Update includes mitigation actions for each community in the MetroCOG Region. New mitigation strategies were identified through a variety of meetings with local officials and the public participation process summarized in Chapter II and documented in Appendices C and D.

Recommendations from the 2019 NHMP were presented in Chapter V. Many of the actions carried forward have been revised to reflect lessons learned from implementing past actions. Those actions carried forward from 2019 are indicated with a "CF" with their previous 2019 ID is referenced.

#### VI.7.i BRIDGEPORT

The City of Bridgeport has demonstrated a commitment to implementing NHMP recommendations regarding regulations, infrastructure, natural resource protection, and public education and awareness. The City's new zoning regulations require freeboard and encourage low impact development and resilience standards. The City is examining opportunities for strategic buy-outs of flood-prone properties, continues to prioritize nature based solutions, and promotes "right tree, right place."

The City continues to conduct programming, awareness campaigns, and distributes information and resources on emergency preparedness and safety through a variety of programs. Over 200 seminars on flooding and public safety are provided to residents every year. The Citizen Alert System and the online Bridgeport 311 keeps residents and concerned citizens informed of issues and problems in the city. Bridgeport has a universal shelter policy which helps to meet the specific needs of residents, including allowing pets.

Bridgeport has made significant progress installing green infrastructure on public property and continues to encourage the elevation and/or floodproofing of homes and electrical systems. The City has committed to "right tree, right place" planting to ensure the sustainability and longevity of its canopy and future tree planting efforts. The City and its partners continues to monitor, restore and protect the Ash Creek tidal estuary through native planting restoration, preparing a shoreline protection plan, and examining opportunities to make the system more resilient to climate change impacts through thin layer deposition. Bridgeport and local stakeholder organizations continue to utilize native plants as much as possible and restore lost habitats, such as at the Sliver by the River project in Downtown Bridgeport.

Since 2019, Bridgeport was awarded funding from the CTDEEP Climate Resilience fund to conduct a vulnerability and resiliency needs assessment that will model climate impacts and sociodemographic information to inform priority areas for resiliency interventions, with a focus on nature-based solutions with co-benefits. An urban heat island mapping campaign will complement and inform this project and an urban agriculture plan is also underway. The urban heat mapping campaign will identify the most vulnerable neighborhoods and populations and will engage residents and stakeholders in developing local solutions to this increasing hazard. The City continues to implement recommendations from the Pleasure Beach Master Plan and Waterfront Pathway Plan.

Catch basins, storm grates, and river channels are cleaned regularly. City Hall, the Police Department, and the Senior Center are served by a microgrid and the City continues to install renewable energy systems on its municipal facilities, such as a battery storage system at the fire station. Opportunities for backup battery storage systems at critical facilities continue to be examined.

The revised 2022 stormwater regulations now better address stormwater issues. Flood control studies are ongoing at Ox Brook, Bruce Brook, and Island brook. These studies will inform flood control projects, which will be funded by \$42

million in state bond funding. Construction and implementation of projects along watercourses will reduce flooding and mitigate its impacts.

Actions are listed in Table VI.7.i. .Abbreviations are listed to the right and below the first Table.

Mitigation Abbreviations					
Code Mitigation Type					
EA	Education & Awareness				
ES	Emergency Services				
NSP	NSP Natural Systems Protection				
PP	PP Property Protection				
PR Prevention					
ST Structural/Infrastructure					

VI.7	VI.7.i.1 IMPLEMENTATION MATRIX, CITY OF BRIDGEPORT *** Addition during public comment perio							t period			
2019	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
4	1	Factor climate change impacts into City-funded critical infrastructure improvement plans by requiring that the standards similar to those of PA 18-82 be applied.	SLR	CF	PR, ST, PP	PF, OPED	PF & OPED will collaborate to develop a document by 2027 based on PA 18-82 guidance.	2025- 2027	<\$100K	Dept. oper. budget; staff to coordinate	16
11	2	Identify open space to acquire in high risk and repetitive loss areas.	CF, IF, SLR, DF, HTS	CF	NSP	PF, OPED	PF & OPED will collaborate to identify opportunities.	2024- 2029	<\$100K	Dept. oper. budget; staff to coordinate	15
44	3	Carefully regulate the 60 Main Street and ferry terminal site redevelopments to ensure that the projects are flood resilient; these are high-visibility, key waterfront sites and the City has an opportunity for supporting innovative designs.	CF, SLR	CF	PP	OPED	Reuse study is underway for the PSEG site. OPED to review future designs/ construction to ensure resilient development.	2024- 2026	<\$100K	Dept. oper. budget; staff to coordinate	13
na	4	Prioritize nature-based solutions to mitigate natural and climate induced hazards as relevant in projects	CF, IF, SLR	N	NSP	SO, PF, OPED, E, part- ners	Create framework and inventory of nature based solutions; include in project development review	2024- 2029	<\$100K	Dept. oper. budget; staff to coordinate	13
na	5	Support the creation and exploration * * * of resiliency centers/hubs for each neighborhood in the city	ALL	N	ES, PR, PR	SO & PF	Establish 1 resiliency center and create a framework to replicate across the city. Should be done in collaboration with the Freeman Center and statewide partners like CIRCA	2024- 2029	\$500K	Grants	13

\*CF=Carried Forward N=New

HAZARD ABBREVIATIONS					
Code	Hazard				
ALL	ALL All Hazards				
CF	Coastal Flooding				
DF	Dam Failure				
DR	Drought				
EQ	Earthquake				

Hazard Abbreviations					
Code Hazard					
EC Extreme Cold					
EH	Extreme Heat				
Hurricanes & Tropical					
IF Inland Flooding					

HAZARE	Hazard Abbreviations						
Code	Hazard						
SLR Sea Level Rise							
SST	Summer Storms & Tornadoes						
WF Wildfires							
WS	Winter Storms						

DEPARTMENT ABBREVIATIONS					
Code	Mitigation Type				
EMHS	Emergency Management/Homeland Security				
E	Engineering				
OPED	Office of Planning & Economic Development				
PR	Parks & Recreation				
PF	Public Facilities				
SO	Sustainability Office				

VI.7	VI.7.i.1 Implementation Matrix, City of Bridgeport										
	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
1	6	Complete CAV and initial steps to enter into the CRS program.	CF, IF, SLR	CF	PP, PR, ES, NSP	PF, OPED	In process. COVID delayed a site visit. Engineering Department is the designated coordinator (4/2018 FEMA letter). OPED will be brought into process as needed for reviewing building/development permits.	2024- 2025	<\$100K	Dept. oper. budget; staff to coordinate	9
5	7	Complete the components of the "Resilient Bridge-port" project execution that are scheduled for 2024-2029.	CF, SLR, HTS	CF	ST, PP	PF, OPED	Additional funding recently announced. Elements at 90% design. State is managing project; city will coordinate/participate as needed.	2024- 2029	<\$85 Million	U.S. HUD, CT DOH	5
6	8	Make additional progress with combined sewer separations and CSO abatement as outlined in 2018 plans.	CF, IF	CF	ST	PF, WPCA	PF will continue to coordinate; department recently finished a separation project. Upgrades to the 2 WWTFs are in progress and will increase capacity, thus reducing CSO impacts.	2024- 2029	>\$1 Million	City capital & EPA CWA	4
7	9	Pending funding, proceed with the Stormwater Authority Feasibility Study. Consider incentives to reduce the amount of impervious surface in the City.	CF, IF	CF	PR	SO & PF	City stakeholders will coordinate internally to identify project manager and responsible department to complete this study. Strong interest and need across departments for the study.	2025- 2026	<\$100K	City capital funds to retain consultant	7
8	10	Pursue a target of 30 additional GI installations on City-owned land and along streets in the 2024- 2029 planning timeframe. Select some locations from the Regional Framework for Coastal Resil- ience.	CF, IF, SLR	CF	ST, NSP	PF, OPED	PF will continue effort and will follow process utilized for the 12 instal- lations that occurred in 2019-2024.	2024- 2029	>\$1 Million	City capital & grant funds; in-kind services from non- profits such as TNC	7

VI.7	VI.7.i.1 IMPLEMENTATION MATRIX, CITY OF BRIDGEPORT  *** Addition during public comment period										
2019	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
9, 10	11	Identify opportunities for floodplain/waterfront easements; secure as available.	CF, IF, SLR	CF	NSP	PF, OPED	PF & OPED will collaborate to identify opportunities. Some properties are in process of being acquired. Flood control studies will inform future decisions. Studies are underway & to be completed in near future.	2024- 2029	\$100K- \$500K	City capital funds to retain legal expertise	8
12	12	Identify parcels within potential marsh advance- ment zones that may be acquired, including prop- erties along Cedar Creek that have low potential for redevelopment.	CF, SLR	CF	NSP	PF, OPED	Action is in process. PF and OPED will continue to collaborate to identify these opportunities.	2024- 2029	<\$100K	Dept. oper. budget; staff to coordinate (to identify \$ only).	9
13	13	Conduct study of Ash Creek sedimentation to determine if sedimentation will enhance longevity, stability, and sustainability of the ecosystem.  Seek funding to implement habitat restoration and nature based solutions/living shoreline in Ash Creek tidal estuary, examine feasibility of thin layer deposition to address erosion and ecosystem collapse at Sand Spit and Great Marsh Island.***	CF, SLR	CF	ST	SO, PF, E, PR, Part- ners	City will collaborate with CTDEEP and NGOs (Ash Creek Conservation Association and Save the Sound) to examine opportunities to raise the wetland through thin layer deposition. If necessary, consultant will be secured.	2024- 2027	\$1.5 Million	City capital funds to retain consultant. \$600K has been awarded to Save the Sound.	2
14	14	Continue to identify areas of erosion along Ash Creek that may require mitigation and secure fund- ing for feasibility studies.	CF, SLR, HTS	CF	ST	PF	Ash Creek Estuary Master Plan was updated in 2023. The City will coordinate with ACCA and the Town of Fairfield on similar protection and restoration efforts that occurred during the 2019-2024 plan.	2024- 2027	<\$100K	City capital funds to retain consultant	2
16	15	As sites are identified, remove derelict structures in flood zones and other areas of high risk; redevelop or convert to open space.	CF, IF	CF	NSP	PF, OPED	PF and OPED will collaborate to identify opportunities.	2024- 2029	>\$1 Million	U.S. HUD, CT DOH, FEMA HMA	7

VI.7	VI.7.i.1 Implementation Matrix, City of Bridgeport										
2019	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
17	16	Replace the State Street Ext/Commerce Drive Bridge and upgrade the catch basins and drainage system.	CF, IF, SLR	CF	ST	E	Project is in progress; Fairfield Engineering is lead. Permits were recently granted & construction soon to go to bid. Bridgeport's will collaborate with Fairfield & CTDOT.	2024- 2029	>\$3 Million	CTDOT, City/Town of Fairfield capital	4
18	17	Execute design of the flood mitigation project for Island Brook and Ox Brook.	IF	CF	ST	PF	City has begun a study. Conceptual designs will be developed and downstream studies will identify implementation actions and projects for state bonded funding PF is retaining consultant to complete design.	2025- 2027	\$100K- \$500K	City capital funds to retain consultants	9
19	18	Execute design of the flood mitigation project for northeast Bridgeport.	IF	CF	ST	PF	City has begun a study. Conceptual designs will be developed and downstream studies will identify implementation actions and projects for state bonded funding PF is retaining consultant to complete design.	2025- 2027	\$100K- \$500K	City capital funds to retain consultants	9
20	19	Pursue funds for design of a demonstration project for green coastal bank protection opportunities along the Yellow Mill Channel.	CF, SLR	CF	ST, NSP	PF	City is actively looking for funding. Potential funds are NOAA, NFWF, and CIRCA (state) grant programs.	2025- 2027	<\$100K	Dept. oper. budget; staff to coordinate (to identify \$ only).	7
21	20	Pursue funds for design of a demonstration project for green coastal enhancement and restoration opportunities (similar to the action for Yellow Mill Channel, above).	CF, SLR	CF	ST, NSP	SO, PF	City is actively looking for funding. Potential funds are NOAA, NFWF, and CIRCA (state) grant programs.	2024- 2027	<\$100K	Dept. oper. budget; staff to coordinate (to identify \$ only).	7

VI.7	VI.7.i.1 Implementation Matrix, City of Bridgeport										
	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
22	21	Work with Stratford to complete the Bruce Brook improvements near Barnum Ave. City is looking to install a floating trash collection device in brook. Coordinate with watershed plan (#49).	IF	CF	ST	PF	Stratford is leading; project is in design/permitting. PF is collaborating as needed.	2024- 2027	<\$100K	Dept. oper. budget; staff to coordinate (to identify \$ only).	8
23	22	Execute the design to address drainage and flooding at Seaview Avenue where it crosses the railroad line. The bridge structure is aging.	CF, IF	CF	ST	PF	Stakeholders are coordinating to identify drainage issues. Requires extensive coordination with CT DOT, MTA, & MNR. PF will retain consultant to complete design.	2026- 2028	\$100K- \$500K	City capital funds to retain consul- tants	5
24	23	Select one recommendation from the Pequonnock River Watershed Plan to improve water quality and alleviate flooding, and secure funding.	IF	CF	ST, NSP	PF, OPED	PF and OPED are actively coordinating to identify and secure funds. Potential funds are NOAA, NFWF, and EPA Section 319 programs.	2025- 2027	<\$100K	Oper. budget; staff to coordinate (to identify \$ only).	5
25	24	Select one recommendation from the Rooster River Watershed Plan to improve water quality and alleviate flooding, and secure funding.	IF	CF	ST, NSP	PF, OPED	This action is in progress and water quality monitoring continues.	2025- 2027	<\$100K	Oper. budget; staff to coordinate (to identify \$ only).	5
26	25	Pilot test an automated viaduct closure system for one viaduct. Add a sensor on bridge for water level and a signage system that notifies drivers that the underpass is flooded and don't drive through. This is a recurring problem highly likely to increase in intensity and frequency this remains a major priority.	CF, IF, SLR	CF	ES	EOC, SO	EOC & SO coordinating to identify funding, as this remains a major priority. Funding is actively being sought. Price proposals have been sought and sample systems have been vetted	2027- 2029	\$100K- \$500K	City capital funds with potential DHS emergency pre- paredness funding	7
30	26	Maintain and expand outreach programs to educate citizens regarding flood management ordinances, flood insurance programs, and other flood relevant issues, including creditable activities in the CRS program and GIS.	CF, IF, SLR	CF	PR, EA		City hopes to increase frequency. Education/outreach occur via the religious community, libraries, higher ed., and implementation of neighborhood emergency/communications plans.	2025- 2029	<\$100K	Dept. oper. bud- get; staff to coordi- nate in connection with CRS	7

VI.7	1.7.i.1 Implementation Matrix, City of Bridgeport										
	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
32	27	Periodically review neighborhood plans for emergency management and communications. Monitor implementation of plan provisions.	ALL	CF	ES	PF and EMHS	City will update as needed and continue communication and promotion of plans	2024- 2029	<\$100K	Dept. oper. budget; staff to coordinate	6
33	28	Annually evaluate training program on community awareness for potential new audiences and additional information to include, especially for high-need populations in flood-prone areas.	ALL	CF	PR, EA	EMHS	Training provided to variety of audiences: churches, NRZs, schools, non-profits, businesses.	2024- 2029	<\$100K	Dept. oper. budget; staff to coordinate	5
34	29	In high density and public housing developments, post the evacuation routes and evaluate additional transportation needs. Determine an effective means of communicating variations.	ALL	CF	ES	EMHS	EMHS leading. City has some exterior signage but since routes vary depending on incident, they may change.	2025- 2029	<\$100K	Dept. oper. budget; staff to coordinate	7
35	30	Assess and augment local areas of the public refuge system across the City and ensure residents are aware of uses and procedures during emergencies. Evaluate opportunities for improvements.	ALL	CF	ES	EMHS	EMHS provides shelter information ahead of/during emergencies; will work to identify additional needs. All schools prepared for short term shelters; some for long term.	2024- 2029	<\$100K	Dept. oper. budget; staff to coordinate	7
36	31	Inform homeowners of flood insurance options and benefits	CF, IF, SLR, HTS	CF	PP	PF and EMHS	City promotes purchase after every storm.	2024- 2029	<\$100K	Oper. budget; staff coordinate w/CRS	
37, 47	32	Assist in reducing the disbursement of toxic substances from flooded homes and facilities by conducting targeted outreach. Engage with small businesses to help prevent the accidental release and pollution from chemicals at their facilities during or following a natural hazard.	CF, IF, SLR, HTS	CF	ES	PF and EMHS	Pamphlets provided about preparation/storing toxic substances. City has provided mops/other resources to help with clean up. Tier II facilities required to ensure adequate storage/protection during natural hazards. EMHS coordinates w/CTDEEP.		<\$100K	Dept. oper. budget; staff to coordinate	8

\*CF=Carried Forward N=New

VI.7	VI.7.i.1 Implementation Matrix, City of Bridgeport										
	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
38	33	Regularly assess capacities and needs of sheltering, cooling, and medical network across the City as well as adjoining municipalities in the Greater Bridgeport Region.	EC, EH, WS, HTS, SST	CF	ES	EMHS	EMHS leads this now-standardized prac- tice. Assessment occurs with greater frequency than annually.	2024- 2029	\$100K- \$500K	City capital to retain consultants	4
39	34	Improve the City's natural hazard warning and alert systems. Utilize CT Alert more frequently. Utilize social media.	ALL	CF	ES	EMHS	Train EMHS supervisors, 911 operators, & dispatch on CT Alert. Use GIS to ensure notification of residents in impacted areas. Work w/police/fire on public addresses. Assess feasibility of flood gates & lighting.	2024- 2029	<\$100K	Dept. oper. budget; staff to coordinate (to identify \$ only).	9
40	35	Pursue funding to complete a feasibility study for raising bridges and their connecting roads in one specific pilot area.	CF, IF, SLR	CF	ST	PF	City currently working w/UConn Graduate students to understand what incentivizes risk adverse behavior and how priorities around flooded infrastructure, conservation and community need align	2026- 2028	<\$100K	Dept. oper. budget; staff to co- ordinate (to secure \$ only).	8
41	36	Pursue funding to upgrade Emergency Operations Center equipment to include a complete camera board for situational awareness and display board for public facilities equipment tracking.	ALL	CF	ES	EMHS	Funding being pursued by EOC to complete. All PF vehicles currently tracked w/GPS	2026- 2027	<\$100K	Dept. oper. budget; staff to co- ordinate (to secure \$ only).	8
42	37	Utilize recently-installed camera system to more thoroughly understand storm surge and to enhance evacuation plans at Seaside Park, Bridgeport Harbor, Pleasure Beach and Black Rock Harbor.	CF, SLR, HTS	N	ES	EMHS	EMHS is leading this project.	2024- 2029	<\$100K	Dept. oper. budget; staff to coordinate (to identify \$ only).	8

\*CF=Carried Forward N=New

VI.7	VI.7.i.1 Implementation Matrix, City of Bridgeport										
2019	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
43	38	Closely monitor Marina Village reconstruction to ensure that the project is flood resilient.	CF, SLR	N	PP	OPED	1st phase completed (50-unit Windward apts). Reconstruction not complete & staff monitoring.	2024- 2028	<\$100K	Dept. oper. budget; staff to coordinate staff to coordinate	10
45	39	Incorporate flood resiliency in the WWTP upgrades that occur in the near future.	CF, IF, SLR	N	PP	WPCA	The WPCA is leading this project and incorporating resilience considerations into upgrades.	2025- 2029	>\$1 Million	City capital & EPA CWA	9
46	40	Complete permitting and design of Johnson Creek Living Shoreline demonstration project.	CF, SLR	N	NSP	OPED, PF	OPED is coordinating; design is in process. TPL pursuing construction funds.	2025- 2026	<\$100K	City capital to retain consultants	10
49	41	Work w/CTDEEP to complete formal validation of RL list; update mitigation status of each property.	IF, CF, SLR, DF	N	PP	PF, E	This activity occurs annually	2024- 2029	<\$100K	Oper. budget; staff to coordinate	8
50	42	Contact the owners of Repetitive Loss (RL) properties and those nearby at risk to inquire about mitigation undertaken and suggest options for mitigating flooding. This should be accomplished with a letter directly mailed to each property owner.	IF, CF, SLR, DF	N	PP	PF, E	This activity is occurring but privacy issues have caused delays.	2024- 2025	<\$100K	Dept oper. budget; staff to coordinate	8
na	43	Conduct an urban heat mapping campaign to understand exposure and priority areas for intervention	EH	N	PR	SO, PF & H.	Utilize city-owned assets and partners to com- plete volunteer led heat mapping campaign. NGOs will assist.	2024- 2025	<\$100K	Federal programs, staff & NGOs to coordinate	9
na	44	Conduct a comprehensive vulnerability and resiliency assessment focusing on climate impacts, storms, heat, etc.	HTS, WS, EH, EC, SST	N	PR	OPED, SO, and PF	PF to execute with awarded funding	2024- 2026	<\$100K	Statewide grants, staff to coordinate	6
na	45	Develop or acquire software for an Emergency Preparedness app for the City of Bridgeport to be able to send push notifications to all residents	ALL	N	ES	SO & EMHS	EOC to execute	2024- 2026	<\$100K	Existing staff to coordinate	6

\*CF=Carried Forward N=New

VI.7	VI.7.i.1 Implementation Matrix, City of Bridgeport										
	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
na	46	Examine opportunities to create floodable parks and utilize municipal/park property to mitigate climate impacts	CF, IF, SLR, DF	N	PR, NSP	SO & PF	Conduct study on best use of properties & opportunities for living shorelines, using nature based solutions, etc.	2024- 2029	<\$200K	Existing staff to coordinate, utilize state funding sources to retain consultant	8
na	47	Conduct strategic buy-outs of properties being flooded, in an effort to increase capacity of system	CF, IF, SLR, DF	N	PP	PF	Locate repetitive flood properties existing next to or in close proximity to channelized river and coordinate with local representatives around feasibility of buyout	2024- 2029	>\$1 million	Existing staff to coordinate	6
na	48	Complete the "Sliver by the River" project, which will provide public access to the Downtown Pequonnock River waterfront, improve habitat, and restore water quality.	CF, SLR	N	NSP	OPED, SO, PF	Conceptual designs developed for proj- ect. Funding in place for 100% design and construction. Seeking funding for salt marsh flood mitigation portion.	2024- 2026	<\$2.5 million	Existing staff to coordinate with NGOs	8
na	49	Select one recommendation from the Bruce Brook Watershed Plan to improve water quality and alleviate flooding, and secure funding.	IF	CF	ST, NSP	PF, OPED	As Bruce Brook plan nears completion, will begin process of se- lecting priority action & identify funding.	2025- 2029	<\$100K	Dept .oper. budget; staff to coordinate (to identify \$ only).	5
na	50	During extreme temperature events, publicize the locations of cooling and warming centers .	EH, EC, WS	N	PR	EMHS	EMHS to work with departments/local media to publicize information.	2024- 2029	<\$100K	Dept. oper. budget; staff to coordinate	6
na	51	Conduct critical facility assessments for resilience to earthquakes	EQ	N	PR, PP	PF	As funding/staffing becomes available, will prioritize sites.	2025- 2029	\$100K- \$500K	Dept. oper. budget; staff to coordinate (to identify \$ only).	4

**1-5 = Priorities**\*CF=Carried Forward N=New
\*\*S-E Score=STAPLE+E, see Appendix G

VI.7	/1.7.i.1 IMPLEMENTATION MATRIX, CITY OF BRIDGEPORT										
2019	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
na	52	Evaluate opportunities for vegetation management on municipally owned land and specific private properties (water company lands, conserved lands) to reduce vulnerability to wildfires. Includes phragmites removal in coastal areas.	WF	N	NSP, PR	SO, PF	As funding and staffing becomes available, the City will integrate these practices into departmental operations.	2024- 2029	<\$100K	Dept. oper. budget; staff to coordinate (to identify \$ only).	5
na	53	Utilize Sustainable CT actions and best practices for landscaping practices to reduce water usage and the vulnerability of vegetation to drought.	DR	N	NSP, PR	SO	As funding and staffing becomes available, City will distribute material to residents. MetroCOG hosts a Sustainable CT intern over the summer who can assist with activity.	2024- 2029	<\$100K	Dept. oper. budget; staff to coordinate	8
na	54	Evaluate use of microgrids and utility protection/ hardening for resilience to severe storms and winter storms.	HTS, WS, SST	N	ST	SO, PF	As funding and staffing becomes available, City will prioritize sites for future improvements.	2024- 2029	>\$1 million	Dept. oper. budget; staff to coordinate (to identify \$ only).	8
na	55	Examine feasibility of dredging and beach nourishment at Seaside Park to ensure resilience and sustaiability of the cultural and environmental resource. * * *	CF, HTS, SLR, SST, WS	N	NSP, ST	E, PR, SO, PF	City staff will evaluate the pros and cons of strategies to reduce/mit- igate erosion, develop a timeframe/mainte- nance plan, and identify permits and funding sources.	2025- 2029	>\$1 million	Departmental operating budget; existing staff to identify funding opportunities for a plan and implementation.	5
na	56	Conduct focus groups to determine emergency preparedness for and notifying the City's unhoused population of natural hazard events.***	ALL	N	EA, ES	EMHS	City staff will work with partner NGOs in assembling focus groups.	2024- 2029	<\$100k	Departmental operating budgets.	11
na	57	Review evacuation routes and update based on new development, daytime/nightime population needs, and/or changes to the street network.***	ALL	N	ES	EMHS	City staff will periodically review evacuation routes against changes in neighborhood development and local populations.	2024- 2029	<\$100k	Departmental operating budgets.	12

#### VI.7.ii EASTON

The Town of Easton continues to ensure the safety of residents by erecting barricades on roads vulnerable to flooding during heavy rain events and by warning residents that may become isolated by flooded roads or downed trees. The town ensures emergency management is accessible to all residents though their Reverse 911 system and direct outreach.

Tree maintenance and management has significantly increased though the number of inspections that occur to ensure public safety. The goal of inspections is to improve the resilience of the Town of Easton to the potential impacts of high winds and utility outages.

In the 2024 NHMP, the town has become more concerned with hardening existing critical facilities and ensuring that homeowners are well equipped with the education and resources needed to prevent potential future loss. Back-up and alternative power generators at critical facilities are also priorities.

Actions are listed in Table VI.7.ii.1. Abbreviations are listed above right.

Hazard Abbreviations								
Code	Hazard							
ALL	All Hazards							
CF	Coastal Flooding							
DF	Dam Failure							
DR	Drought							
EQ	Earthquake							
EC	Extreme Cold							
EH	Extreme Heat							
HTS	Hurricanes & Tropical Storms							
IF	Inland Flooding							
SLR	Sea Level Rise							
SST	Summer Storms & Tornadoes							
WF	Wildfires							
WS	Winter Storms							

DEPARTMENT ABBREVIATIONS							
Code	Department						
AHD	Aspetuck Health District						
BOS	Board of Selectmen						
CON	Conservation Commission						
DPW	Department of Public Works						
EM	Emergency Management						
	Planning & Zoning						
PZC	Commission						

MITIGATION ABBREVIATIONS								
Code	Mitigation Type							
EA Education & Awareness								
ES	Emergency Services							
NSP	Natural Systems Protection							
PP	Property Protection							
PR	Prevention							
ST Structural/Infrastructure								

VI.7	VI.7.ii.1 Implementation Matrix, Town of Easton												
IDs 2019 2024		Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score		
4	1	Secure funding from SHPO to conduct a historic resources survey focusing on potential historic resources in flood risk areas.	IF, SLR	CF	PP	PZC	Coordinate directly with CT SHPO on this state-wide initiative.	2024- 2029	<\$100K	PZC Oper. Budget; staff to coordinate (action is to secure funds only).	13		
5	2	Complete bridge replacement projects.	DF, EQ, SLR	CF	ST	DPW	Work with MetroCOG, Town of Monroe, and CT DOT as needed.	2024- 2029	>\$1 Million	LOTCIP & federal bridge funds	16		

VI.7	.ii.1	mplementation Matrix, Town of Eas	TON								
	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
6&7	3	Work with CT DEEP to complete a formal validation of the RL list (currently 1 property) and update the mitigation status. Contact the owners of RL 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	IF	CF	PP	DPW	Contact the NFIP coordinator at CT DEEP to get started and obtain the appropriate forms in the coming year	2024- 2029	<\$100K	DPW Oper. Budget; staff to coordinate.	19
8	4	Acquire a generator for the Senior Center to enhance its use as a heating and cooling center.	EH, EC, HTS, WS, SST,	CF	ES	BOS	Research costs of potential generators & potential emergency management funding streams. Once completed, secure funding and assign project to appropriate staff to execute.	2024- 2029	\$100K- \$500K	FEMA HMA, DHS emergency pre- paredness	12
NA	5	Upgrade generator at the PWD yard support all required facilities	EH, EC, HTS, WS, SS,	N	ES	DPW	Secure funding and assign project to appropriate staff to execute.	2024- 2029	<\$100K	DPW Oper. Budget	11
1	6	Increase funding for the routine tree maintenance and inspection program and remove a greater number of hazardous trees and branches each year.	WS, EH, EC, HTS, WF	CF	PP	DPW	Work w/BOS & Finance to increase funding, with target for accomplishing this within two years.	2024- 2027	<\$100K	Town Budget, DPW Oper. Budget	-2
2	7	Annually explore the benefits associated with actively participating in the Sustainable CT program, which includes objectives aligned with hazard mitigation.	ALL	CF	PR, NSP	BOS	Reach out to neighboring towns such as Fairfield & Trumbull for advice. Estimate staff/volunteer time to enter and remain in program.	2024- 2029	<\$100K	BOS Oper. Budget; existing staff to coordinate.	2
NA	8	Construct Garage/Barn at Satellite DPW yard with power/gas/water and generator (22 kW)	EH, EC, , HTS, WS, SST,	N	ES	DPW	Research and secure funding and assign proj- ect to appropriate staff to execute.	2024- 2029	\$100K- \$500K	DPW Oper. Budget	11

VI.7	VI.7.ii.1 IMPLEMENTATION MATRIX, TOWN OF EASTON  *** Addition during public comment period												
	Os	A	Hazard	NI OU	Mit.		Implementation			- I	S-E**		
2019	2024	Action	Type	New?*	Type	Dept	Process	Time	Cost	Funding	Score		
NA	9	During extreme temperature events, publicize the locations of cooling and warming centers .	EH, EC, WS	NA	PR, EA	EM, AHD	EM to work with depart- ments/local media to publicize information.	2025- 2029	<\$100K	Dept. oper. budget; staff to coordinate	6		
NA	10	Conduct critical facility assessments for resilience to earthquakes	EQ	NA	PR, PP	DPW	As funding/staffing becomes available, will prioritize sites.	2025- 2029	\$100- 500k	Dept. oper. budget; staff to coordinate (to identify \$ only).	4		
NA	11	Evaluate opportunities for vegetation management on municipally owned land and specific private properties (water company lands, conserved lands) to reduce vulnerability to wildfires.	WF	NA	NSP, PR	DPW, CON	As funding and staffing becomes available, the Town will integrate these practices into departmental operations.	2024- 2029	<\$100K	Dept. oper. budget; staff to coordinate (to identify \$ only).	5		
NA	12	Utilize Sustainable CT actions and best practices for landscaping practices to reduce water usage and the vulnerability of vegetation to drought.	DR	NA	NSP, PR	BOS	As funding and staffing becomes available, Easton will distribute material to residents. MetroCOG hosts a Sustainable CT intern over the summer who can assist with activity.	2024- 2029	<\$100K	Dept. oper. budget; staff to coordinate	8		
NA	13	Evaluate use of microgrids and utility protection/ hardening for resilience to severe storms and winter storms.	HTS, WS, SST	NA	ST	DPW	As funding and staffing becomes available, Easton will prioritize sites for future improvements.	2024- 2029	>\$1 million	Dept. oper. budget; staff to coordinate (to identify \$ only).	8		
NA	14	Conduct a townwide hydrologic analysis that addresses flooding, stormwater, and water conveyance needs to identify projects that can be implemented to reduce risks to infrastructure and people. Based on this analysis, evaluate long-term mitigation strategies. * * *	IF, HTS, WS, SST	NA	ST	DPW	Secure funding and assign project to appropriate staff to execute.	2024- 2029	\$100K- \$500K	Town capital funds combined with grant funds	17		

\*CF=Carried Forward NA=New Action

#### VI.7.iii FAIRFIELD

Storms, extreme high tides, and heavy rain events continue to reinforce awareness of the need to plan for and mitigate impacts from flooding and high winds. Heavy rain events have caused significant inland flooding, especially along the Rooster River. The Town has continues with the CRS Program, continues to develop tree health, cutting and maintenance plans, and continues to require any new streets to utilize underground utilities. These activities are complemented by new priorities, which highlight the need for stormwater system improvements and exploring innovative engineering techniques to heighten resiliency.

- Lessons learned from the Riverside Drive/Ash Creek Flood
  Protection and Coastal Resiliency Study will be utilized in the
  design of a flood protection system by focusing on a segment
  that affects only Town-owned land.
- Based on conceptual plans mentioned in the 2019 plan, green infrastructure projects will be constructed in Fairfield Center and explored in townwide development projects.
- The Town is identifying the next steps to set aside land for detention/watershed storage in the Rooster River watershed and is allocating funds to replace culverts to alleviate flooding in the

DEPART	DEPARTMENT ABBREVIATIONS										
Code	Department										
AW	Aquarion Water										
BOS	Board of Selectmen										
BU	Building										
CON	Conservation Department										
DPW	Department of Public Works										
ENG	Engineering Department										
FECB	Flood & Erosion Control Board										
	Operations & Emergency										
OEM	Management										
PZ	Planning & Zoning Department										
SF	Sustainable Fairfield										
WPCA	Water Pollution Control Authority										

Rooster River, Royal Avenue, and Camden Street areas.

The Towns' Flood and Erosion
 Control Board anticipates conducting a resilience study with an outreach component, which will help inform and evaluate feasibility of resilience opportunities.

Actions are listed in Table VI.7.iii.1.

Abbreviations are listed above/right.

MITIGATION ABBREVIATIONS									
Mitigation Type									
Education & Awareness									
Emergency Services									
Natural Systems Protection									
Property Protection									
Prevention									
Structural/Infrastructure									

Hazari	Hazard Abbreviations									
Code	Hazard									
ALL	All Hazards									
CF	Coastal Flooding									
DF	Dam Failure									
DR	Drought									
EQ	Earthquake									
EC	Extreme Cold									
EH	Extreme Heat									
HTS	Hurricanes & Tropical Storms									
IF	Inland Flooding									
SLR	Sea Level Rise									
SST	Summer Storms & Tornadoes									
WF	Wildfires									
WS	Winter Storms									

VI.7	VI.7.iii.1 Implementation Matrix, Town of Fairfield											
	Ds 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score	
NA	1	Identify beach area stormwater drainage system areas for upgrade	SLR, CF, IF	NA	ST	DPW/	Staff will need to identify other drainage improvement options in this area (FBR). A list of suggested repairs and replacements will be compiled.	2024- 2029	<\$100K	Capital Improve- ment Funds (CIF)	16	

VI.7	VI.7.iii.1 Implementation Matrix, Town of Fairfield											
11 2019	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score	
NA	2	2024 Town of Fairfield Flood, Erosion and Resilience Plan Update	ALL	CF	PP	ENG	Development of town- wide plan an that will address coastal and riv- erine flood and erosion.	2024- 2029	\$400K -\$500K based on scope	ARPA	17	
NA	3	Elevate/Replace Sanitary Pump Stations 1. Center Street Pump Station 2. Fairfield Beach Pump Station 3. Pine Creek Pump Station 4. Willow Street Pump Station 5. Mill Hill Terrace Pump Station	CF, IF	NA	ST	WPCA & ENG	Projects under design with T&B. Fairfield Beach Pump Station will be going into design in 2024. Once completed, Center Street and Pine Creek will be prioritized.	2024- 2025	\$10 -20 Million	WPCA fund, but applying for CWA funds	14	
10	4	Downtown Stormwater System Improvements	IF	CF	ST, NSP	ENG	Used ARPA funds to hire Consultant. In Design/ Part of 5-year Plan. The project has been split into 5 phases of 4 portions.	2024- 2025	\$10 -15 Million	Operating budget; existing staff to coordinate. CIF or bonding.	15	
NA	5	Rooster River Sediment Removal (remove 1-2 inches to improve conveyance)	IF	NA	ES	ENG	The town is looking at Rooster River cleaning. Engineering is taking the lead on the project and will work with Metro-COG to explore funding opportunities	2024- 2027	\$1 million	Operating budget, Engineering	11	
1	6	Secure funds and proceed with construction of the Riverside Drive tide gate system	CF, IF	CF	ST	CON/ ENG	Conservation & DPW collaborating on project through construction.	2024- 2029	\$7.15 Million	Capital improve- ment funds	14	
2	7	Ensure that the current dam failure EAPs are filed with pertinent Town departments.	DF	CF	ES	OEM	EMD to obtain copies and file them with de- partments such as DPW and Planning.	2024- 2029	<\$100K	Operating budget; staff to coordinate (action is to obtain and distribute).	9	
3	8	Advance the South Benson Road pumping station to final design/construction.	CF, IF	CF	ST	DPW/ ENG	DPW/Engineering is coordinating this project. Lower priority due to funding costs.	2029- 2033	\$37 Million	Capital improve- ment funds	4	

VI.7	.iii.1	Implementation Matrix, Town of Fair	* * * Deletion during public comment period								
	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
4	9	Pursue an executable phase of the Riverside Drive/ Ash Creek flood protection system by focusing on design of a segment that affects only Town-owned land.	CF, IF	CF	ST	CON, ENG, FECB	Conservation, DPW, & FECB collaborated on the Riverside Drive/Ash Creek project in 2016-2017 and will collaborate on the design phase in a similar manner.	2024- 2029	\$100K -\$500K	Grant funds for design. CIRCA BCA review in 2022-23 showed BCA < 1. Will review costs in Town Resilience Plan Update.	5
5	10	Secure funds for a microgrid at the WWTP to include adjacent and nearby municipal buildings.	ALL	CF	PP, ES	WPCA	Town was successful with state microgrid program and leveraging this experience to pursue a microgrid at the WWTP/nearby buildings. Should be complete summer 2024.	2024- 2025	\$3 Million	State microgrid program	9
6	11	Address equipment in library basements to prepare for when flooding occurs.	ALL	CF	PP	LIB/ DPW	Identify if the need for preparation at the library still exists	2024- 2029	\$100K -\$500K	Capital improve- ment funds	10
NA	12	Discuss a potential Resiliency Fund with the Board of Selectman	ALL	NA	PP	FECB, FIN	Requires review and Implementation with BOS Pending, but FECB has had conversations with BOS.	2024- 2025	\$1 Million 1st year, TBD annually	General Fund	0
NA	13	Flood Protection Study for area Between Jennings and Penfield Beaches	IF, CF, SLR	NA	PP	ENG	On hold, will be reviewed as part of 2024 Town of Fairfield Flood, Erosion and Resilience Plan Update. The initial conceptual drawings for flood protection indicate the plan would not have been impactful. CT DEEP coordination is needed for meaningful imple- mentation. * * *	2024- 2029	\$100K	Capital Non-recurring	7

VI.7.iii.1 Implementation Matrix, Town of Fairfield											
2019	Ds 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
NA	14	Flood Protection Study for Penfield Beach area	IF, CF, SLR	CF	PP	ENG/ FECB	Determine additional neighborhood protec- tion needs with Pavilion remediation project	2024- 2029	\$100K	General Fund	7
7	15	Coordinate with the Army Corps of Engineers to determine a feasible option for future improvements to the Pine Creek dike system.	IF	CF	ST	FECB/ ENG	New tide gates at Kiwanis Field, which will go to bid in summer of 2024	2024- 2030+	\$1 Million	Construction funding if awarded is 35% town match	10
NA	16	Tide gate/Flood control inventory	CF, SLR	NA	ST	ENG	Develop 5-year maintenance & repair plan. Draft report will be finalized in 2024. Town will bond in 2024. Inventory completed and implementation will follow.	2024- 2029	\$2.5-\$3 Million	Capital Funds	5
8	17	Secure funds for beach nourishment in accordance with the engineered beach study and design.	CF, SLR	CF	NSP	CON/ ENG/ FECB	The Town has conducted beach nourishment in the past and will utilize similar procedures going forward. Proceed with ACOE/DEEP approvals.	2024- 2029	<\$100K	Operating budget; existing staff to coordinate (action is to secure funds only). Determine annual cost based on sand needs.	7
9	18	Relocate/increase capacity for sanitary sewer trunk lines in areas of significant flood risk.	CF, SLR, IF	CF	ST	WPCA	This project scheduled 2024 (East Trunk)	2024- 2025	\$11 Million	Capital improve- ment funds	3
11	19	Allocate funds for replacements of culverts to alleviate flooding in the Rooster River, Royal Avenue, and Camden Street areas.	IF, CF, SLR	CF	ST	ENG	Study and design has been completed for some areas. The Town will begin allocating funds through the CIP. Buying 3 Camden prop- erties via FEMA funds pending	2024- 2029	>\$1 Million	Capital improve- ment funds/poten- tial funding through CT DOT for 1-95 Culverts	1

.iii.1	Implementation Matrix, Town of Fai	RFIELD								
Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
20	Determine whether the culvert at Merwins Lane can be replaced to increase capacity.	IF	CF	ST	ENG	Replacing culvert in kind with potential for increased capacity.	2024- 2029	>\$250K	Operating budget; staff to coordinate. May include knock out for future culvert. Using FEMA \$ to replace headwall.	3
21	Identify the next steps to set aside land for detention/watershed storage in the Rooster River watershed.	IF	CF	ST, NSP	ENG/ DPW	Rooster River watershed flood detention/stor- age study completed in 2019.	P: 2024 CON 2024- 2026	\$7-\$10 Million	ARPA and Bonding Bridgeport to con- tribute \$750 K for Fairchild Wheeler G.C. detention	9
22	Purchase 150 Villa Avenue parcel for open space and stormwater quality improvements which result in minor detention /conveyance improvements	IF, SST, WS	CF	ST, NSP	ENG/ DPW	Rooster River watershed flood detention/stor- age study completed in 2019.	P: 2023 CON: 2024	\$400K	Town used ARPA funds to purchase parcel.	-3
23	Conduct a feasibility study for elevating Fairfield Beach Road, including public outreach and incor- poration of public input.	IF, CF, SLR	CF	ST, ES	ENG, DPW, FECB, and OEM	Public outreach is to be included in Town Resiliency Plan. Existing staff has been too busy to have the action as a priority, however as funding is available, the town will pursue.	2024- 2029	>\$500K	Engineering Operating budget for existing staff and/or consultant	0
24	Conduct a study to determine the feasibility of extending the dike in Southport along Harbor Road (Perry's Green Bulkhead Repair to elev. 5.8)	CF	CF	ST	FECB/ ENG	DEEP permitting needed for construction. Coor- dination between state and town needed.	Con- struc- tion 2024	\$1.5 Million	ARPA	4
25	Utilize CIRCA Planning to pursue funding to alleviate flooding to the railroad underpasses.	CF, SLR, IF	NA	ST	ENG/ DPW	CIRCA completed study in winter 2023. Additional coordination needed with DOT	2025- 2030+	\$250K to \$1.4 Million	Possible coordination w/VT DOT for increased mobility and improved access.	2
	20 21 22 23 24	Determine whether the culvert at Merwins Lane can be replaced to increase capacity.  Identify the next steps to set aside land for detention/watershed storage in the Rooster River watershed.  Purchase 150 Villa Avenue parcel for open space and stormwater quality improvements which result in minor detention /conveyance improvements  Conduct a feasibility study for elevating Fairfield Beach Road, including public outreach and incorporation of public input.  Conduct a study to determine the feasibility of extending the dike in Southport along Harbor Road (Perry's Green Bulkhead Repair to elev. 5.8)	20 Determine whether the culvert at Merwins Lane can be replaced to increase capacity.  Identify the next steps to set aside land for detention/watershed storage in the Rooster River watershed.  Purchase 150 Villa Avenue parcel for open space and stormwater quality improvements which result in minor detention / conveyance improvements  Conduct a feasibility study for elevating Fairfield Beach Road, including public outreach and incorporation of public input.  IF, CF, SLR  Conduct a study to determine the feasibility of extending the dike in Southport along Harbor Road (Perry's Green Bulkhead Repair to elev. 5.8)  Utilize CIRCA Planning to pursue funding to allevi-	Determine whether the culvert at Merwins Lane can be replaced to increase capacity.    Determine whether the culvert at Merwins Lane can be replaced to increase capacity.    Identify the next steps to set aside land for detention/watershed storage in the Rooster River watershed.    Purchase 150 Villa Avenue parcel for open space and stormwater quality improvements which result in minor detention / conveyance improvements    IF, SST, WS   CF	Action  Action  Hazard Type New?* Type  Determine whether the culvert at Merwins Lane can be replaced to increase capacity.  Identify the next steps to set aside land for detention/watershed storage in the Rooster River watershed.  Purchase 150 Villa Avenue parcel for open space and stormwater quality improvements which result in minor detention /conveyance improvements  Conduct a feasibility study for elevating Fairfield Beach Road, including public outreach and incorporation of public input.  Conduct a study to determine the feasibility of extending the dike in Southport along Harbor Road (Perry's Green Bulkhead Repair to elev. 5.8)  With the next steps to set aside land for detention determine the feasibility of extending the dike in Southport along Harbor Road (Perry's Green Bulkhead Repair to elev. 5.8)	Determine whether the culvert at Merwins Lane can be replaced to increase capacity.  Determine whether the culvert at Merwins Lane can be replaced to increase capacity.  If CF ST ENG  Lidentify the next steps to set aside land for detention/watershed storage in the Rooster River watershed.  Purchase 150 Villa Avenue parcel for open space and stormwater quality improvements which result in minor detention /conveyance improvements  Conduct a feasibility study for elevating Fairfield Beach Road, including public outreach and incorporation of public input.  Conduct a study to determine the feasibility of extending the dike in Southport along Harbor Road (Perry's Green Bulkhead Repair to elev. 5.8)  Litilize CIRCA Planning to pursue funding to alleviting the state of the total study to determine the set of the state o	Determine whether the culvert at Merwins Lane can be replaced to increase capacity.   Implementation Process	Determine whether the culvert at Merwins Lane can be replaced to increase capacity.  Determine whether the culvert at Merwins Lane can be replaced to increase capacity.  Identify the next steps to set aside land for detention/watershed storage in the Rooster River watershed.  If CF ST, NSP DPW  Implementation Process  Replacing culvert in kind with potential for increased capacity.  2024-2029  Lidentify the next steps to set aside land for detention/watershed storage in the Rooster River watershed flood detention/storage study completed in 2019.  Purchase 150 Villa Avenue parcel for open space and stormwater quality improvements which result in minor detention / conveyance improvements  Conduct a feasibility study for elevating Fairfield Beach Road, including public outreach and incorporation of public input.  Conduct a feasibility study for elevating Fairfield Beach Road, including public outreach and incorporation of public input.  Conduct a study to determine the feasibility of extending the dike in Southport along Harbor Road (Perry's Green Bulkhead Repair to elev. 5.8)  CF ST ENG/	Determine whether the culvert at Merwins Lane can be replaced to increase capacity.  Determine whether the culvert at Merwins Lane can be replaced to increase capacity.  Identify the next steps to set aside land for detention/watershed storage in the Rooster River watershed.  IF CF ST ENG Replacing culvert in kind with potential for increased capacity.  221 Identify the next steps to set aside land for detention/watershed storage in the Rooster River watershed tention/watershed storage in the Rooster River watershed.  IF CF ST ENG/NSP DPW 2019.  222 Purchase 150 Villa Avenue parcel for open space and stormwater quality improvements which result in minor detention / conveyance improvements  IF, CF, ST, WS DPW	Determine whether the culvert at Merwins Lane can be replaced to increase capacity.    Purchase 150 Villa Avenue parcel for open space and stormwater quality improvements which result in minor determino / conveyance improvements which result in minor determino of public input.    Conduct a feasibility study for elevating Fairfield Beach Road, including public outreach and incorporation of public input.    Conduct a study to determine the feasibility of extending the dike in Southport along Harbor Road (Perry's Green Bulkhead Repair to elev. 5.8)    Conduct a fire opens whether the culvert at Merwins Lane can be replaced to increase capacity.   If CF   ST   ENG / NSP   ENG / NSP   ENG / NSP   ENG / Road determine the feasibility of extending the dike in Southport along Harbor Road (Perry's Green Bulkhead Repair to elev. 5.8)   CF   ST   ENG / Perry's Green

VI.7	VI.7.iii.1 IMPLEMENTATION MATRIX, TOWN OF FAIRFIELD  *** Deletion during public comment perio												
2019	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score		
NA	26	Secure funds to study feasibility of raising the bulk- head elevation along Pine Creek to protect against future Sea Level Rise	SLR, CF, IF	NA	ST	FECB/ ENG	Engineering should retain a consultant for this feasibility study if possible	2025- 2030	\$150K	Capital/Non-re- curring/Grant Funding	4		
17	27	Select one action from the Rooster River Water- shed Management Plan and secure funding for its execution. Focus on an action that has multiple hazard mitigation benefits. Detention Basins + 150 Villa Ave purchase.	IF	CF	st, Nsp	CON	CON dept to identify funds such as NOAA, NFWF, and EPA 319 grants. Harbor Watch to provide water quality monitoring.	2024- 2029	>\$400K	CON Oper. budget; staff to co- ordinate (to secure funds only).	6		
18	28	Conduct outreach and feasibility study for the conceptual dune ridge design that addresses the Penfield/Shoal Point area.	SLR	CF	ST, NSP	CON/ ENG / FECB	CON dept to identify funds such as NOAA, NFWF, and EPA 319 grants. Will working with FECB and Engineering. Public outreach conducted in spring 2024**	2024- 2029	\$100K- \$500K	Engineering Operating budget for existing staff and/or consultant	6		
NA	29	Continue to explore feasibility of off-shore methods to reduce wave impacts	SST, WS, SLR, CF	NA	NSP	FECB	On Hold – Part of 2024 Town of Fairfield Flood, Erosion and Resilience Plan Update	2024- 2025	\$400K	Capital/Non-re- curring grant	7		
NA	30	Tidal Marsh Restoration	SST, WS, SLR, CF	NA	NSP	CON	Increase tidal marsh flushing between Reef and Rowland Rds	2024- 2026	\$300K	Grant funds for design	8		
19	31	Train/equip neighborhood response teams for areas that have in the past been cut off from emergency services by floodwaters or downed trees, and to assist lower-income populations.	ALL	CF	ES	OEM/ CERT	EMD and CERTs will collaborate to accomplish action. Spring 2023 training completed.	2024- 2029	<\$100K	OEM Operating budget; existing staff to coordinate.	8		

\*CF=Carried Forward NA=New Action

VI.7.iii.1 Implementation Matrix, Town of Fairfield											
2019	Ds 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
20	32	Develop tree planting guidelines that are aligned with hazard mitigation goals.	WF, SST, WS, EC, EH	CF	PP	DPW/ CON	CON dept, DPW & SF will develop guidelines for native tree species on town properties. Guidance from the State's "Right Tree Right Place" will be used when planning new trees. Will coordinate with the group 'Fairfield Trees'.	2024- 2029	<\$100K	DPW Operating budget; existing staff to coordinate.	9
NA	33	Co-host Education Workshop and update on Rooster River Flood Mitigation study and projects with Fairfield and Bridgeport residents	IF	NA	PP	ENG	Engineering Dept. to work with Bridgeport staff and consultant. Public engagement has started. Town plans to continue with educa- tion/updates. Seeking easements. The town hosted a public meeting Sept 2023.	2024- 2029	<\$100K	Engineering Operating budget; existing staff to coordinate	3
21	34	Conduct a feasibility study for elevating Turney Road, including public outreach and incorporation of public input.  Unlike the Riverside Drive/Ash Creek study, this action should directly involve emergency management personnel.	IF, CF, SLR	CF	ST, ES	CON, ENG, FECB, and OEM	Elevating Turney Rd partly addressed during public engagement for Riverside Drive/Ash Creek flood protection study. Past effort will be used to initiate study. Consultant services may be secured for further evaluating feasibility and engaging the public. The project is starting to fix culverts in 2024.	2024- 2029	>\$500K	Engineering Operating budget, seeking grant options.	3

\*CF=Carried Forward NA=New Action

VI.7.iii.1 Implementation Matrix, Town of Fairfield											
2019	Ds 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
22	35	ID need for generators at senior housing and other complexes that serve vulnerable populations to allow them to shelter in place	ALL	CF	ES, PP	OEM/ DPW	Assigned staff should begin securing funds early in the lifespan of the plan update.	2024- 2029	>\$1 Million	FEMA HMA, DHS preparedness grants	7
24	36	Enhance flood protection at the DPW (immediate and surrounding areas) garage or consider feasibility of moving garage to an alternate location.	IF, CF, SLR, SST, WS	CF	ST, PP	DPW	DPW will commence this action with a feasibility study that addresses flood protection vs. relocation.	2024- 2029	\$100K- \$500K	DPW Operating budget for existing staff and/or con- sultant	12
25	37	Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.	IF, CS, SLR, SST, WS, HHS	CF	PR, EA	PZ	Coordinate directly with CT DEEP on this state- wide initiative. Town will place outreach informa- tion in local newsletter.	2024- 2029	<\$100K	P/Z Operating budget; existing staff to coordinate.	8
26	38	Secure funding from SHPO to conduct a historic resources survey focusing on potential historic resources in coastal flood risk areas.	CF	CF	PP	PZ	Coordinate directly with CT SHPO on this statewide initiative. Town is aware of ConCris Viewer.	2024- 2029	<\$100K	P/Z Operating budget; existing staff to coordinate (action is to secure funds only).	4
27, 28, 29	39	Work with CT DEEP to complete a formal validation of the RL list and update the mitigation status of each listed property, Contact the owners of RL 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. Coordinate with CRS participation, and contact the owners of properties that experience frequent flooding (which may not be RL properties) to suggest options for mitigating flooding. This should be accomplished with a letter directly mailed to each property owner.	ALL	CF	PP	PZ	Coordinate directly with FEMA region 1. Conduct in connection with CRS participation.	2026	<\$100K	Planning and Zoning operating budget; existing staff to coordinate.	8

VI.7	VI.7.iii.1 Implementation Matrix, Town of Fairfield										
	Ds 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
30	40	Achieve additional objectives associated with the Sustainable CT program, focusing on those aligned with hazard mitigation.	ALL	CF	PR, NSP	SF	Encourage the existing volunteer committee to achieve additional actions, with direction to focus on those aligned with hazard mitigation. On going. The town anticipates utilizing the MetroCOG hosted Sustainable CT Intern in 2024 to achieve additional actions.	2024- 2025	<\$100K	Operating budget; existing staff to coordinate.	5
31	41	Work with USGS or NOAA to establish a tide gauge in Long Island Sound to provide real-time water level data. The nearest USGS gauge is in Stamford and the nearest NOAA gauge is in Bridgeport.	SLR, CF, IF	CF	ES	ENG/ OEM	Requires considerable coordination including NOAA and USGS, as both agencies host tide gauges in LI Sound. Tide gage markings installed in South Benson Marina area and FBR sewer pump station captured by CCTV for 24-hour remote monitoring that allows early warning to OEM. Significant funding needed and will be explored as opportunities become available.	2024- 2029	<\$100K	Operating budget; existing staff to co- ordinate. Funding for execution will be addressed in future updates.	9
32	42	Develop a written plan for inspection of Town- owned bridges that may experience scour during flood events. The plan should set a timeframe for inspections after floodwaters have receded.	CF, IF	CF	ST	DPW/ ENG	DPW and Engineering will collaborate. Process instituted after every 10-year+ rainfall storm event. Written plan for scour created and will update as needed, as required by state. Action plan portion completed.	2024- 2029	<\$100K	DPW operating budget; existing staff to coordinate.	11

VI.7	VI.7.iii.1 Implementation Matrix, Town of Fairfield										
2019	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
33	43	Provide suggested "code plus" strategies to make structures more resilient to wind when applications are processed for elevating buildings.	EQ, STS, SST,	CF	PP	В	The Building Department staff will commence this action in the next fiscal year and then make it common practice.	2024- 2025	<\$100K	Building operating budget; existing staff to coordinate.	7
NA	44	Explore the option of working with UCONN Climate Corps intern to map flood-compliant and non-flood-compliant structures in the flood zone	CF, IF	NA	PP, PR & ES	FECB w/PZ and ENG	14-week work intern work period with a presentation & mapping provided at the end	2024- 2029	\$5K	NA	9
NA	45	Discussions with Aquarion Water to develop resident notification plans for properties that lie within the inundation zones from a dam failure.	DF	NA	PP, PR ES	FD/ AW	Aquarion is working through their corporate process to approve messaging	2024- 2029	No cost	On-going/Annual	9
NA	46	Pursue Funding for Railroad underpass automatic flood barrier system	IF, CF, SLR, SST, WS	NA	PP	DPW	The town is actively looking for funding options through various channels, such as PROTECT	2025	\$250K per install	TBD- likely DPW operating budget	7
NA	47	During extreme temperature events, publicize the locations of cooling and warming centers .	EH, EC, WS	NA	PR	OEM	OEM to work with departments/local media to publicize information.	2025- 2029	<\$100K	Dept. oper. budget; staff to coordinate	6
NA	48	Conduct critical facility assessments for resilience to earthquakes	EQ	NA	PR, PP	DPW	As funding/staffing becomes available, will prioritize sites.	2025- 2029	\$100K- \$500K	Dept. oper. budget; staff to coordinate (to identify \$ only).	4
NA	49	Evaluate opportunities for vegetation management on municipally owned land and specific private properties (water company lands, conserved lands) to reduce vulnerability to wildfires. Includes phragmites removal in coastal areas.	WF	NA	NSP, PR	DPW	As funding and staffing becomes available, the Town will integrate these practices into departmental operations.	2024- 2029	<\$100K	Dept. oper. budget; staff to coordinate (to identify \$ only).	5

1-5 = Priorities

\*CF=Carried Forward NA=New Action

\*\*S-E Score=STAPLE+E, see Appendix G

VI.7	.iii.1	IMPLEMENTATION MATRIX, TOWN OF FAI	RFIELD					*** A	Addition duri	ing public comment p	eriod
2019	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
NA	50	Utilize Sustainable CT actions and best practices for landscaping practices to reduce water usage and the vulnerability of vegetation to drought.	DR	NA	NSP, PR	DPW,	As funding and staffing becomes available, Fairfield will distribute material to residents.  MetroCOG hosts a Sustainable CT intern over the summer who can assist with activity.	2024- 2029	<\$100K	Dept. oper. budget; staff to coordinate	8
NA	51	Evaluate use of microgrids and utility protection/ hardening for resilience to severe storms and winter storms.	HTS, WS, SST	NA	ST	DPW, CON	As funding and staffing becomes available, Fairfield will prioritize sites for future improvements.	2024- 2029	>\$1 million	Dept. oper. budget; staff to coordinate (to identify \$ only).	8
NA	52	Conduct study of Ash Creek sedimentation to determine if sedimentation will enhance longevity, stability, and sustainability of the ecosystem.  Seek funding to implement habitat restoration and nature based solutions/living shoreline in Ash Creek tidal estuary, examine feasibility of thin layer deposition to address erosion and ecosystem collapse at Sand Spit and Great Marsh Island.***	CF, SLR	NA	ST	DPW, CON	Town will collaborate with CTDEEP and NGOs (Ash Creek Conservation Association and Save the Sound) to examine opportunities to raise the wetland through thin layer deposition. If necessary, consultant will be secured.	2024- 2027	\$1.5 Million	Dept. oper. budget; staff to coordinate. \$600K has been awarded to Save the Sound.	2
NA	53	Continue to identify areas of erosion along Ash Creek that may require mitigation and secure fund- ing for feasibility studies.***	CF, SLR, HTS	NA	ST	DPW, CON	Ash Creek Estuary Master Plan was updated in 2023. The Town will coordinate with ACCA and City of Bridgeport on similar protection and restoration efforts that occurred during the 2019-2024 plan.	2024- 2027	<\$ 100K	Dept. oper. budget; staff to coordinate	2

1-5 = Priorities

\*CF=Carried Forward NA=New Action

\*\*S-E Score=STAPLE+E, see Appendix G

#### VI.7.iv MONROE

The Town of Monroe continues proactive maintenance of culverts and keeping debris out of streams to protect ecosystems and ensure erosion prevention. In addition, the Town continues to encourage residents to use alternate routes in areas prone to flooding during flood events via public service announcements, notices, and postings on the Town web site. Future projects will be informed by a town-wide hydrologic analysis of flooding, stormwater, and water conveyance needs. Due to a problematic beaver dam at Sammis Brook, a hydraulic study is also planned for this area to determine if improvements are needed to reduce flood risk.

The Town of continues to improve coordination between the Department of Public Works and local "Make Safe" utility crews before, during and after a high wind or storm event. This coordination ensures that resources are allocated to priority locations, downed trees and limbs are cleared from roads and the ultimate restoration of power to homes and businesses. Communication with residents who may become isolated because of downed tree limbs continues. To further reduce risk, the Town plans to update their Subdivision Regulations to address tree heights and identify appropriate street trees.

DEPARTMENT ABBREVIATIONS								
Code Department								
DPW Department of Public Works								
ECD Economic & Community Developm								
EM	Emergency Management							
ENG Engineering Department								
PZ	Planning & Zoning Department							

In the past, the Town has installed generators at the Town Garage, Jockey Hollow Middle School, all town shelters, the EOC, the Senior Center, and Fairway Acres (senior housing complex). In the 2024-2029 planning period, Monroe has prioritized installation of a generator at the high school which will allow it to serve as a shelter during emergencies for both residents and those from neighboring communities.

Actions are listed in Table VI.7.iv.1. Abbreviations are listed above/right.

MITIGATION ABBREVIATIONS								
Code	Mitigation Type							
EA	Education & Awareness							
ES	Emergency Services							
NSP	Natural Systems Protection							
PP	Property Protection							
PR	Prevention							
ST	Structural/Infrastructure							

Hazari	O <b>A</b> BBREVIATIONS
Code	Hazard
ALL	All Hazards
CF	Coastal Flooding
DF	Dam Failure
DR	Drought
EQ	Earthquake
EC	Extreme Cold
EH	Extreme Heat
HTS	Hurricanes & Tropical Storms
IF	Inland Flooding
SLR	Sea Level Rise
SST	Summer Storms & Tornadoes
WF	Wildfires
WS	Winter Storms

VI.7	VI.7.iv.1 Implementation Matrix, Town of Monroe										
	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
4	1	Conduct a townwide hydrologic analysis that addresses flooding, stormwater, and water conveyance needs to identify projects that can be implemented to reduce risks to infrastructure and people.	IF, HTS, WS, SST	CF	ST	ENG	Study has been in the CIP for several years but not conducted due to budgetary constraints. The Engineering Dept will secure funding and execute project in 2024	2024- 2029	\$100K- \$500K	Town capital funds combined with grant funds	17

VI.7	VI.7.iv.1 Implementation Matrix, Town of Monroe										
2019	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
6	2	Acquire and install a generator for the high school that enables its use as a shelter.	ALL	CF	ES, PP	DPW	The Town will secure funds and prioritize this installation in less than 5 years.	2024- 2029	>\$1 Million	FEMA HMA and DHS preparedness grants	15
9	3	Prepare a hydraulic study of the part of Sammis Brook where a beaver dam has been a problem in the past, and determine if improvements are need- ed to reduce flood risk.	IF	CF	ST	ENG	The necessary scope of this evaluation is believed understood. The Engineering Department will secure the appropriate funds and either complete internally, or retain a consultant for the study.	2024- 2029	<\$100K	Town capital funds combined with grant funds	11
10	4	Address (in the Subdivision Regulations) tree heights and appropriate street trees.	EH EC, WF, SST, WS, HRT	N	PP	PZ	The town anticipates using Right Tree Right Place standards that have been suggested from DEEP Forestry for management standards, as well as maintaining a regular maintenance schedule for tree health	2024- 2029	<\$100K	Town operating budget for staff resources plus allocation for consultant services during POCD update.	14
12	5	Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.	ALL	N	PR	ECD	Coordinate directly with CT DEEP on this statewide initiative on an annual basis.	2024- 2029	<\$100K	Operating budget; existing staff to coordinate.	12
5	6	Implement one additional project identified in the watershed management plan, with a focus on flood risk reduction.	IF, SLR, WS, SST	CF	PR, NSP	DPW	Town has made progress. A 319 grant was secured for a stream buffer enhancement project w/in the last 5 years. Additional projects are desired outside the 319 program resources. The Town has experience and will apply for additional funds.	2024- 2029	\$100K- \$500K	Town capital funds combined with 319 grant funds	7

		MPLEMENTATION MATRIX, TOWN OF MO	l								
2019	Ds 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
11	7	Consider the costs and benefits associated with registering in the Sustainable CT program, which includes some objectives aligned with hazard mitigation.	ALL	N	PR, NSP	PZ	The town will be reaching out to neighboring towns such as Fairfield and Trumbull to seek advice about the program. Estimate staff and volunteer time to enter the program and remain in the program. Monroe will use MetroCOG interns to help identify areas that are eligible for points.	2024- 2029	<\$100K	Operating budget; existing staff to coordinate.	7
13	8	Secure funding from SHPO to conduct a historic resources survey focusing on potential historic resources in flood risk areas.	IF, SLR, WS, SST	N	PP	PZ	Annually coordinate directly with CT DEEP on this statewide initiative.	2024- 2029	<\$100K	Operating budget; staff to coordinate (action to secure funds only).	5
NA	9	During extreme temperature events, publicize the locations of cooling and warming centers .	EH, EC, WS	NA	PR	EM	OEM to work with departments/local media to publicize information.	2025- 2029	<\$100K	Dept. oper. budget; staff to coordinate	6
NA	10	Conduct critical facility assessments for resilience to earthquakes	EQ	NA	PR, PP	DPW	As funding/staffing becomes available, will prioritize sites.	2025- 2029	\$100K- \$500K	Dept. oper. budget; staff to coordinate (to identify \$ only).	4
NA	11	Evaluate opportunities for vegetation management on municipally owned land and specific private properties (water company lands, conserved lands) to reduce vulnerability to wildfires.	WF	NA	NSP, PR	DPW	As funding and staffing becomes available, the Town will integrate these practices into departmental operations.	2024- 2029	<\$100K	Dept. oper. budget; staff to coordinate (to identify \$ only).	5

**1-5 = Priorities**\*CF=Carried Forward N=New
\*\*S-E Score=STAPLE+E, see Appendix G

VI.7	VI.7.iv.1 Implementation Matrix, Town of Monroe										
2019	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
NA	12	Utilize Sustainable CT actions and best practices for landscaping practices to reduce water usage and the vulnerability of vegetation to drought.	DR	NA	NSP, PR	DPW	As funding and staffing becomes available, City will distribute material to residents. MetroCOG hosts a Sustainable CT intern over the summer who can assist with activity.	2024- 2029	<\$100K	Dept. oper. budget; staff to coordinate	8
NA	13	Evaluate use of microgrids and utility protection/ hardening for resilience to severe storms and winter storms.	HTS, WS, SST	NA	ST	DPW	As funding and staffing becomes available, Monroe will prioritize sites for future improvements.	2024- 2029	>\$1 million	Dept. oper. budget; staff to coordinate (to identify \$ only).	8

**1-5 = Priorities** \*CF=Carried Forward N=New \*\*S-E Score=STAPLE+E, see Appendix G

#### VI.7.v STRATFORD

Since the 2019 NHMP Update, the Town of Stratford has implemented a number of recommendations. The culvert and bridge at Old Spring Road were replaced. A project to increase the width of the channelized stream downstream of Broadbridge Avenue was completed; a portion of the existing concrete channel was removed in favor of a naturally sloped stream bank. The West Broad Street project was also completed, and flooding has been reduced in the area.

Although this momentum continues, permitting and rights-of-way (ROW) requirements have caused delays to both design and implementation. The design for Bruce Brook culvert/channel improvements at Bowe Avenue is close to complete, but future improvements at Barnum Avenue will have to address ROW issues. The Town has one permit to secure for a project at Surf Avenue before construction can begin. Coordination with the Connecticut Department of Transportation regarding issues on state roads continues. The TIME project will improve travel times on the Metro North New Haven line; some drainage improvements to underpasses in Stratford will be integrated into this project, but not all the problematic intersections on state ROWs are currently included. Overall, drainage improvements are necessary to address flooding at multiple state and local intersections. Each intersection must be carefully evaluated as the cause of flooding varies, including blue-sky flooding due to extreme high tides, heavy rains, and coastal storm surge.

The Town continues to promote the Stratford Electronic Notification System and trains residents how to register for the system. Other efforts to note include, floodproofing at the South End Community Center will be underway as we enter the design phase, and funding

has been secured for an emergency generator at Bunnell High School therefore enhancing its use as an emergency shelter.

In the 2024-2029 NHMP cycle, Stratford will be conducting several studies focused on mitigating specific hazards. Currently in its initial phase, a drainage study will identify strategies to mitigate some of the inland flooding issues in the South End neighborhood. FEMA BRIC funds have been finalized for a Repetitive Loss Area Analysis. Numerous studies have been completed with final recommendations that will mitigate damage from natural hazards, if funding is secured. Coastal flooding in the South End was a focus of Phase III of Resilient CT, and mitigation strategies were identified through this project. The Town continues to implement recommendations from the 2016 Coastal Resilience Plan and maintains their CRS Class 8 rating.

Actions are listed in Table VI.7.v.1 on the next page(s). Abbreviations are listed to the right.

MITIGATION ABBREVIATIONS								
Code	Mitigation Type							
EA Education & Awareness								
ES	Emergency Services							
NSP	Natural Systems Protection							
PP	Property Protection							
PR	Prevention							
ST Structural/Infrastructure								

HAZARI	Hazard Abbreviations									
Code	Hazard									
ALL	All Hazards									
CF	Coastal Flooding									
DF	Dam Failure									
DR	Drought									
EQ	Earthquake									
EC	Extreme Cold									
EH	Extreme Heat									
HTS	Hurricanes & Tropical Storms									
IF	Inland Flooding									
SLR	Sea Level Rise									
SST	Summer Storms & Tornadoes									
WF	Wildfires									
WS	Winter Storms									

DEPARTMENT ABBREVIATIONS							
Code	Mitigation Type						
В	Building						
С	Conservation						
E Engineering							
EM Emergency Management							
Н	Health						
IT	Information Technology						
M	Mayor						
P Planning							
PW	PW Public Works						

VI.7	.v.1 Ir	mplementation Matrix, Town of Stra	*** Addition during public comment period								
	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
3 & 9		Pursue funding to mitigate existing/future risks to the South End, the adjacent commercial and industrial area, and Lordship as identified in POCD based on findings/ feedback from Phase III of Resilient CT. Funds may be used to reconstruct drainage systems, install flood control systems and/or elevate/extend seawalls as necessary. *** Includes 2019 action #9: "Secure funding to design/build twin 6' X 8' box culvert and tide gate to allow tidal flushing & preventing flooding along Lordship Blvd"	CF, SLR	CF	ST, PP	E, P	Apply for FEMA BRIC funds (and other sources as announced) to design, permit, and construct recommended projects.	2024- 2029	>\$1 Million	Dept. op. budget for staff coordi- nation (to secure funds). FEMA BRIC for implementation.	14
10	2	Pursue funding to evaluate the feasibility of daylighting of streams and prioritize actions to reduce hazards.	IF	CF	ST, NSP	E, PW	Town to leverage experience with Tanners Brook (2019) to evaluate if other streams can be partially restored by removing channelized sections.	2024- 2029	<\$100K	Dept. op. budget for staff coordi- nation (to secure funds only).	10
4	3	Maintain a list of properties that have experienced repetitive loss from storms and flooding (with owner interest for future acquisition) and pursue open space funding as it becomes available. Acquire properties based on this list (this action calls for list development and applications for funding in the timeframe of this plan).	CF, IF, SLR, DF	CF	NSP	Е, Р	Utilize RLAA and recently released survey to maintain the list. Recommended mitigation measures from Coastal Resiliency Plan to inform sites prioritization, what properties for acquisition, and developing funding applications.	2024- 2029	<\$100K	Dept. op. budget for staff coordina- tion; staff to coor- dinate to secure funds only).	9

**1, 6-9: Priorities** \*CF=Carried Forward N=New \*\*S-E Score=STAPLE+E, see Appendix G

VI.7	.v.1 In	mplementation Matrix, Town of Stra	ATFORD								
	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
20	4	As South End neighborhood drainage study progresses, identify opportunities to mitigate impacts from inland flooding, in order of priority:  Area 1: Wellington St/Benton St; Benton St; Masarik Ave, Stratford Ave & Bruce Ave; Orange St, Columbus Ave, & Roosevelt Ave; & Woodend Rd/Old South Ave.  Area 2: Hamilton Ave Area 3: Woodend Rd/Old South Ave; Frash Pond Intersections at Honeyspot Rd & Fotch St; Mount Carmel Ave & Shaw St flood less regularly.	IF	CF	PP	Е, Р	Kickoff began early 2024. Upon completion of study, will pursue implementation funding for priority Areas 1, 2, & 3, which are intersections or streets that regularly experience flooding.  Those with less regular flooding to be completed after Areas 1, 2 & 3.	2024- 2029	<\$20 Million	Dept. op. budgets for staff to coor- dinate & secure funds for enhanced equipment.	9
37, 38 & 39	5	Conduct the BRIC-funded Repetitive Loss Area Analysis (RLAA). The RLAA will include a formal validation of the RL list and outreach to RL property owners and nearby properties (via direct mailings). The results of this study will enable to Town to then pursue additional funding based on the highest priorities outlined in the study.	CF, IF, SLR, DF	CF	PP	Р	RLAA will follow Activity 510 of CRS Manual. Staff will advertise RFP to solicit proposals. Consultants will work with CT DEEP to update and validate list. Direct mailings will inquire about actions undertaken and recommendations for mitigation. Priorities set using a systematic approach for evaluating the feasibility of FEMA-approved mitigation activities, including a BCA.	2024- 2029	<\$100K	Dept. op. budget for staff coordina- tion.	8
5	6	Construct multiple culverts and channels on Surf Avenue at the I-95 overpass along with the flood wall to reduce chronic coastal flooding.	CF, SLR	CF	ST	Е, Р	The Town has one more permit to secure. Some funding has been appropriated.	2024- 2026	<\$100K	Dept. oper. budget for staff coordina- tion (to secure \$ only).	12

1, 6-9: Priorities

\*CF=Carried Forward N=New

\*\*S-E Score=STAPLE+E, see Appendix G

VI.7	.v.1 In	mplementation Matrix, Town of Stra	ATFORD								
	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
8	7	Finalize design and implement flood protection measures around the wastewater treatment plant by raising the existing flood control berm.	CF, SLR	CF	ST	E, PW	Project is in design and will be bid out through a competitive selection process.	2024- 2027	>\$2.5 Million	CDBG/FEMA PDM for construction. Staff to coordinate through dept. oper. budgets.	15
13		Reduce I/I through execution of projects utilizing the Clean Water Act grant funds.	CF, IF, SLR	CF	ST	E, PW	The Town will utilize a past study to continue determining the areas where Inflow and Infiltration can be reduced as part of future CWA-funded projects.	2024- 2029	>\$1 Million	Clean Water Act funds.	16
17 & 22		Prioritize floodproofing needs as part of municipal building updates. Includes raising equipment and generators and installing projectile-proof windows where necessary.	CF, IF, SLR	CF	PP	PW, IT, M, E	Utilize the Town's Continuing Operations Plan to prioritize needs and pursue funding for highest priority buildings as they are being updated. Complete floodproofing the South End community center as part of a larger renovation project (underway). Identify funding sources to floodproof the animal shelter. Pursue funds from FEMA and other mitigation and preparedness grant programs.	2024- 2029	<\$100K	Dept. op. budgets for staff to coor- dinate & secure funds for enhanced equipment.	12
19	10	Implement the best approach to maintain the functionality of the Birdseye boat ramp under flooded conditions to ensure continued use during disasters.	CF, SLR	CF	ES	PW, EM	Implement consultant recommendations; EMS Department is currently seeking approval from CTDEEP and the Town Council.	2024- 2029	<\$1 million	Capital improve- ment funds	4

1, 6-9: Priorities

\*CF=Carried Forward N=New

\*\*S-E Score=STAPLE+E, see Appendix G

2019	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
25	11	Pursue funding to address the impacts of hazards on natural areas, focusing on individual studies for Roosevelt Forest, Booth Memorial Park, Far Mill River, and Wooster Park. The studies should identify ways to enhance defensive/protective features for additional flood protection in the long term.	CF, IF, SLR, DF	CF	NSP	Е, С	As funding opportunities for mitigation and resilience are announced, staff will submit applications. If awarded, staff to determine if study should be conducted in-house or by consultants.	2024- 2029	\$100K- \$500K	Combination of dept. op. budget (for staff to secure funds) and other funds (NOAA, CIRCA, etc.) to conduct a study	6
1	12	Develop comprehensive stormwater regulations for the Town Center's TOD area that address quality and quantity control measures including MS4 requirements and LID techniques.	IF	CF	PR	Е, Р	Develop regulations based on model storm- water ordinance that will be released by the State.	2024- 2029	<\$100K	Dept. op. budgets for staff to coor- dinate	8
2	13	Elevate homes to meet or exceed FEMA requirements for Base Flood Elevation (Lordship area).	CF, IF, SLR	CF	PP	E, P	Assist homeowners with securing/implementing FEMA grants and other funding. Staff to utilize lessons learned from past grants to assess feasibility of application.	2024- 2029	>\$1 million	FEMA HMA	6
6	14	Complete the design for the Bowe Avenue portion of the culvert and channel improvement project along Bruce Brook. Secure construction funds for culvert and channel widening upstream and downstream of Barnum Avenue (RR tracks to Barnum Avenue and Barnum Avenue culvert).	IF	CF	ST	E, P	ROW issues to be addressed before Phases I & II of design can be completed. Staff will identify/apply for construction funding as future phases announced.	2024- 2029	\$12 million	Dept. op. budget for staff coordi- nation (to secure funds only).	10
12	15	Pursue funding to complete the bridge project to elevate Broad Street over Ferry Creek.	CF, SLR	CF	ST	E, PW	Town in permitting phase; working to identify funding sources for implementation.	2024- 2026	<\$100K	Dept. op. budget for staff coordi- nation (to secure funds only).	8

**1, 6-9: Priorities** \*CF=Carried Forward N=New \*\*S-E Score=STAPLE+E, see Appendix G

VI.7	.v.1 In	mplementation Matrix, Town of Stra	ATFORD								
	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
16	16	Provide emergency preparedness information and on-site Stratford Electronic Notification System instructions to Oronoque Village residents. Acquire additional equipment to provide enhanced emergency management related to the development.	ALL	CF	ES	ЕМ, Н	Health Department provides preparedness information; EM staff to periodically provide on-site instructions on enrolling in the system for timely emergency notifications. EMD to identify funding for equipment needs.	2024- 2029	<\$100K	Dept. op. budget for staff coordi- nation to secure funds for enhanced equipment.	4
21	17	Mitigate bank erosion at Diane Terrace and engage private properties on that street.	CF, SLR	CF	ST	E, PW	Town to include in CIP. Will schedule design, permitting and con- struction in the order of prioritized capital improvements	2024- 2029	>\$1 Million	Capital improve- ment funds	0
23	18	Conduct a study to evaluate larger-scale resilience improvements in the Lordship area, including the feasibility of modifications to the seawall to increase its resilience to future storms.	CF, SLR	CF	ST	E, PW	As funding opportunities are announced, staff will apply. If awarded, staff to determine if study should be conducted inhouse or by consultants. Study must evaluate private property impacts in area.	2024- 2029	\$100K- \$500K	Combination of dept op. budget (to secure funds) and other funds (NOAA, CIRCA, etc.) to conduct study	2
26	19	Educate private land owners about the importance and benefits of maintaining and leaving vegetation in place to stabilize riverbanks	CF, IF, SLR	CF	PR, EA	С	Town will maintain and evaluate the effective- ness of this program, which includes flyers and discussions at public events. Additional opportunities to promote program to be identified.	2024- 2029	<\$100K	Dept. oper. budget for staff coordina- tion	6

**1, 6-9: Priorities** \*CF=Carried Forward N=New \*\*S-E Score=STAPLE+E, see Appendix G

VI.7	VI.7.v.1 Implementation Matrix, Town of Stratford										
	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
27	20	Address bank stabilization issues at the outfall easements at Russian Beach.	CF, SLR	CF	ST, NSP	Е, С	Staff to pursue funds from mitigation/resiliency grants in immediate easement area. Due to private property issues, need to engage legal counsel for landowner coordination - to be evaluated as needed.	2024- 2029	\$100K- \$500K	Dept. oper. budget for coordination	3
28	21	Conduct the urban forestry plan and implement recommendations. Develop an ordinance that mandates a tree replanting program/schedule in accordance with "right tree, right place" policy.	HTS, D, WS, EH, SST	CF	PP	PW	The Town's Tree Warden coordinate the management plan and will utilize recommendations to develop an ordinance.	2024- 2029	<\$100K	IRA funds through US Forest/Arbor Day foundation. Dept. op. budgets for coordination.	9
29	22	Develop, adopt, and implement a PPI as part of the Town's participation in the CRS program. This PPI will serve as a guide in educating general public and local officials on all types of hazards.	CF, IF, SLR, DF	CF	PR	Р	If staffing allows, will develop schedule and outreach plan for adoption by the Town.	2024- 2029	<\$100K	Dept. oper. budget for coordination	7
30	23	Update the evacuation plans and make these routes available on the Regional GIS system. Make evacuation routes available on the Town's website.	ALL	CF	ES	EM	New Town website recently released. EMS will work with Fire/Police Depts; MetroCOG to update plans and make routes available on the existing Regional GIS and as website is optimized.	2024- 2029	\$100K- \$500K	Dept. op. budget for staff coordina- tion	4
31	24	Pursue funding to provide adequate back-up power to Birdseye Municipal Complex, Flood Middle School, Stratford Housing Authority units, and the Baldwin Senior Center; and to make improvements to the existing generator at Stratford Fire Station .	ALL	CF	ES, PP	PW	Plans exist for imple- mentation over a 2-3 year timeline, and for updated maintenance of current generators. Generators will be installed at other sites as funding is available.	2024- 2027	>\$1 Million	FEMA HMA & pre- paredness grants	7

1, 6-9: Priorities

VI.7	VI.7.v.1 Implementation Matrix, Town of Stratford										
	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
32	25	Pursue funding to update evacuation plans to factor lack of access to transportation routes during peak events such as a severe hurricane, and display them using digital signage at select locations. Identify additional means of notification for voluntary and mandatory evacuation orders due to limitations of digital signage.  The Town has used digital signage for events and warnings and has obtained a new digital sign, but signs are limited to a small number of characters, which prevents the display of detailed information. For those not heeding voluntary or mandatory, National Guard unit may be called in to evacuate in the areas of highest risk.	HTS, CF, IF, SLR, SST	CF	ES, PR	EM	Fire, police and health utilize Stratford Electronic Notification System for pre-event notifications warning people about dangers of waiting too long to evacuate. The Town currently has a multi-tiered approach to creating a communication flow with residents. Town's EMS works with CAO's office to disseminate messages through social media.	2024- 2029	\$100K- \$500K	Dept. oper. budget for coordination	6
33	26	Develop and train a CERT team to provide support in sheltering and mass care activities. The Town's EMS Department has goals to re-focus on this program to determine usage, how to keep CERT members engaged, how to train and recruit CERT members, etc.	ALL	CF	ES	EM	The Town's Emergency Operation Plan has updated to delineate CERT's function. Plan will be utilized to develop training and optimize response functions of emergency services.	2024- 2029	<\$100K	Dept. oper. budget for coordination	7
35	27	Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.	HTS, CF, IF, SLR, DF	CF	PR	P, EM	Town will coordinate directly with CT DEEP on this statewide initiative.	2024- 2029	<\$100K	Dept. oper. budget for coordination	8
NA	28	Follow up Surf Ave culvert project with improvements to I-95 unnamed stream to clear of vegetation and sediment from Surf to Honeyspot Rd and widen culverts at Stagg St and Moffit St. and Stagg St and at I-95 intersection.	CF, IF, SLR	Ν	PR, NSP	Е	Town to request funding from CT DOT for channel improvements and will appropriate funding for road culvert crossings. May be phased beginning with Stagg St to Surf Ave, then Moffit St to Stagg St.	2030	\$2.5 Million	CTDOT & local capital funds.	8

		mplementation Matrix, Town of Stra	ATFORD								
	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
NA	29	Coordinate with CTDOT on an interim project to address extreme high-tide flooding on Main Street/CT-113 between Dorne Drive and Sniffens Lane (near the airport runway), which will address weekly blue-sky flooding issues caused by regular high-tides. A longer-term project (recommended by the CIRCA study) is installation of a down-stream berm which will address weekly blue-sky flooding issues caused by regular high-tides and less frequent coastal flooding events.	CF, SLR	N	ST	Е	Town has requested CTDOT correct chronic flooding that should have been addressed upon completion of a road realignment several years ago. Town and DOT to pursue funding and permit consensus for recommended larger scale flood control berm/gates project.	2025	>\$300K	CTDOT funds	7
NA	30	Install tide-gate and outlet pipe at Marine Basin to prevent tidal flooding at Dorne Drive and Short Beach Road intersection.	CF, SLR	N	ST	E	Pipe located within EPA Superfund site at landfill; Town will work with EPA on implementation.	2027	>\$300K	Capital improve- ment funds	4
NA	31	Coordinate with CTDOT on the New Haven Line TIME Phase 1 project (0300-0214) The purpose of this project is to provide high-speed service on MNSP's New Haven Line. As part of the project's bridge improvement components, CTDOT is anticipated to address the following issues in Stratford	CF, IF, SLR	N	ST	E	CTDOT considering lowering road to provide clearance. Would require installing a pump station to drain underpass.	2026	\$25 Million	State & federal transportation funds	10
NA	32	Bruce Brook capacity improvements from the rail-road tracks south to 195	IF	N	ST	Е	Town has requested CTDOT evaluate the RR culvert and consider replacing as part of the bridge replacement project. Town and CTDOT will pursue funding for state culverts at CT-130 and I-95, and stream improvements.	2027	>\$40 Million	CTDOT funds supplemented by Stratford Bridge- port capital funds	6

**1, 6-9: Priorities** \*CF=Carried Forward N=New \*\*S-E Score=STAPLE+E, see Appendix G

VI.7	.v.1 In	mplementation Matrix, Town of Stra	ATFORD								
	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
NA	33	Coordinate w/the state on frequently flooded intersection on state roads: including: Barnum Ave Cutoff (Rte 1) and & East Main Street (Rte 110) and Nichols Ave (Rte 108) & Barnum Ave (Rte 1)	CF, IF, SLR	N	ST	Е	The Town will request CT DOT evaluate solutions to flooding on state roads and develop projects for mitigation. Cost is dependent on number of intersections.	2028	\$500K- \$1 Million	CTDOT funds	5
NA	34	Conduct drainage improvements at local intersections that experience periodic flooding, including Jefferson St and & Stratford Rd; Milford Ave and & Rockwell Ave; Luanne Rd and & surrounding areas; and Nichols Ave and & Van Buskirk Ave.	IF	N	ST	Е	Town will evaluate solutions to flooding on local roads, develop projects for mitigation and seek funding to implement.	2028	\$500K- \$1 Million	Capital improve- ment funds	4
NA	35	Select one recommendation from the Bruce Brook Watershed Plan to improve water quality and alleviate flooding, and secure funding.	IF	CF	ST, NSP	PW, P	As the Bruce Brook plan nears completion, Town will begin process of selecting a high priority action and identify fund- ing opportunities.	2025- 2029	<\$100K	Dept. op. budget for staff coordi- nation (to secure funds only).	5
NA	36	During extreme temperature events, publicize the locations of cooling and warming centers .	EH, EC	N	PR	EM	The EMS will work with multiple town depart- ments and local media to provide this informa- tion to the public.	2024- 2029	<\$100K	Dept. op. budget for staff coordina- tion.	6
NA	37	Conduct critical facility assessments for resilience to earthquakes	EQ	N	PR, PP	Е, В	As funding and staffing becomes available, the Town will prioritize sites to assess.	2024- 2029	\$100K- \$500K	Dept. oper. budget for staff coordi- nation (to secure funds only).	4
NA	38	Evaluate opportunities for vegetation management on municipally owned land and specific private properties (water company lands, conserved lands) to reduce vulnerability to wildfires. Includes phragmites removal in coastal areas.	WF	N	NSP, PR	С	As funding and staffing becomes available, the Town will integrate these practices into departmental operations.	2024- 2029	<\$100K	Dept. oper. budget for staff coordi- nation (to secure funds only).	5

**1, 6-9: Priorities** \*CF=Carried Forward N=New \*\*S-E Score=STAPLE+E, see Appendix G

VI.7	.v.1 In	uplementation Matrix, Town of Stra			* * *	Addition d	uring public commen	t period			
	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
NA	39	Utilize Sustainable CT actions and best practices for landscaping practices to reduce water usage and the vulnerability of vegetation to drought.	DR	N	NSP, PR	С	As funding and staffing becomes available, the Town will distribute informational material to residents. MetroCOG hosts a Sustainable CT intern over the summer who can assist with this activity as well.	2024- 2029	<\$100K	Dept. oper. budget for staff coordina- tion	8
NA	40	Evaluate use of microgrids and utility protection/ hardening for resilience to severe storms and winter storms.	HTS, WS, SST	N	ST	EM	As funding and staffing becomes available, the Town will prioritize sites for future resilience improvements.	2024- 2029	>\$1 Million	Dept. oper. budget for staff coordi- nation (to secure funds only).	8
NA	41	Conduct a drainage study of Washington Parkway in the vicinity of West Hillside Avenue to identify options for reducing road and property flooding and minimize disruptions to daily life of nearby residents. * * *	CF, SLR, WS, SST, HTS	N	PP	E, PW	The Town will retain a consultant to conduct this study. Grade changes, impacts of nearby development, tide flaps on drainage systems, stormwater system configuration, stormwater system condition, and potential blockages should all be included in the study.	2024- 2025	\$150K	Capital improve- ment funds	10
NA	42	Upgrade drainage systems as identified in the study of Washington Parkway in the vicinity of West Hillside Avenue * * *	CF, SLR, WS, SST, HTS	N	ST	E, PW	The Town will utilize the recommendations of the study in #41 to determine the scope of system upgrades.	2025- 2027	\$1 Million	Capital improve- ment funds	6
NA	43	Conduct drainage studies in other areas as needed, including other parts of Lordship***	CF, SLR, WS, SST, HTS	N	PP	E, PW	The Town will retain a consultant to conduct this study. The study in #41 will inform the scope of work for future studies.	2025- 2026	\$150K	Capital improve- ment funds	10

### VI.7.vi TRUMBULL

As a CRS community, Trumbull has prioritized communication with repetitive loss property owners and reducing flood risk. Town staff are working to floodproof three additional sewer pumping stations over the 2024-2029 planning period.

The Town of Trumbull continues to provide reliable information, notifications, and warnings to residents through a reverse 911 system and regular website updates. Special outreach to at risk populations, such as those in group homes or convalescence homes, is coordinated with social services to ensure all residents are adequately prepared. The Town will expand this outreach as additional opportunities to reach at-risk populations are identified and ensure work with social services is coordinated.

The long-term needs for power continuity and generator upgrades continue to be assessed to ensure adequate sheltering services. Improvements to communication and coordination with Region 1, local utility crews, and the EMS Department continue. In the 2024-2029 planning period, the Town will explore the potential for solar pow-

HAZARI	HAZARD ABBREVIATIONS								
Code	Hazard								
ALL	All Hazards								
CF	Coastal Flooding								
DF	Dam Failure								
DR	Drought								
EQ	Earthquake								
EC	Extreme Cold								
EH	Extreme Heat								
HTS	Hurricanes & Tropical Storms								
IF	Inland Flooding								
SLR	Sea Level Rise								
SST	Summer Storms & Tornadoes								
WF	Wildfires								
WS	Winter Storms								

er on town owned buildings and schools as an potential alternative energy source. Actions are listed in Table VI.7.vi.1. Abbreviations are listed above right.

DEPARTMENT ABBREVIATIONS						
Code	Department					
BOE	Board of Education					
DPW	Department of Public Works					
ENG	Engineering					
IWWC	Inland Wetlands & Water- courses Commission					
OEM	Office of Emergency Management					
PZ	Planning & Zoning					

MITIGATION ABBREVIATIONS					
Code	Mitigation Type				
EA	Education & Awareness				
ES	Emergency Services				
NSP	Natural Systems Protection				
PP	Property Protection				
PR	Prevention				
ST	Structural/Infrastructure				

VI.7	VI.7.vi.1 Implementation Matrix, Town of Trumbull										
2019	Ds 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
5	1	Annually send a letter to property owners in RL areas to inform them of options for elevating or acquiring structures to reduce flood risk and coordinate with DEEP to complete a formal validation of the RL list and update the mitigation status of each listed property.	IF	CF	PP	DPW	Conduct in connection with CRS participation, and work with DEEP	2024- 2029	<\$100K	PW Operating budget; staff to coordinate.	18
7	2	Floodproof remaining sewer pumping stations in accordance with master plan, as designs are completed.	IF	CF	PP	DPW	Conduct in connection with CRS participation, and work with DEEP	2024- 2029	<\$100K	PW Operating budget; staff to coordinate.	15

VI.7	VI.7.vi.1 Implementation Matrix, Town of Trumbull										
2019	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
12		Allocate funds and retain consultant to review dam safety files and EAPs for dams in Trumbull; and determine which dams may have the ability to be modified for flood mitigation capabilities.	DF	CF	ST	ENG	The Town intends to secure funds and retain consultant services for this study.	2024- 2029	<\$100K	Dept. Operating budget; existing staff to coordinate.	17
15		Expand outreach to residents on the importance of wetlands and drainage swales for risk reduction from flooding. Look to increase the protection of additional floodplains.	IF	CF	EA, PR	DPW, IWWC	Conduct in connection with CRS participation and ensure appropriate parties are engaged.	2024- 2029	<\$100K	Dept. Operating budgets; existing staff to coordinate.	21
18		Improve access to and availability of information on services during an emergency for all Trumbull residents.	ALL	CF	PR, ES, EA	OEM	Conduct in connection with CRS participation and ensure all residents are engaged.	2024- 2029	<\$100K	Dept. Operating budget; existing staff to coordinate.	17
1,2,13	6	Ensure Green Infrastructure is explored to the fullest extend and incorporated whenever possible on town projects.	IF	CF	PR, NSP	DPW, PZ	Town encourages LID during development reviews but does not have a policy in place or locations identified for additional GI, nor are regulations in place. A feasibility study will help understand effective GI installations. Town will review findings and recommendations of the rural LID guidance on CIRCA website Potential regulations can be taken from guidance.	2024- 2029	<\$100K	Grant funding from Section 319, CIRCA, or other sources.	3
3	7	Provide 100 year flood plain locations on the GIS website for residents.	IF, DF	CF	EA	DPW	Conduct in connection with CRS participation. The town will collaborate with MetroCOG, as needed.	2024- 2029	<\$100K	coordinate.	12

1-5 = Priorities

\*CF=Carried Forward N=New

\*\*S-E Score=STAPLE+E, see Appendix G

VI.7	VI.7.vi.1 Implementation Matrix, Town of Trumbull										
	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
9, 10, 11	8	Determine if flood plain enhancement is possible at the Pequannock river and allocate funds for potential culvert, bridge replacement and design for conveyance.	IF	CF	ST	ENG	May be possible to complete internally without outside service, to be determined by amount of funding available and the amount needed to be secured. Depending on the outcome, the town may need to retain a consultant.	2024- 2029	<\$100K	PW Operating budget; existing staff to coordinate (action is mainly to secure funding).	1
14	9	Improve tree management through outreach and public education.	WS, HTS, SST	CF	EA, PR	DPW, PZ	Conduct in connection with CRS participation and ensure appropriate parties are engaged.	2024- 2029	<\$100K	Operating budget; existing staff to coordinate.	10
16,17	10	Improve access and outreach effort regarding preparing for disasters to all Trumbull residents, as needed.	ALL	CF	EA, PR	OEM	Conduct in connection with CRS participation and coordinate with social services.	2024- 2029	<\$100K	OEM Operating budget; existing staff to coordinate.	4
19	11	Evaluate the need for emergency access into and from the Trumbull Corporate Park and the Westfield/Trumbull Shopping Mall internally and with additional coordination from DEMHS.	ALL	CF	ES	OEM	OEM to conduct	2024- 2029	<\$100k	OEM Operating budget; existing staff to coordinate.	3
20	12	Conduct annual outreach to local small businesses to prevent the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.	IF, HTS, SST	CF	ES	OEM	Coordinate directly with CT DEEP on this state-wide initiative.	2024- 2029	<\$100k	OEM Operating budget; existing staff to coordinate.	4
23	13	Take steps in summer 2024 to become certified in the Sustainable CT program, focusing on actions that achieve hazard mitigation benefits.	ALL	CF	PR	OEM	Existing coordinator to work on this.	2024- 2029	<\$100k	OEM Operating budget; existing staff to coordinate.	1
NA	14	Explore the potential for solar power on town owned buildings as an alternative energy source by coordinating internally and obtaining information about potential funding sources	ALL	NA	PR, NSP	DPW, BOE	Coordinate with the BOE for school roofs and use existing DPW staff to coordinate	2024- 2029	>\$500k	BOE+ PW operating budget	11

1-5 = Priorities

\*CF=Carried Forward N=New

\*\*S-E Score=STAPLE+E, see Appendix G

VI.7	VI.7.vi.1 Implementation Matrix, Town of Trumbull										
	Os 2024	Action	Hazard Type	New?*	Mit. Type	Dept	Implementation Process	Time	Cost	Funding	S-E** Score
NA	15	During extreme temperature events, publicize the locations of cooling and warming centers .	EC, EH	NA	PR	OEM	OEM to work with departments/local media to publicize information.	2025- 2029	<\$100K	Dept. oper. budget; staff to coordinate	6
NA	16	Conduct critical facility assessments for resilience to earthquakes, including class B & C dams	EQ	NA	PR, PP	DPW	As funding/staffing becomes available, will prioritize sites.	2025- 2029	\$100- 500k	Dept. oper. budget; staff to coordinate (to identify \$ only).	4
NA	17	Evaluate opportunities for vegetation management on municipally owned land, limited access highways, and specific private properties (water company lands, conserved lands) to reduce vulnerability to wildfires.	WF	NA	NSP, PR	DPW	As funding and staffing becomes available, the Town will integrate these practices into departmental operations.	2024- 2029	<\$100K	Dept. oper. budget; staff to coordinate (to identify \$ only).	5
NA	18	Utilize Sustainable CT actions and best practices for landscaping practices to reduce water usage and the vulnerability of vegetation to drought.	DR	NA	NSP, PR	DPW	As funding and staffing becomes available, City will distribute material to residents. MetroCOG hosts a Sustainable CT intern over the summer who can assist with activity.	2024- 2029	<\$100K	Dept. oper. budget; staff to coordinate	8
NA	19	Evaluate use of microgrids and utility protection/ hardening for resilience to severe storms and winter storms.	HTS, WS, SST	NA	ST	DPW	As funding and staffing becomes available, City will prioritize sites for future improvements.	2024- 2029	>\$1 million	Dept. oper. budget; staff to coordinate (to identify \$ only).	8

**1-5 = Priorities**\*CF=Carried Forward N=New
\*\*S-E Score=STAPLE+E, see Appendix G

# VI.8 Technical & Financial Resources

A variety of resources are available that could potentially assist with technical and/or financial support to implement local mitigation actions. Table VI.8.1 lists federal funding resources that communities can utilize to implement the plan.

The full range of federal and state funds available are detailed in Appendix F, as well as several volunteer/NGOs that may also provide support before, during, and after a natural hazard.

Chapter IV describes existing capabilities at the federal, state, regional, and local scales that can may also support implementation

These lists are not inclusive of all resources and should be updated periodically.

VI 9 1 Erpeny Funding so	and I was a supplication.
VI.8.1 FEDERAL FUNDING FO	
Name Federal Emergency Management	Description Agency (FEMA)
HMGP: Hazard Mitigation Grant	Grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration.
BRIC: Building Resilient Infrastructure & Communities	Funds for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event.
FMA: Flood Mitigation Assistance Program	Funds to assist states and communities to implement measures that reduce or eliminate the long-term risk of flood damage to structures insurable under the National Flood Insurance Program (NFIP).
PA: Public Assistance Grant Program	Grants that offer 75% of funding for mitigation projects to protect eligible damaged public and private nonprofit facilities from future damage.
IA: Individuals and Family Grant Program	Assistance to meet the basic needs of eligible individuals and households affected by a disaster.
EMPG: Emergency Management Performance Grants Program	Grants to provide for a system of emergency preparedness to protect life and property from hazards
Small Business Administration (S	SBA)
Disaster Loan	Requires a FEMA disaster declaration. Low-interest funds to install mitigation measures or to cover the cost of bringing a damaged property up to state or local code requirements.
<b>Environmental Protection Agenc</b>	y (EPA)
	Low interest loans to governments to repair, replace, or relocate wastewater treatment plants damaged in floods.
Clean Water Act Section 319 Grants	Cost-share grants to state agencies that can be used for funding watershed resource restoration activities, including wetlands and other aquatic habitats. Administered by CTDEEP.

VI.8.1 Federal Funding for Implementation							
Name	Description						
Department of Housing and Urban Development (HUD)							
CDBG: Community Development Block Grants	Eligible to communities with populations greater than 50,000. One objective is to improve housing conditions for low and moderate income families - projects can include acquiring flood prone homes or protecting them from flood damage. 100% grant which can be used as the local match for other federal funding programs. Administered by the CT DECD.						
Army Corps of Engineers (ACOE)							
Section 205: Small Flood Damage Reduction Projects	Study, design, and construction of small flood control projects. Feasibility studies are 100% federally funded up to \$100,000. Costs for the preparation of plans and construction are funded 65% with a maximum federal expenditure of \$7 million.						
Section 14: Emergency Streambank & Shoreline Protection	Construction of emergency shoreline and streambank protection works to protect public facilities and non-profit public facilities. Maximum federal expenditure is \$1.5 million.						
Section 103 – Hurricane and Storm Damage Reduction Projects	Study, design, and construction of small coastal storm damage reduction projects. Cost sharing is in line with Section 205. Maximum federal expenditure is \$5 million.						
Section 208 – Clearing and Snagging Projects:	Channel clearing and excavation with limited embankment construction to reduce nuisance flood damages caused by debris and minor shoaling. Cost sharing is in line with Section 205. Maximum federal expenditure is \$500,000.						
Section 206 – Floodplain Management Services	Full range of technical services and planning guidance to support effective floodplain management. When funding is available, this work is 100% federally funded.						
Fish & Wildlife Service							
North American Wetlands Conservation Act Grants Program	Matching grants to organizations and individuals who have developed partnerships to carry out wetlands project that focus on protecting, restoring, and/or enhancing critical habitats.						
U.S. Department of Agriculture (U	USDA)						
	Financial assistance is available under the Emergency Watershed Protection Program, the Cooperative River Basin Program, and the Small Watershed Protection Program.						

# VII PLAN APPROVAL

## 7.1 Resolutions



City of Bridgeport, Connecticut

## OFFICE OF THE CITY CLERK

LEGISLATIVE DEPARTMENT

45 Lyon Terrace • Bridgeport, Connecticut 06604 • Telephone (203) 576-7081 • Fax (203) 332-5608

LYDIA N. MARTINEZ City Clerk FRANCES ORTIZ Assistant City Clerk

November 15, 2024

Chadwick Schroeder, Sustainability Manager Public Facilities Department City of Bridgeport, Connecticut 06604

Dear Mr. Schroeder:

The City Council of the City of Bridgeport on November 4, 2024 adopted the following resolution #148-23:

# CITY OF BRIDGEPORT CITY COUNCIL A RESOLUTION ADOPTING THE NATURAL HAZARD MITIGATION PLAN UPDATE, 2024

WHEREAS, the City of Bridgeport has experienced severe damage from natural hazards and it continues to be vulnerable to the effects of those natural hazards profiled in the plan (e.g. floods, winter storms, tornadoes, hurricanes and tropical storms, sea level rise, earthquakes, dam failure, wildfires, extreme temperatures, and drought), resulting in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS, the Bridgeport City Council approved the previous version of the Plan in 2019; and

WHEREAS, the City of Bridgeport and Connecticut Metropolitan Council of Governments developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for the Natural Hazard Mitigation Plan Update, 2024 under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held and public input was sought in 2023 and 2024 regarding the development and review of the Natural Hazard Mitigation Plan Update, 2024; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedure for the City of Bridgeport; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the City of Bridgeport, with the effect of protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the City of Bridgeport eligible for funding to alleviate the impacts of future hazards; now therefore be it

#### **RESOLVED** by the City Council:

- 1. The Plan is hereby adopted as an official plan of the City of Bridgeport;
- 2. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;
- 3. Future revisions and Plan maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as a part of this resolution for a period of five (5) years from the date of this resolution.
- 4. An annual report on the progress of the implementation elements of the Plan shall be presented to the City Council.

Attest:

Frances Ortiz
Assistant City Clerk

FO: aw

Attachment: MetroCOG 2024 Natural Hazard Mitigation Plan Update (278 pages)

#### TOWN OF EASTON BOARD OF SELECTMEN

#### A RESOLUTION ADOPTING THE NATURAL HAZARD MITIGATION PLAN UPDATE, 2024

WHEREAS, the Town of Easton has experienced severe damage from natural hazards and it continues to be vulnerable to the effects of those natural hazards profiled in the plan (e.g. floods, winter storms, tornadoes, hurricanes and tropical storms, sea level rise, earthquakes, dam failure, wildfires, extreme temperatures, and drought), resulting in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS, the Easton Board of Selectmen approved the previous version of the Plan in 2019; and

WHEREAS, the Town of Easton and Connecticut Metropolitan Council of Governments developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for the Natural Hazard Mitigation Plan Update, 2024 under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held and public input was sought in 2023 and 2024 regarding the development and review of the Natural Hazard Mitigation Plan Update, 2024; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedure for the Town of Easton; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the Town of Easton, with the effect of protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the Town of Easton eligible for funding to alleviate the impacts of future hazards; now therefore be it

RESOLVED by the Board of Selectmen:

- 1. The Plan is hereby adopted as an official Natural Hazard Mitigation Plan of the Town of Easton;
- 2. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;
- 3. Future revisions and Plan maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as a part of this resolution for a period of five (5) years from the date of this resolution.

	part of this resolution for a period of five (3) years from the date of this resolution.
4.	An annual report on the progress of the implementation elements of the Plan shall be presented to
	the Board of Selectmen.
Ad	opted this 15 day of 12024 by the Board of Selectmen of Easton, Connecticut
	ll S
Firs	st Selectman U
	WITNESS WHEREOF, the undersigned has affixed his/heb signature and the corporate seal of the
Tov	wn of Easton this land day of August, 2024.
	Dotor Bard
Tov	vn Clerk



#### TOWN OF FAIRFIELD 611 OLD POST ROAD FAIRFIELD, CONNECTICUT 06824-6690 (203) 256-3090 bbrowne@fairfieldct.org

OFFICE OF THE TOWN CLERK

ELIZABETH P. BROWNE, MMC, MCTC TOWN CLERK RECEIVED
SEP 2 5 2024

TOWN PLAN & ZONING DEPT.

I, Elizabeth P. Browne, Town Clerk of the Town of Fairfield, a municipality organized and existing under the laws of the State of Connecticut, hereby certify that the following is a true copy of the resolution adopted at the Representative Town Meeting of said municipality at the Regular Meeting held on September 23, 2024:

"WHEREAS, the Town of Fairfield has experienced severe damage from natural hazards and it continues to be vulnerable to the effects of those natural hazards profiled in the plan (e.g. floods, winter storms, tornadoes, hurricanes and tropical storms, sea level rise, earthquakes, dam failure, wildfires, extreme temperatures, and drought), resulting in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS, the Fairfield Board of Selectmen approved the previous version of the Plan in 2019; and

WHEREAS, the Town of Fairfield and Connecticut Metropolitan Council of Governments developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for the Natural Hazard Mitigation Plan Update, 2024 under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held and public input was sought in 2023 and 2024 regarding the development and review of the Natural Hazard Mitigation Plan Update, 2024; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedure for the Town of Fairfield; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the Town of Fairfield, with the effect of protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the Town of Fairfield eligible for funding to alleviate the impacts of future hazards;

#### NOW, THEREFORE, BE IT RESOLVED that,

- 1. The Plan is hereby adopted as an official plan of the Town of Fairfield;
- 2. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;
- 3. Future revisions and Plan maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as a part of this resolution for a period of five (5) years from the date of this resolution.
- 4. An annual report on the progress of the implementation elements of the Plan shall be presented to the Board of Selectmen as part of the Community Rating System review."

AND I DO FURTHER CERTIFY that the above resolution has in no way been altered, amended or revoked, and is in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the Seal of the Town of Fairfield this 24<sup>th</sup> day of September, 2024.

Elizabeth P. Browne

Town Clerk

Town of Fairfield, Connecticut

#### TOWN OF MONROE TOWN COUNCIL

#### A RESOLUTION ADOPTING THE NATURAL HAZARD MITIGATION PLAN UPDATE, 2024

WHEREAS, the Town of Monroe has experienced severe damage from natural hazards and it continues to be vulnerable to the effects of those natural hazards profiled in the plan (e.g. floods, winter storms, tornadoes, hurricanes and tropical storms, sea level rise, earthquakes, dam failure, wildfires, extreme temperatures, and drought), resulting in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS, the Monroe Town Council approved the previous version of the Plan in 2019; and

WHEREAS, the Town of Monroe and Connecticut Metropolitan Council of Governments developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for the Natural Hazard Mitigation Plan Update, 2024 under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held and public input was sought in 2023 and 2024 regarding the development and review of the Natural Hazard Mitigation Plan Update, 2024; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedure for the Town of Monroe; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the Town of Monroe, with the effect of protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the Town of Monroe eligible for funding to alleviate the impacts of future hazards; now therefore be it

#### RESOLVED by the Town Council:

- 1. The Plan is hereby adopted as an official plan of the Town of Monroe;
- 2. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;
- 3. Future revisions and Plan maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as a part of this resolution for a period of five (5) years from the date of this resolution.
- 4. An annual report on the progress of the implementation elements of the Plan shall be presented to the Town

Council.		
Adopted this 9th	day of September 2024 by the Town Council of Monroe, Conn	ecticut
Jane T-	216	
First Selectman		
	OF, the undersigned has affixed his/her signature and the corp	oorate seal of the Town of Monroe thig
Town Clerk	and Degeolge, USA+	s
	(1) m (1) g	4

Page **2** of **2** 



Stratford Town Hall, 2725 Main Street, Stratford, CT 06615 Phone: 203-385-4020 • Fax: 203-385-4005 www.townofstratford.com



### CERTIFIED RESOLUTION AND CERTIFICATE OF INCUMBENCY

State of Connecticut
County of Fairfield ss. Stratford

Town of Stratford Office of the Town Clerk

"RESOLUTION ADOPTING THE NATURAL HAZARD MITIGATION PLAN UPDATE, 2024"

I, <u>Susan M. Pawluk</u>, Town Clerk of the Town of Stratford, DO HEREBY certify that the attached is a true and correct copy of the Resolution passed at a Regular Meeting of the Stratford Town Council duly held and convened on **October 15, 2024** at which meeting a duly constituted quorum of the members were present and acting throughout and that such document has not been modified, rescinded or revoked and is at present in full force and effect.

FURTHER, under the provisions of "Connecticut State Statutes" §7-16a and the "Stratford Town Charter" § 5.7.1, I, Susan M. Pawluk, Town Clerk of the Town of Stratford, a municipal corporation of the State of Connecticut, do hereby certify that Laura R. Hoydick, is the current Mayor of said municipality, having been duly elected on November 2, 2021, in accordance with § 1.1. of the Town Charter.

**IN WITNESS WHEREOF**, the undersigned has affixed her signature and the corporate seal of the Town of Stratford this **22**<sup>nd</sup> **day of October 2024**.

Attest:

Susan M. Pawluk, MCTC, CMC

Town Clerk



## CERTIFIED RESOLUTION AND CERTIFICATE OF INCUMBENCY

State of Connecticut
County of Fairfield ss. Stratford

Town of Stratford
Office of the Town Clerk

"RESOLUTION ADOPTING THE TOWN OF STRATFORD REPETITIVE LOSS AREA ANALYSIS, 2025.

I, <u>Susan M. Pawluk</u>, Town Clerk of the Town of Stratford, DO HEREBY certify that the attached is a true and correct copy of the Resolution passed at a Regular Meeting of the Stratford Town Council duly held and convened on **July 14**, **2025**, at which meeting a duly constituted quorum of the members were present and acting throughout and that such document has not been modified, rescinded or revoked and is at present in full force and effect.

FURTHER, under the provisions of "Connecticut State Statutes" §7-16a and the "Stratford Town Charter" § 5.7.1, I, Susan M. Pawluk, Town Clerk of the Town of Stratford, a municipal corporation of the State of Connecticut, do hereby certify that Laura R. Hoydick, is the current Mayor of said municipality, having been duly elected on November 2, 2021, in accordance with § 1.1. of the Town Charter.

IN WITNESS WHEREOF, the undersigned has affixed her signature and the corporate seal of the Town of Stratford this 6<sup>th</sup> day of August, 2025.

Attest:

Susan M. Pawluk, MCTC, CMC

Town Clerk

#### TOWN OF TRUMBULL TOWN COUNCIL

#### A RESOLUTION ADOPTING THE NATURAL HAZARD MITIGATION PLAN UPDATE, 2024

WHEREAS, the Town of Trumbull has experienced severe damage from natural hazards and it continues to be vulnerable to the effects of those natural hazards profiled in the plan (e.g. floods, winter storms, tornadoes, hurricanes and tropical storms, sea level rise, earthquakes, dam failure, wildfires, extreme temperatures, and drought), resulting in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS, the Trumbull Town Council approved the previous version of the Plan in 2019; and

WHEREAS, the Town of Trumbull and Connecticut Metropolitan Council of Governments developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for the Natural Hazard Mitigation Plan Update, 2024 under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held and public input was sought in 2023 and 2024 regarding the development and review of the Natural Hazard Mitigation Plan Update, 2024; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedure for the Town of Trumbull; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the Town of Trumbull, with the effect of protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the Town of Trumbull eligible for funding to alleviate the impacts of future hazards; now therefore be it

#### RESOLVED by the Town Council:

- 1. The Plan is hereby adopted as an official plan of the Town of Trumbull;
- 2. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;
- 3. Future revisions and Plan maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as a part of this resolution for a period of five (5) years from the date of this resolution.
- 4. An annual report on the progress of the implementation elements of the Plan shall be presented to the Town Council, alongside requirements as part of the Community Rating System.

First Selectman		
	REOF, the undersigned has affixed his/her signatulation this day of, 2024.	ure and the corporate seal of th

5402

5402

RESOLUTION TC30-78: BE IT RESOLVED, WHEREAS, The Town of Trumbull has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its Hazard Mitigation Plan Update, 2024 under the requirements of 44 CFR 201.6; and WHEREAS, adoption of this Plan Update will make the Town of Trumbull eligible for funding to alleviate the impacts of future hazards. (Full Resolution Attached)

Introduced by	Marsh
Council	09-05-24
Referred to Selectman	09-06-24
Published	09-10-24
Posted on Website	09-10-24
Effective	09-10-24 (Emergency Legislation)

Certified by Clerk

Approved

Date

I hereby certify that this is a true copy of the

ATTEST

# 7.2 FEMA Approval Letters

U.S. Department of Homeland Security FEMA Region 1 220 Binney Street Cambridge, MA 02142



August 22, 2024

Ken Dumais, State Hazard Mitigation Officer Connecticut Division of Emergency Management & Homeland Security Hazard Mitigation and Resiliency 1111 Country Club Road Middletown, Connecticut 06457

Dear Ken Dumais:

The U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA) Region 1 Mitigation Division has approved the *METROCOG Connecticut Metropolitan Council of Governments 2024 Natural Hazard Mitigation Plan Update* effective **August 21, 2024** through **August 20, 2029** in accordance with the planning requirements of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended; the National Flood Insurance Act of 1968, as amended; the National Dam Safety Program Act, as amended; and Title 44 Code of Federal Regulations (CFR) Part 201.

This plan approval includes the following participating jurisdictions that provided copies of their resolutions adopting the plan. Newly approved jurisdictions are highlighted in **bold**.

#### • Town of Easton

With this plan approval, the communities listed above are eligible to apply to the Connecticut Division of Emergency Management & Homeland Security for mitigation grants administered by FEMA. Requests for funding will be evaluated according to the eligibility requirements identified for each of these programs. A specific mitigation activity or project identified in the community's plan may not meet the eligibility requirements for FEMA funding; even eligible mitigation activities or projects are not automatically approved.

The plan must be updated and resubmitted to the FEMA Region 1 Mitigation Division for approval every five years in order to remain eligible for FEMA mitigation grant funding.

Ken Dumais Page 2

Thank you for your continued commitment and dedication to risk reduction demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please contact Nan Johnson at (617) 378-8024 or <a href="mailto:nan.johnson@fema.dhs.gov">nan.johnson@fema.dhs.gov</a>.

Sincerely,

CHRISTOPHER J MARKESICH Digitally signed by CHRISTOPHER J MARKESICH Date: 2024.08.23 06:30:37 -04'00'

Christopher Markesich Floodplain Management and Insurance Acting Branch Chief Mitigation Division | DHS, FEMA Region 1

Meghan A. Sloan, Planning Director, CT Metropolitan Council of Governments cc: Dean Savramis, Mitigation Division Director, DHS, FEMA Region 1 Marie-Annette (Nan) Johnson, Senior Community Planner, DHS, FEMA Region 1

U.S. Department of Homeland Security FEMA Region 1 220 Binney Street Cambridge, MA 02142



October 17, 2024

Ken Dumais, State Hazard Mitigation Officer Connecticut Division of Emergency Management & Homeland Security Hazard Mitigation and Resiliency 1111 Country Club Road Middletown, Connecticut 06457

#### Dear Ken Dumais:

The U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA) Region 1 Mitigation Division has approved the *METROCOG Connecticut Metropolitan Council of Governments 2024 Natural Hazard Mitigation Plan Update* effective **August 21, 2024** through **August 20, 2029** in accordance with the planning requirements of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended; the National Flood Insurance Act of 1968, as amended; the National Dam Safety Program Act, as amended; and Title 44 Code of Federal Regulations (CFR) Part 201.

This plan approval includes the following participating jurisdictions that provided copies of their resolutions adopting the plan. Newly approved jurisdictions are highlighted in **bold**.

• Town of Easton

- Town of Monroe
- Town of Fairfield
- Town of Trumbull

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The plan must be updated and resubmitted to the FEMA Region 1 Mitigation Division for approval every five years in order to remain eligible for FEMA mitigation grant funding.

Ken Dumais Page 2

Thank you for your continued commitment and dedication to risk reduction demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please contact Nan Johnson at (617) 378-8024 or nan.johnson@fema.dhs.gov.

Sincerely,

CHRISTOPHER J MARKESICH Digitally signed by CHRISTOPHER J MARKESICH Date: 2024.10.18 18:02:29 -04'00'

Christopher Markesich Floodplain Management and Insurance Branch Chief Mitigation Division | DHS, FEMA Region 1

Meghan A. Sloan, Planning Director, CT Metropolitan Council of Governments cc: Dean Savramis, Mitigation Division Director, DHS, FEMA Region 1 Marie-Annette (Nan) Johnson, Senior Community Planner, DHS, FEMA Region 1

U.S. Department of Homeland Security FEMA Region 1 220 Binney Street Cambridge, MA 02142



November 20, 2024

Ken Dumais, State Hazard Mitigation Officer Connecticut Division of Emergency Management & Homeland Security Hazard Mitigation and Resiliency 1111 Country Club Road Middletown, Connecticut 06457

#### Dear Ken Dumais:

The U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA) Region 1 Mitigation Division has approved the *METROCOG Connecticut Metropolitan Council of Governments 2024 Natural Hazard Mitigation Plan Update* effective **August 21, 2024** through **August 20, 2029** in accordance with the planning requirements of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended; the National Flood Insurance Act of 1968, as amended; the National Dam Safety Program Act, as amended; and Title 44 Code of Federal Regulations (CFR) Part 201.

This plan approval includes the following participating jurisdictions that provided copies of their resolutions adopting the plan. Newly approved jurisdictions are highlighted in **bold**.

- City of Bridgeport
- Town of Easton
- Town of Fairfield
- Town of Monroe
- Town of Stratford
- Town of Trumbull

With this plan approval, the communities listed above are eligible to apply to the Connecticut Division of Emergency Management & Homeland Security for mitigation grants administered by FEMA. Requests for funding will be evaluated according to the eligibility requirements identified for each of these programs. A specific mitigation activity or project identified in the community's plan may not meet the eligibility requirements for FEMA funding; even eligible mitigation activities or projects are not automatically approved.

The plan must be updated and resubmitted to the FEMA Region 1 Mitigation Division for approval every five years in order to remain eligible for FEMA mitigation grant funding.

Ken Dumais Page 2

Thank you for your continued commitment and dedication to risk reduction demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please contact Nan Johnson at (617) 378-8024 or nan.johnson@fema.dhs.gov.

Sincerely,

CHRISTOPHER J MARKESICH Digitally signed by CHRISTOPHER J MARKESICH Date: 2024.11.22 08:54:03 -05'00'

Christopher Markesich Floodplain Management and Insurance Branch Chief Mitigation Division | DHS, FEMA Region 1

Meghan A. Sloan, Planning Director, CT Metropolitan Council of Governments cc: Dean Savramis, Mitigation Division Director, DHS, FEMA Region 1 Marie-Annette (Nan) Johnson, Senior Community Planner, DHS, FEMA Region 1

# **ACKNOWEDGEMENTS**

# **Council of Governments**



City of Bridgeport: Mayor Joseph P. Ganim



Town of Easton:

First Selectman David Bindelglass

Secretary



Town of Fairfield:

First Selectman William A. Gerber



Town of Monroe:

First Selectman Terry Rooney



Town of Stratford:

Mayor Laura Hoydick

Vice Chair



Town of Trumbull:

First Selectman Vicki Tesoro

Chair

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